AUG 9 1979

DISTRIBUTION

| | |
|---|---|
| NRC PDR | J. Knight |
| Local PDR | R. Tedesco |
| Docket Files | R. DeYoung |
| LWR-4 File | V. Moore |
| D. Vassallo | W. Kreger |
| D. Ross | M. Ernst |
| S. Varga | R. Denise |
| F. J. Williams | R. Hartfield |
| L. Rubenstein | Attorney, ELD |
| C. Stahle | IE (3) |
| M. Service | |
| R. Mattson | bcc: NSIC |
| S. Hanauer | TIC |
| | ACRS (16) |

Docket Nos.: 50-390/391

Mr. H. G. Parris
Manager of Power
Tennessee Valley Authority
500A Chestnut Street Tower II
Chattanooga, Tennessee 37401

Dear Mr. Parris:

SUBJECT: REQUESTS FOR INFORMATION ON WATTS BAR

Enclosed are requests for information on mechanical engineering and the test program for Watts Bar.

Your responses by September 28, 1979, are requested in order to continue our reviews.

Sincerely,

Original signed by:
C. Stahle

L. S. Rubenstein, Acting Chief
Light Water Reactors Branch No. 4
Division of Project Management

Enclosure:
As stated

cc w/encl:
See next page

7908210040

Appl/Amt 3

| OFFICE | DPM:LWR#4 | DPM:LWR#4 | | | | |
|---|---|---|---|---|---|---|
| SURNAME | CStahle/jt | LRubenstein | | | | |
| DATE | 8/9 /79 | 8/9 /79 | | | | |

NRC FORM 318 (9-76) NRCM 0240 ★ U.S. GOVERNMENT PRINTING OFFICE: 1976 - 265 - 769

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

AUG 9 1979

Docket Nos.: 50-390/391

Mr. H. G. Parris
Manager of Power
Tennessee Valley Authority
500A Chestnut Street Tower II
Chattanooga, Tennessee 37401

Dear Mr. Parris:

SUBJECT: REQUESTS FOR INFORMATION ON WATTS BAR

Enclosed are requests for information on mechanical engineering and the test program for Watts Bar.

Your responses by September 28, 1979, are requested in order to continue our reviews.

Sincerely,

for L. S. Rubenstein, Acting Chief
Light Water Reactors Branch No. 4
Division of Project Management

Enclosure:
As stated

cc w/encl:
See next page

Tennessee Valley Authority

ccs:
Herbert S. Sanger, Jr. Esq.
General Counsel
Tennessee Valley Authority
400 Commerce Avenue
E11B33
Knoxville, Tennessee 37902

Mr. E. G. Beasley
Tennessee Valley Authority
400 Commerce Avenue
W10C131 C
Knoxville, Tennessee 37902

Mr. Michael Harding
Westinghouse Electric Corporation
P. O. Box 355
Pittsburgh, Pennsylvania 15230

Mr. David Lambert
Tennessee Valley Authority
400 Chestnut Street Tower II
Chattanooga, Tennessee 37401

Enclosure

WATTS BAR NUCLEAR PLANTS, UNIT NOS. 1 & 2

413.0 QUALITY ASSURANCE BRANCH

413.09 Your response to parts of questions 413.01 and 413.02 was that testing will not be conducted on systems that you do not consider to be within the scope of Appendix B to 10 CFR Part 50 and are not covered by Regulatory Guide 1.68, Revision 0. The staff has recognized the deficiency in Regulatory Guide 1.68, Rev. 0, in that it fails to reference Appendix A to 10 CFR Part 50 which also requires system testing. Therefore, systems to be tested are not necessarily restricted to those falling under Appendix B; this deficiency has been corrected in Revision 2 to the Regulatory Guide. The original question, 413.01, identified the criteria used by the staff to determine the systems to be tested. We recognize that the tests performed on these systems may be less rigorous than those performed on more critical systems, but assurance of the plant's ability to perform as described in the FSAR is dependent on a thorough test program. Therefore, it is the staff's position, in accordance with the provisions of Appendix A to 10 CFR Part 50 and Regulatory Guide 1.68, Rev. 2, that the pre-operational test program include testing of the systems identified in questions 413.01b, Parts (7), (8), (9), (10), (11), (12), (13), (14), (15), (16), (17), (20); and 413.02, Parts r and zz.

413.10 Several tests which have been designated preoperational tests are actually startup tests in accordance with the definitions in Regulatory Guide 1.68. Redesignate the following tests as Startup Tests:

W9.5 Operational Alignment of NIS
W9.4 Adjustment of Main Steam and Feedwater Instruments
W9.7 Adjustment of Reactor Controls
W8.5 Steam Dump
W9.6 Operational Alignment of Temperature Instruments
W8.1 Automatic Reactor Control
W8.2 Automatic Steam Generator Control
W9.11 Axial Flux Difference Instrumentation Calibration
W7.5 Reactor Plant Systems Setpoints

If portions of the tests are to be performed preoperationally, provide separate test descriptions for those portions of the tests.

413.11 Your responses to several parts of question 413.01 are inadequate. Modify the following test descriptions as indicated:

1. Part a, Item A.2.a. You have misinterpreted the recommended test. The test should include testing of the CVCS system's ability to blend concentrated boric acid for injection, verification of sampling paths and holdup or delay times in sample lines, verification of sampling procedures, and adequacy of heat tracing on concentrated boric acid systems. It should also verify injection and letdown flowpaths and flow rates.

2. Part a, Item A.3. As described in the FSAR, test W7.1 will not verify total channel response time. The response times

of hardware between the measured variable and the input to the sensors (i.e., snubbers, flow limiting devices, sensing lines, etc.) have not been accounted for in the test summary or acceptance criteria. Modify the test description to include response time between the measured variable and the sensor. (The delay times of instruments may be accounted for analytically.)

3. Part a, Item A.4.a. Although the test descriptions referenced in your reply do include expansion and restraint tests, they do not include operability tests of pumps, valves, controls, logics, isolations, and interlocks.

4. Part a, Item A.5.r. Expand test TVA-52 to include testing of alarm and recorder functions. Explain what the phrase "to ensure the assurance and operability" means.

5. Part a, Item A.6.b. Test descriptions TVA-13A, 13B, 13C, 15 and 16 require full load testing only of the emergency diesel generators and the 125VDC batteries. Modify these descriptions or provide additional test descriptions that address the testing of vital buses at rated load from preferred offsite supplies, 125VDC buses from the battery chargers, and the instrument and control buses from normal and alternate power supplies. Tests should include full load tests with normal operating loads, as well as with accident loads.

6. Part a, Item A.10.c. Test description W10.1 addresses the cask loading pit gate and transfer canal gate in the prerequisites. Describe the testing to determine operability and leak tightness of these sectionalizing devices.

7. Part a, Item A.12.c. Even though the sampling equipment is purchased as a unit, transportation and installation may have damaged some equipment or invalidated the manufacturer's calibration. Describe the preoperational testing to be conducted to demonstrate that the equipment can perform its function within the required accuracy.

8. Part b(4). Test W3.1 does not include provisions for testing the RWST temperature and level indication. Revise the test description to include this testing. Your response to the question on RWST heater testing is unacceptable. Meeting technical specification limits implies more than an economic necessity. Considering the history of failures of vents, reliefs, and isolation valves in concentrated boric acid systems due to precipitation of boric acid, the ability of the heaters to maintain RWST temperature should be tested.

9. Parts b(5) and (6). Expand test descriptions W6.1 and W6.2 to identify what load tests will be conducted on the bridge and crane.

10. Part b(18). Contrary to your response, the individual test descriptions for CVCS, SIS and auxiliaries, ERCW, and CCW do not contain tests of intersystem leakage. Revise these test abstracts, as necessary, or provide a new description for intersystem leakage detection testing.

413.12 Your responses to several parts of question 413.02 are inadequate. Modify the following test descriptions as indicated:

1. Part a. Describe how the operability of the pressurizer relief valves will be demonstrated. Provide acceptance criteria for pressurizer heaters, relief valves, spray valves, PORV's and steam generator atmospheric dumps. Ensure that the acceptance criteria include minimum and maximum flow rates for pressurizer code safeties and PORV's.

2. Part b. Provide acceptance criteria in W1.2 for the functional check of RCS components, pressurizer relief valve response time and operation, relief tank temperature, and the 240 hr. RCS full flow test.

3. Part c. No acceptance criteria have been provided in W1.3 as requested. Provide these acceptance criteria.

4. Part e. Clarify the prerequisites and test summary in W1.8 to identify the testing that will be done on the slowest measured control rod. Provide technical justification for the tests.

5. Part h. Modify acceptance criteria (5) of test W2.2 to specify what "proper liquid temperatures" are.

6. Part i. No acceptance criteria have been provided in W2.1 as requested. Provide these acceptance criteria.

7. Part j. Verify that test objective (5) of W3.1 will be demonstrated in accordance with your response to question 212.74. Modify the test objective as necessary to reflect this testing. In the test description for the cold leg accumulator instrumentation, identify the "applicable TVA documentation" which will serve as acceptance criteria. In the UHI test objective, clarify what is meant by the "performance evaluation." Provide acceptance criteria for the Recirculation Flow Test in W3.3. Additional information may be required as a result of evaluation of the responses to questions 212.86, 212.79, 212.16, 212.33, and 212.36. Staff review of the testing of ECCS systems will remain an open item until this evaluation is completed.

8. Part k. The response to this question is inadequate . Test description W7.1 does not contain the total response time testing indicated in the original question, and the acceptance criteria from the original test description have been deleted. Provide a description of testing consistent with the original question and complete acceptance criteria consistent with these tests.

9. Part m. Test description W7.3 is not an adequate response. Expand the test description to include response times and acceptance criteria for response times. Expand the acceptance criteria provided to specifically address the test objective and test summary.

10. Part w. This will remain an open item of review until the test description for W9.8 is provided.

11. Part y. Test description W10.9 states that acceptance criteria are provided in individual test sections. Modify the test description to include these acceptance criteria. Also, the response on measuring door opening forces is inadequate. Provide a test summary and acceptance criteria for this testing.

12. Part cc. It is the staff's position that the ventilation system tests described in TVA-4, 5, 6, and 7 should be conducted at hot operating conditions and extrapolated to design conditions. Test data should confirm the adequacy of the as built systems to maintain temperatures within design values. Revise the test descriptions to conform to this position. Provide acceptance criteria for the tests and specify what "applicable flow diagrams" are.

13. Part ee. It is the staff's position that equipment in spaces be operated to simulate worst case accident heat loads. Sufficient test data should be taken to extrapolate the heating or cooling capability of HVAC systems to worst-case accident conditions. Revise test descriptions TVA-9A, 9B, and 9C to reflect this position. Provide acceptance criteria for test TVA-9C. Define "applicable logic and flow diagrams," as used in TVA-9C.

14. Part ff. Revise the test description to include testing of filters and absorbers in accordance with Regulatory Guide 1.52 and to include leak tightness testing. Provide acceptance criteria for these tests.

15. Part ii. Revise test TVA-13C to conform to Regulatory Guide 1.108 as indicated in your reply to question 040.69. Expand the test description to identify the status of the plant's preferred electrical distribution systems during the test. Describe how manual transfer devices for loads supplied by two redundant divisions will be demonstrated.

16. Part mm. Contrary to your response, there is no test description for TVA-17. Provide this test description.

17. Part nn. In test TVA-18, Section (6), identify the "various FSAR sections" which contain the acceptance criteria or summarize the criteria in the test description.

18. Part oo. Test description TVA-20 fails to describe how system redundancy will be demonstrated as requested. Modify the description to include this testing.

19. Part pp. In test description TVA-22, verify that the turbine driven pump will be started from cold conditions, i.e., the pump and pump auxiliaries are at essentially ambient conditions and no system priming, preheating, or preparation which would not be done during normal operation has been done. Provide acceptance criteria for rated flow at various steam generator pressures and for successful operation in the recirc mode.

20. Part qq. Provide test acceptance criteria for each described test in TVA-25.

21. Part rr. Section 9.3.1.4 of your FSAR commits to a test of the compressed air system in accordance with Regulatory Guide 1.80. Expand test description TVA-27 to comply with that commitment. It is the staff's position that testing should be performed on service air, control air, and auxiliary control air to verify that the systems operate in accordance with design and that no unanticipated failure modes would result in a transient more severe than those considered in the accident analysis.

22. Part ss. Revise the acceptance criteria for TVA-28 to ensure that technical specification tolerances can be verified.

23. Part vv. Your response in test description TVA-38 is not acceptable. It is the staff's position that the feedwater and feedwater heating system be tested to verify that main feedwater flow, pump head, and heater operation is within the parameters described in the FSAR and assumed in the accident analysis. Expand the test description to include this testing. Also identify any testing that will be conducted to verify that the main feedwater check valve water hammer (described in your report persuant to 10 CFR §50.55(e) dated May 21, 1979) has been corrected.

24. Part ww. It is the staff's position that valve closure time testing should be done at hot conditions. Modify test description TVA-40 to reflect this position. Also, expand the test description and acceptance criteria to include the time response of instrument lines, sensors, etc. to ensure that the ten seconds from initiation of an accident to valve closure assumed in the accident analysis can be met.

25. Part aaa. Modify test descriptions TVA-21, CVCS, 31 Process Radiation Monitor, and 44A Liquid Waste Drains to provide acceptance criteria consistent with Reactor Coolant Pressure Boundary leak detection criteria.

26. Part o. In test description W9.1, describe the testing of control functions such as rod withdrawal inhibit features. Provide acceptance criteria for the tests.

27. Part r. It is the staff's position that rod deviation, rod insertion limits, and urgent failure alarms are necessary during operation to ensure core parameters remain within accident analysis assumptions. As such, they should be tested to ensure proper operation. Modify test description W5.4 to include this testing. Also, remove the reference to part-length rod banks.

28. Part t. Revise test description W8.2 to include acceptance criteria as requested.

29. Part z. Revise test abstract TVA-1 to include the acceptance criteria for response time and leak tightness as requested.

30. Part gg. It is the staff's position that all communications systems included in the station emergency plan be tested to ensure they can be heard at necessary stations during operating conditions. Testing should include backup AC, DC, or self-contained battery power supplies. Remove the test description of HEPA filter testing in test TVA-11A and replace it with the appropriate test description.

31. Part hh. Revise test descriptions TVA-12B and 12C to indicate that emergency loads will be demonstrated operable from offsite power sources to ensure control and protective circuitry functions properly. Revise the acceptance criteria for TVA-12A through 12D to reference appropriate FSAR design criteria.

32. Part jj. Modify test descriptions TVA 13A through C and 14A through E, as necessary, to comply with Regulatory Guide 1.108, position C2.

33. Parts kk and ll. As detailed in Regulatory Guide 1.68, one purpose of the preoperational test program is to verify that systems have been designed and constructed properly. The tests to ensure redundancy and correct load assignment fulfill part of this purpose. It is the staff's position that redundancy and load group assignments should be verified by these tests. Additionally, testing of DC loads at minimum battery terminal voltage assures valid design and procurement specifications were used and that installation was correct. It is the staff's position that DC loads should be tested at minimum battery voltage. Modify test description TVA-16 to reflect this position. Also, modify the test acceptance criteria to ensure that individual cell limits are not exceeded during the discharge test.

413.13 Several preoperational test descriptions reference manufacturers of suppliers' manuals, such as the Precautions, Limitations, and Setpoints for the Westinghouse NSSS, Westinghouse Safety Injection Accumulator Discharge Curve, SI pump vendor's manual, Magnetic

Control Rod Drive Mechanism Instruction Manual, Rod Position Indication System Technical Manual, and several others. Provide a commitment in your FSAR that all referenced manuals and documents will be made available for review by the IE inspector at least as early as the approved preoperational test procedure.

413.14 Several responses to parts of question 413.03 were unacceptable or incomplete. Modify the applicable test descriptions for the sections of Regulatory Guide 1.68 as follows:

a. C.1.h. Identify the various rod configurations to be tested.

b. D.1.g. This item will remain open for review until test descriptions W9.5 and 9.6 are supplied and reviewed.

c. D.1.j. Revise test description SU-6.3 to conform to Regulatory Guide 1.68.2, Revision 1. Specifically, the test must 1) be initiated by tripping the reactor from outside the control room; 2) be conducted by the minimum number of shift personnel authorized by the technical specifications; and 3) include cooldown of the plant from outside the control room as specified in the Regulatory Guide.

d. D.1.n. Expand test description SU-4.10 to include the testing to be conducted to ensure that instrumentation will detect a single dropped rod or a rod which deviates from its group position in excess of technical specification allowances. Revise the acceptance criteria to include the required degree of conformance between predicted parameters and observed test data.

e. D.1.r. The process computer will be used to verify conformance with technical specification requirements and to provide information on core parameters which may be required in accident or post accident responses. Therefore, the staff position is that these features of the process computer should be verified by testing under operating conditions.

413.15 Several responses to parts of question 413.04 were unacceptable or incomplete. Modify the applicable test descriptions as indicated below.

a. Part a. Provide quantitative acceptance criteria in SU-2.4 for source range monitors (i.e., signal to noise ratio, observed countrates). This item will remain open for review until test description W9.5 has been provided and reviewed.

b. Part c. Expand the acceptance criteria for SU-3.2 to include the required convergence between predicted values and actual critical rod position and boron concentration.

c. Part e. Specify in SU-3.8 which RCCA's and banks will be tested and how those to be tested will be chosen.

d. Part f. Expand SU-3.8 to clearly indicate that this test includes pseudo-rod ejection testing as indicated in SU-1.4, including flux mapping, core peaking factors, and rod worth determination, as specified in the original question. Describe how the most reactive RCCA will be determined.

e. Part h. Modify SU-3.5 and 3.8 to specify that shutdown margin will be verified as a test objective.

f. Part j. Expand SU-4.3 to clearly indicate that this test includes pseudo-rod ejection testing as indicated in SU-1.5, including flux mapping, core peaking factors, and rod worth determination. Describe how the most reactive RCCA will be chosen. Modify both SU-4.2 and 4.3 to identify the rod configurations to be tested.

g. Part l. This item will remain open for review until test description W9.5 has been provided and reviewed.

h. Part m. This item will remain open for review until test descriptions W9.5 and 9.6 have been provided and reviewed.

i. Part o. Expand the acceptance criteria in SU-4.7 to specify the maximum allowable over and under-shoot and the maximum time or cycles for control systems to stabilize.

j. Part p. Expand the acceptance criteria in SU-4.8 to specify the maximum allowable over and under-shoot and the maximum time or cycles for control systems to stabilize.

k. Part q. Modify the acceptance criteria in tests SU-4.9 a and b to include criteria for convergence between predicted and actual plant response. Provide acceptance criteria for the response of the plant's electrical systems. Your response to the original question indicates that the electrical system will not be lined up for normal operation when the test is initiated. It is the staff's position that all electrical systems be in their normal lineups when the test is initiated. Modify the test prerequisites to clearly reflect this position

413.16 Section 14.2.5.2, which was revised in response to question 413.08, still does not provide for review of startup test results from the 30% power plateau and no justification has been provided. Revise this section to include evaluation of test data taken at the 30% power plateau prior to proceeding to higher powers.

413.17 In test W10.7, Containment Sprays, verify that the air flow for nozzle testing will commence at a point in the lines behind the valves which block flow to the nozzles in the water flow test to ensure that there are no blockages in the lines to the nozzles.

413.18 Our review of recent licensee event reports disclosed that a significant number of reported events concerned the operability of hydraulic and mechanical snubbers. Provide a description of the inspections or tests that will be performed following system operation to assure yourself that the snubbers are operable. These inspections or tests should be performed preoperationally if system operation can be accomplished prior to generation of nuclear heat.

413.19 Recently, questions have arisen concerning the operability and dependability of certain ESF pumps in PWR's. Upon investigation, the staff found that some completed preoperational test procedures did not describe the test conditions in sufficient detail. Provide assurance that the preoperational test procedures for ECCS and containment cooling pumps will require recording the status of the pumped fluid (e.g., pressure, temperature, chemistry, amount of debris) and the duration of testing for each pump.

413.20 The personnel qualifications indicated in 14.2.2.4 of your FSAR are not adequate. Provide the minimum qualifications for personnel involved in the test program at the time they are assigned to the task. Your response should address all personnel performing the tasks indicated and should not be limited to TVA personnel. Note that ANSI N45.2.6, although applicable to some categories of personnel during the construction, preoperational, and startup phases, was not intended to cover personnel in the categories indicated below. Our position in this respect is that, in general, the minimum qualification requirements listed below are appropriate for typical organizations.

The minimum qualifications of individuals that direct or supervise the conduct of individual preoperational tests are (at the time that the individual is assigned to the task):

1. A bachelor's degree in engineering or the physical sciences or the equivalent and one year of applicable power plant experience. Included in the one year of experience should be at least three months of indoctrination/training in nuclear power plant systems and component operation of a nuclear power plant that is substantially similar in design to the type at which the individual will perform the function or,

2. A high school diploma or the equivalent and five years of power plant experience. Credit for up to two years of this five year experience may be given for related technical training on a one-for-one time basis. Included in the five years of experience should be at least three months of indoctrination/training in nuclear power plant systems and component operation of a nuclear power plant that is substantially similar in design to the type at which the individual will be employed.

Minimum qualifications of individuals that direct or supervise the conduct of individual startup tests are (at the time of assignment to the task):

1. A bachelor's degree in engineering or the physical sciences or the equivalent and two years of applicable power plant experience of which at least one year shall be applicable nuclear power plant experience or,

2. A high school diploma or the equivalent and six years of applicable power plant experience of which at least two years shall be applicable nuclear power plant experience. Credit for up to two years of non-nuclear experience may be given for related technical training on a one-for-one time basis.

Minimum qualifications of individuals assigned to groups responsible for review and approval of preoperational and startup test procedures and/or review and approval of test results are (at the time the activity is being performed.):

1. Eight years of applicable power plant experience with a minimum of two years of applicable nuclear power plant experience./

413.21 Identify any of the post-fuel loading tests described in Section 14.2 which are not essential towards the demonstration of conformance with design requirements for structures, systems, components, and design features that:

(1) Will be relied upon for safe shutdown and cooldown of the reactor under normal plant conditions and for maintaining the reactor in a safe condition for an extended shutdown period.

(2) Will be relied upon for safe shutdown and cooldown of the reactor under transient (infrequent or moderately frequent events) conditions and postulated accident conditions, and for maintaining the reactor in a safe condition for an extended shutdown period following such conditions.

(3) Will be relied upon for establishing conformance with safety limits or limiting conditions for operation that will be included in the facility technical specifications.

(4) Are classified as engineered safety features or will be relied upon to support or assure the operations of engineered safety features within design limits.

(5) Are assumed to function or for which credit is taken in the accident analysis for the facility (as described in the Final Safety Analysis Report).

(6) Will be utilized to process, store, control, or limit the release of radioactive materials.

112.0 MECHANICAL ENGINEERING BRANCH

112.37 (3.9) (5.2) With respect to the response to Q112.15 in the FSAR, verify that the stress limits which will be used for bolting material for components which are subjected to tensile loads associated with the faulted condition shall not exceed the smaller of 0.7 ultimate stress (Su) or 0.9 yield stress (Sy). For those bolts which may be subjected to a combination of tension and shear or shear alone resulting from the faulted condition, provide the criteria and allowable limits for their design. This question replaces Question 112.32.