



Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381

DEC 18 1995

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

In the Matter of) Docket Nos. 50-390
Tennessee Valley Authority) 50-391

WATTS BAR NUCLEAR PLANT (WBN) - NUREG-0737, ITEM II.F.2,
INSTRUMENTATION FOR DETECTION OF INADEQUATE CORE COOLING (ICC)
(TAC NOS. M77132 and M77133)

This letter provides TVA's response to the NRC's letter dated July 24, 1992, for WBN. This letter will also resolve NRC's open issue for final acceptance of the subject system as noted in Supplemental Safety Evaluation Report (SSER) 10, Section 4.4.8.

In TVA's letter dated January 24, 1992, TVA committed to complete final calibration and scaling of the ICC instrumentation before initial criticality. TVA can not complete the reactor vessel level instrumentation system (RVLIS) calibration and scaling until 100 percent power has been achieved. Data is continually collected during heatup of the reactor until escalation to 100 percent power at which time the final scaling coefficients are determined. This power ascension test summary is described in the Final Safety Analysis Report (FSAR), Table 14.2-2, Sheet 37. Therefore, final calibration and scaling of the ICC instrumentation will be completed following 100 percent power.

Enclosure 1 provides the responses to the July 24, 1992, letter.
Enclosure 2 provides the revised commitment as stated above.

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Should you have any questions concerning this matter, please telephone John Vorees at (423) 365-8819.

Sincerely,



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Enclosures

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ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN)
NUREG-0737, ITEM II.F.2
INSTRUMENTATION FOR DETECTION OF INADEQUATE CORE COOLING

The following provides TVA's response to NRC's request in a letter dated July 24, 1992, concerning NUREG-0737, Item II.F.2, Instrumentation for Detection of Inadequate Core Cooling (ICC). No response is provided for Questions 2 and 9 which are designated as "NRC." NRC has inspected the ICCM-86 system and documented that inspection in Inspection Report 50-390/95-74. That inspection closed the review of NUREG-0737, Item II.F.2 except for the final calibration of the system.

1. Submit final design description (applicant).

RESPONSE

The design of the ICC monitor 86 (ICCM-86) as described in TVA's letter dated January 24, 1992, has not been changed. The ICCM has three indicators, the reactor vessel level indication system (RVLIS), incore thermocouple (ICTC), and subcooling margin monitoring (SMM), that are monitored and displayed by a Westinghouse microprocessor based system. There are two independent fully qualified divisions (primary/backup). The non-qualified plant computer acts as an additional display device for ICTC and SMM in order to provide certain graphing, mapping, and alarm capability. Only the functions provided by the primary/backup fully qualified devices are necessary to meet operational requirements. The NRC's review and approval of this system was found to be acceptable in Supplemental Safety Evaluation Report (SSER) 10.

3. Inventory tracking systems (ITS) installation complete (applicant).

RESPONSE

The ITS for WBN is the RVLIS. The installation of the RVLIS is complete. The RVLIS capillary lines, high volume sensors, hydraulic isolators, strap-on resistance temperature detectors (RTDs), transmitters, and some cabling had been installed before TVA's January 24, 1992, revised response to the NRC. Other than the replacement of the processing and display electronics with ICCM-86, inversion of the head sensor bellows and replacement of the RVLIS transmitters, the RVLIS hardware remains as originally installed. The upgrades to the RVLIS and the setpoint and scaling documents for calibration have been completed.

4. ITS functional testing and calibration complete (applicant).

RESPONSE

Functional testing and preliminary calibration of the RVLIS is complete. Preoperational Test Instruction (PTI), "Inadequate

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Core Cooling Monitor - RVLIS," for Train A and Train B verified proper operation of the ICCM for RVLIS. This test was performed during hot functional testing (HFT). RVLIS satisfactorily met the acceptance criteria during performance of that test. Acceptance criteria included consistent indication between the two trains and comparison of static level RVLIS with a sight gage (tygon tubing). Static level RVLIS is considered fully operational based on the results of the testing. Dynamic level RVLIS is considered conditionally operational by virtue of consistent response between trains, the predicated outputs based on the inputs, and the generic coefficients that are most representative of WBN configuration.

Dynamic level RVLIS is fine tuned during power ascension testing. Westinghouse is involved in that testing and performs the final calibration scaling. TVA's letter dated January 24, 1992, committed to final calibration scaling of the ICCM prior to initial criticality. However, final adjustments may be made up to 100 percent power (Mode 1). The static dp factors, normalization curve coefficients, and the pump coast down time may require adjustment during Mode 4 and Mode 3. Following entry into Mode 2 (initial criticality), the uncompensated 100 percent power dynamic head may require adjustment up to 100 percent thermal power in Mode 1. This power ascension test is described in FSAR Table 14.2-2, Sheet 37. Therefore, final calibration and scaling of the ICCM will be completed at 100 percent power.

5. Prepare revisions to plant operating procedures and emergency procedures based on approved EOP guidelines (applicant).

RESPONSE

Plant operating and emergency procedures based on the ICCM, have been revised and issued. The WBN emergency procedures are based on approved EOP guidelines and those procedures were reviewed and approved by the NRC before WBN's receipt of the low power license.

6. Implementation letter report* to NRC (applicant).

*Contents

- Notification that the system installation, functional testing, and calibration is complete and test results are available for inspection.
- Summary of applicant's conclusions based on test results, e.g., (a) the system performs in accordance with design expectations and within design error tolerances, or (b) description of deviations from design performance specifications and basis for concluding that the deviations are acceptable.

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- Description of any deviations of the as-built system from previous design descriptions with any appropriate explanation.
- Develop or modify technical specifications.
- Confirm that the EOPs used for operator training will conform to the technical content of the NRC-approved guidelines (generic or plant-specific).

RESPONSE

This letter is considered to be the implementation letter report. The items listed in the enclosure of the NRC letter dated July 24, 1992, are addressed below.

- The ICCM-86 microprocessor installation of the RVLIS, ICTC, and SMM is complete. Functional testing and initial calibration have been completed for the ICCM. Certain thermocouples did not pass the hot functional testing (HFT)-1, and later post HFT megger tests determined that many thermocouples did not have adequate insulation resistance due to improper welds. These thermocouples were replaced and the system was retested during HFT-2 subsequently meeting the acceptance criteria. SMM is a microprocessor calculated value which requires no calibration beyond that required for the input.

The results of the testing are available onsite and have been reviewed by the NRC Region II before issuance of the low power operating license, with the exception of the performance of final scaling of dynamic head RVLIS during power ascension testing. Note that the uncompensated 100 percent power dynamic head factor will not be finalized until the reactor reaches 100 percent thermal power due to delta-T final scaling.

- As discussed above, the ICCM parameters performed within the design expectations. Static level RVLIS testing was run during heat up of the HFT-1 and had to be rerun during HFT-1 cooldown due to improper venting procedures. Several incore thermocouples had to be replaced and retested due to improper welds allowing moisture intrusion and degraded insulation resistance. Following test methodology corrections and defective parts replacement, the equipment responded within design basis requirements, with no deviations. Note that dynamic range RVLIS final scaling and performance verification will be done during power ascension testing.
- There are no deviations of the as-built system from the design description in TVA's letter dated January 24, 1992, concerning the subject NUREG item.
- The Watts Bar Technical Specifications have been developed and incorporated by the NRC into the Watts Bar Operating License No. NFP-20. RVLIS, ICTC core quadrant average temperatures,

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and SMM Limited Conditions of Operation are contained in Section 3.3.3, "Post Accident Monitoring (PAM) Instrumentation." RVLIS, ICTC, and SMM are Regulatory Guide 1.97 Category I variables.

- Watts Bar Emergency Operating Procedures used for operator training are written in accordance with Westinghouse Owner's Group Emergency Response Guidelines, which have been approved by the NRC.
7. Perform procedure walk-through to complete task analysis portion of ICC system design (applicant).

RESPONSE

The ICCM design for compliance with NUREG-0737, Item II.F.2 was integrated with requirements of Post Accident Monitoring (Regulatory Guide 1.97), Emergency Response Facilities (NUREG-0696), Control Room Design Review (NUREG-0700), and the Watts Bar Emergency Operating Procedures. In conjunction with the installation completion of the new processing and display electronics for ICCM, a human factors review including walk-through task analysis on the simulator was performed. This human factors review is retrievable in the TVA records identification management system (RIMS). There were no deficiencies found during the task analysis. There were seven identified Human Factor Engineering (HFE) deviations which were minor in nature. These HFES have been resolved.

8. Turn on system for operator training and familiarization (applicant).

RESPONSE

The ICCM has been functional since the preoperational testing performed in March 1994. The ICCM equipment in the WBN simulator was operable before preoperational testing for operator training and familiarization. The operators have been using the simulator equipment for training and have been using the main control board equipment for system operation and testing.

10. Implement modified operating procedures and emergency procedures (applicant).

RESPONSE

The Watts Bar Emergency Operating Procedures (EOPs) are implemented. Operators have been trained using the simulator. The NRC completed the EOP inspection before the WBN Unit 1 low power license was received. This inspection was documented in Inspection Report 50-390/95-58 and restated again in Inspection Report 50-390/95-74.

ENCLOSURE 2

WATTS BAR NUCLEAR PLANT (WBN)
NUREG-0737, ITEM II.F.2
INSTRUMENTATION FOR DETECTION OF INADEQUATE CORE COOLING
COMMITMENT LIST

The final calibration and scaling of the ICC instrumentation will be completed following 100 percent power.