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John H. Garrity
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JAN 24 1992

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

Gentlemen:

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

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2 - NUREG-0737, ITEM II.F.2 - INSTRUMENTATION FOR DETECTION OF INADEQUATE CORE COOLING (ICC) - PROPOSED LICENSE CONDITION 3 (TAC NUMBERS M77132 AND M77133)

This letter provides a revised response that supersedes TVA's previous responses concerning the subject NUREG item, with the exception of the Westinghouse Summary Report dated December 1980, "Westinghouse Reactor Vessel Level Instrumentation System (RVLIS) for Monitoring Inadequate Core Cooling." That report was submitted as an attachment to Item II.F.2 response in TVA's letter dated August 12, 1982. The Westinghouse summary report is still applicable to WBN for the described equipment, with the exception of the processing and display electronics that are being replaced by Westinghouse's Inadequate Core Cooling Monitor-86 (ICCM-86). The ICCM-86 and the WBN schedule for completion of the instrumentation for ICC are described in detail in Enclosure 1 of this letter.

Previous commitments for WBN Units 1 and 2 concerning the subject NUREG item are being superseded by this letter because a qualified ICC system is being installed. The Final Safety Analysis Report (FSAR) updates for the ICC System are located in Amendment 69. Enclosure 2 provides a list of the open commitments associated with this letter.

If you have any questions concerning this matter, please telephone John Vorees at (615) 365-8819.

Sincerely,

John H Garrity

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A002

Enclosures
cc: See Page 2

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50-390 WATTS BAR 1 TVA

Instrumentation for Detection of Inadequate Core Cooling-Proposed License Condition 3

Rec'd w/ltr dtd 1/24/92...9202030091

-NOTICE-

ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2
NUREG-0737, ITEM II.F.2
INSTRUMENTATION FOR DETECTION OF INADEQUATE CORE COOLING

1. INTRODUCTION

1.1 This revised response is required because WBN will install, before initial fuel loading of the respective units, a Westinghouse Inadequate Core Cooling Monitor-86 (ICCM-86) to perform processing and display of the three indicators important for detecting the approach to, existence of, and recovery from inadequate core cooling (ICC) conditions. The three parameters that indicate the approach to or existence of ICC as required by NUREG-0737, Item II.F.2, are subcooling margin, incore thermocouple (ICTC) temperature, and reactor vessel level (RVL). ICTC temperature and RVL are also important indications of the success of recovery actions.

1.2 The ICCM-86 that WBN is installing is similar to monitoring instrumentation that has been installed in many other Westinghouse nuclear steam supply system plants. For RVL, this system offers an enhanced man-machine interface over the Reactor Vessel Level Instrumentation System (RVLIS) display described in TVA's previous submittals. ICCM-86 for WBN differs from other installed Westinghouse ICCM systems in that RVL is fully compensated and analyzed by the microprocessor to display 0 - 100 percent level or 0 - 100 percent liquid without any operator interpretation. Complete functional requirements for ICC instrumentation are described in WBN design basis documents.

1.3 This response supersedes all previous WBN NUREG-0737, Item II.F.2 responses to NRC, with the exception of Attachment A in TVA's letter dated August 12, 1982 (Reference 8.2). The generic Westinghouse RVLIS System described therein has been accepted by NRC for tracking Reactor Coolant System (RCS) inventory in Generic Letter (GL) 82-28, with details of the NRC Staff's review reported in NUREG/CR 2627. That attachment is still applicable for the described equipment, except the processing and display electronics, which is being replaced by ICCM-86. These changes are described in detail in this submittal.

1.4 The Westinghouse ICCM and associated indicators and recorders will serve as the primary and backup display device for ICC parameter display. The ICCM is a fully qualified, redundant, Class 1E microprocessor based system, meeting the requirements of IEEE 344-1975, IEEE 323-1974, and the intent of Regulatory Guide (RG) 1.75, Revision 0, as described in the WBN Final Safety Analysis Report (FSAR). Therefore, the ICCM has a fully qualified primary and a fully qualified backup redundant display. ICTC temperatures, subcooling margin, and RVL are also RG 1.97, Category 1 variables. Compliance with RG 1.97 is discussed in TVA's letter dated August 31, 1990 (Reference 8.3).

1.5 The location of the ICCM displays and the format of the display pages were developed using human factor principles. The display screens available to the operator are detailed in Attachment B of this enclosure. The WBN operating staff was involved in the development of these features and in subsequent simulator evaluations. The ICCM design for compliance with NUREG-0737, Item II.F.2, was integrated with requirements of Post Accident Monitoring (RG 1.97), Emergency Response Facilities (NUREG-0696), Control Room Design Review (NUREG-0700), and the WBN emergency operating procedures.

1.6 Additional display devices available for ICTC monitoring and for subcooling margin monitoring (SMM) are printers and recorders driven by the Westinghouse P2500 computer. These devices provide hard copy printouts of thermocouple temperatures and long-term trend capability for thermocouple temperatures.

1.7 The sensors, local electronics, cabling, and primary and backup displays are fully qualified to Class 1E requirements up to and including the isolators to the additional display device driver (the Westinghouse P2500 computer), with two exceptions to separation requirements: (1) some sensor connections to the RCS are shared between two redundant divisions (See Paragraph 2.1.2) and (2) thermocouple cables do not maintain minimum separation between redundant divisions in the vicinity of the reactor vessel head (see Paragraph 3.1.2). Attachment A of this enclosure provides a listing of qualification documentation for the WBN ICC equipment.

1.8 WBN operating procedures are based on the latest revision of the Westinghouse Owner's Group (WOG) Emergency Response Guidelines (ERGs). Currently, the WOG-ERG revision in use is Revision 1A.

1.9 See Figure 1-1 for an ICCM system block diagram.

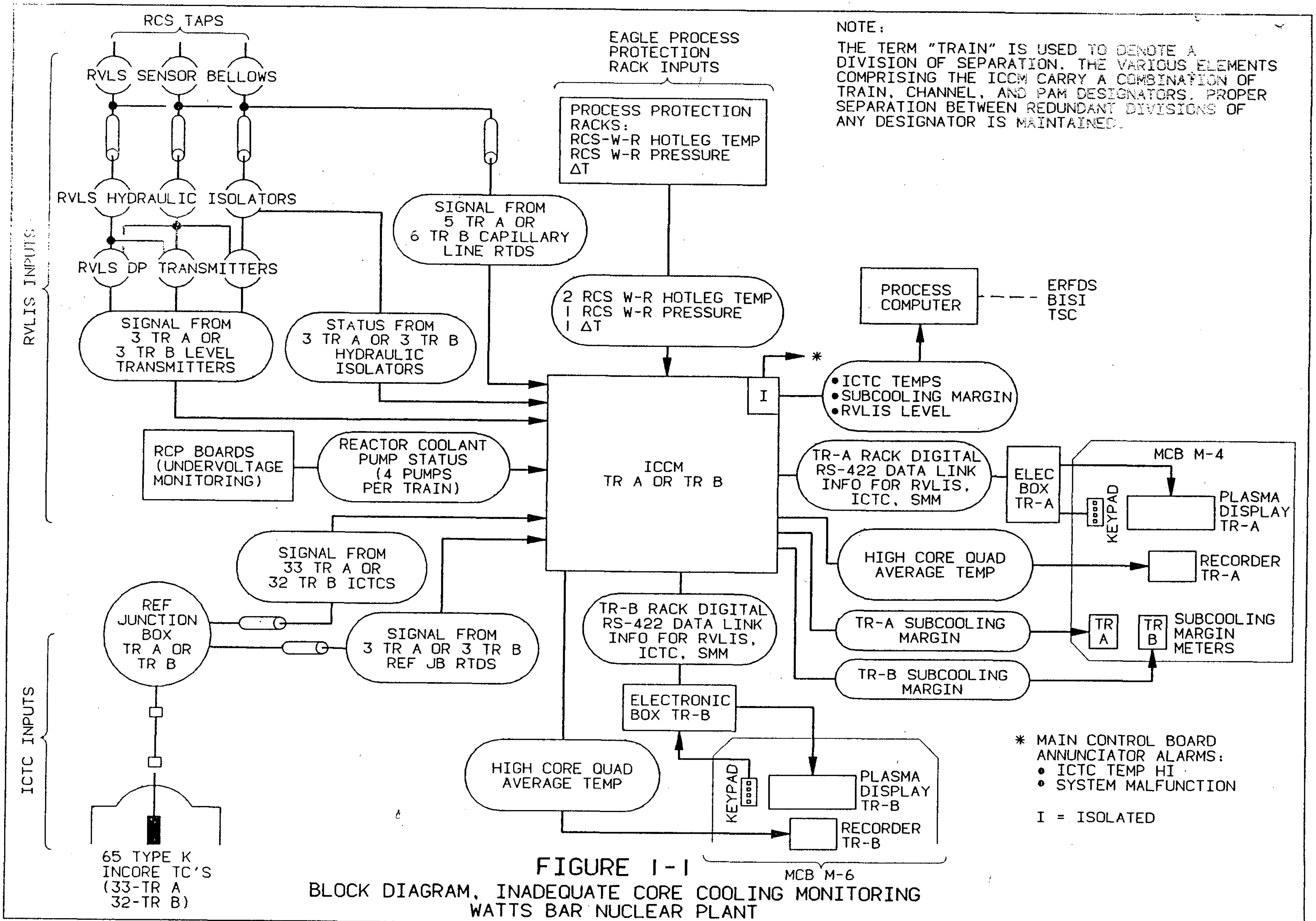

FIGURE 1-1

BLOCK DIAGRAM, INADEQUATE CORE COOLING MONITORING
WATTS BAR NUCLEAR PLANT

2. REACTOR VESSEL LEVEL INSTRUMENTATION SYSTEM (RVLIS)

2.1 RVLIS System Design

2.1.1 The RVLIS is composed of three parts: a Westinghouse differential pressure measurement system, the processing electronics in the Westinghouse ICCM cabinet, and the Westinghouse output plasma display device supplied with the ICCM cabinet.

2.1.2 The RVLIS differential pressure measuring system includes three differential pressure transmitters per division which are connected via sealed reference legs to (a) a spare penetration near the top of the reactor vessel upper head, (b) an existing bottom mounted instrumentation guide tube at the seal table, and (c) a tap in two of the RCS hot legs. Exceptions to minimum separation requirements for redundant divisions exist at the instrumentation taps at the reactor vessel upper head and at the seal table, which are shared by redundant divisions. This configuration has been analyzed and found acceptable (Reference 8.4).

2.1.3 The upper range transmitter is configured to accept inputs from the reactor vessel upper head tap and from the RCS hot leg tap, and provides information to the processor to determine the level in the vessel above the hot leg connection. The main function of this configuration is for static indication (pumps not running condition).

2.1.4 The lower range and dynamic head transmitters are configured to accept inputs from the RCS hot leg tap and from the guide tube tap at the seal table. The lower range transmitter is designed to provide information to the processor that is used to determine the level from the bottom of the vessel to the hot leg connection during natural circulation conditions (no pumps running). The dynamic head transmitter is designed to provide information to the processor to determine coolant conditions on a continuing basis during forced flow conditions (any combination of pumps running) by determining relative void content or density of the circulating fluid.

2.1.5 The processing electronics is a Westinghouse ICCM microprocessor based system. Each redundant division is housed in a separate cabinet in the auxiliary instrument room, and each is powered by a separate Class 1E battery backed power source. The inputs from the differential pressure transmitters described in Sections 2.1.2, 2.1.3, and 2.1.4 are compensated with inputs from the capillary line strap-on resistance temperature detector (RTDs), RCS wide-range

2.1.5 (Continued)

pressure, and RCS wide-range hot leg temperature (from the process protection racks), and reactor coolant pump (RCP) status. The result is a static range RVL (percent LVL) indication from 0 to 100 percent, where 0 percent = bottom of vessel and 100 percent = top of vessel, or a dynamic range reactor vessel liquid content (percent LIQ) normalized from 0 to 100 percent. Normalization corrects the transmitted level information for the RCP operational configuration, so that regardless of the pattern of pumps running, a given fluid density or void content will always be represented by the same dynamic percent LIQ. This normalization minimizes operator time to interpret the RVL indication.

2.1.6 The display system is a Westinghouse microprocessor based system comprised of three physical components: the plasma display, the electronics package, and the keypad located near the plasma display. The operator is able to select the display screen most useful to him. This is a Class 1E redundant system, with separate divisions of display and keypad located on two different main control boards in the main control room horseshoe. Each division of the display is powered by a separate Class 1E battery backed power source. The RVLIS displays available to the operator are as follows.

2.1.6.1 A summary page, indicating the static range (percent LVL) or the dynamic range (percent LIQ), whichever is applicable, an indication of which RCPs are running, the applicable RCS wide range hot leg temperature (°F), and the ICTC auctioneered high quadrant average temperature (°F).

2.1.6.2 A RVLIS static head trend page indicating a 30-minute trend of static head (percent LVL). (The most recent 30-minute history is retained by the electronics package for use in displaying the 30-minute trend graph.)

2.1.6.3 A RVLIS dynamic head trend page indicating a 30-minute trend of dynamic head (percent LIQ). (The most recent 30-minute history file is retained by the electronics package for use in displaying the 30-minute trend graph.)

2.1.6.4 A RVLIS sensor display page indicating the relative installed location of the capillary line strap-on RTDs and hydraulic isolators, the quality code of applicable sensor inputs, and the quality code of the calculated upper range, lower range, and dynamic head vessel levels.

2.1.6.5 A page used for diagnosis of system problems.

The real time values are updated approximately every 2 seconds; the trend values are updated approximately every 20 seconds.

An analysis of WBN specific inaccuracies for RVL indication has been completed with acceptable results (Reference 8.12). The minimal impact of cable leakage on accuracy is currently in the verification process.

2.2 Operator Action Based on RVLIS

2.2.1 Operators do not base actions solely on RVLIS, in accordance with NRC's GL 82-28.

2.2.2 RVLIS is not used as a primary indicator of an ICC condition. RVLIS is used to diagnose an approach to an ICC condition when subcooling margin has been lost and ICTC temperatures are still less than those at which ICC is assumed to exist. Thus, RVLIS is used only to assist in the determination of the most effective response to an ICC situation, not as the primary indicator that an ICC situation exists.

NOTE: The applicable ICTC temperature setpoint is defined as the saturation temperature of the RCS safety valve setpoint plus channel inaccuracies following a high energy line rupture.

2.2.3 RVLIS is used as a primary indicator of the existence of a void in the vessel with the emergency core cooling system (ECCS) not in operation and no RCPs running, or at least one RCP running with pressurizer level high. After it has been determined that a void exists, RVLIS is used as an aide to establishing when and if the void has collapsed and, thus, guide the operators in deciding the correct action to take.

2.2.4 Because RVLIS is not used independently as the indicator of the existence of an ICC condition, but is used only in conjunction with ICTC temperatures to diagnose an approach to an ICC condition, it is not necessary that it be continuously displayed, only that it be continuously available. RVLIS indication is continuously updated and is always available to the operators as a page on the plasma display.

3. ICTC MONITORING SYSTEM

3.1 ICTC System Design

3.1.1 The ICTC system is composed of sensors, cables, special connectors, processing electronics, and primary/backup (ICCM) and additional (computer) display devices. The 65 ICTCs, in conjunction with RCS wide range temperatures, are sufficient to provide indication of radial distribution of the coolant enthalpy rise across representative sections of the core.

3.1.2 The ICTC sensors are 65 Type K thermocouples that have been assigned to two redundant divisions (33 PAM I and 32 PAM II). There are at least four thermocouples of each division per quadrant. Because of the particular thermocouple hardline cables that are routed through each conoseal, the thermocouple cables do not meet minimum separation criterion until they exit the reactor cavity biological shield wall area. These exceptions have been justified (Reference 8.5). The thermocouple cables are then routed to the reference junction box (one per redundant division). Three RTDs in each reference junction box provide a signal to the ICCM that is used in the calculation of the cold reference junction compensated ICTC temperatures. The signal cable is converted to mineral insulated copper hardline cabling at the exit of the reference junction boxes. The signals are then routed through containment penetrations to the Westinghouse ICCM cabinets in the Auxiliary Instrument Room (see Figure 3-1).

3.1.3 The Westinghouse microprocessor based ICCM system described in Section 2.1.5 is used to process the ICTC signals, using temperature compensation obtained from the RTDs located in the reference junction box. The ICCM provides the compensated ICTC temperatures to both the primary/backup display devices (the Westinghouse plasma displays) and through isolation devices to the additional display device (the P2500 plant computer printer or recorder). Additionally, ICCM calculates for the primary/backup display devices the average ICTC temperature, the high core quadrant average temperature, and the maximum, average, and minimum temperature associated with each quadrant. The ICCM microprocessors also supply selectable analog outputs, including high core quadrant average ICTC temperature, for display on fully qualified main control board recorders (one per redundant division).

3.1.4 The primary/backup display devices are the fully qualified Westinghouse ICCM microprocessor based plasma displays, described in Section 2.1.6. The ICTC displays available to the operator are as follows:

3.1.4.1 ICTC map page displaying a spatially oriented core map of real time ICTC temperatures (°F), one map per plasma display.

3.1.4.2 ICTC quadrant summary page displaying the real time minimum, average, and maximum temperatures (°F) for each quadrant in a core map outline.

3.1.4.3 Individual ICTC quadrant page providing a list of real time ICTC temperatures by quadrant location and value (°F).

3.1.4.4 ICTC average temperature trend page indicating a 30-minute trend display of average ICTC temperature. (The most recent 30-minute history is retained by the display electronics package for use in generating the trend page.)

3.1.4.5 Auctioneered high core quadrant average temperature trend page indicating a 30-minute trend display of the auctioneered high quadrant average ICTC temperature. (The most recent 30-minute history is retained in the display electronics package for use in generating the trend page.)

3.1.4.6 ICTC diagnostic Pages 1 and 2 indicating ICTC temperature information to aid in system troubleshooting. One entry on these pages is an obvious indication of the hottest ICTC temperature.

The real time values are updated approximately every 2 seconds. The trend displays are updated approximately every 20 seconds. The range of temperature indications is from 200°F to 2,300°F.

An analysis of WBN's specific inaccuracies for ICTC temperature has been completed, with acceptable results (Reference 8.8). The minimal impact of cable leakage on accuracy is currently in the verification process.

3.1.5 In addition to the pages of information available to the operator on the plasma display, the auctioneered high core quadrant average ICTC temperature is continuously trended on a fully qualified Class 1E recorder. The redundant recorders are located on two different control board panels, and each is powered by a separate Class 1E battery backed power source. The recorder includes a digital display cycling automatically through the real time values of each of three recorded parameters at an approximate scan speed of once every 5 seconds. One pen is permanently assigned to auctioneered high core quadrant average ICTC temperature. This satisfies the need for continuous display that is required because the ICTC temperatures are a primary indicator of the approach to ICC and based on which the operator must take action.

3.1.6 Although not required, alarm capability is provided by the ICCM at alarm setpoints determined in the Westinghouse uncertainty analysis and the EOP setpoint document (References 8.8 and 8.13).

3.1.7 Additional display devices available for monitoring ICTC temperatures are printers and recorders driven by the Westinghouse P2500 plant computer. The additional displays have the following capabilities:

3.1.7.1 An on-demand, spatially oriented, core map indicating the temperature at each ICTC location is available.

3.1.7.2 An on-demand tabular listing of the ICTC temperatures is available.

3.1.7.3 A printout of average, real time, and maximum values can be provided for the ICTC temperatures. The range will meet the required range of 200°F to 2,300°F.

3.1.7.4 Alarm capability is provided in conjunction with the subcooling monitor function (see Section 4.1.5).

3.1.7.5 Trend capability indicating temperature time histories is designed into the system. Strip chart recorder points are available to assign to any ICTC temperature on demand. In addition, a point value trend printout is available on the control room printer.

The ICTC program has a validity-check comparison, reducing the probability of accessing false readings.

3.2 Operator Action Based on ICTC Temperature

3.2.1 ICTC temperatures provide the primary indication of the existence of an ICC condition. This requires that the operators take immediate action. The temperature that is calculated to indicate the existence of an ICC condition incorporates the channel inaccuracy exhibited by the system following a high energy line rupture (Reference 8.9).

3.2.2 ICTC temperatures, in conjunction with RVLIS, provide an indication of the approach to an ICC condition.

NOTE: The applicable ICTC temperature setpoint is defined as the saturation temperature of the RCS safety valve setpoint, plus channel inaccuracies following a high energy line rupture.

3.2.3 At ICTC temperatures indicative of an ICC condition, the operator must ensure the initiation of the ECCS. Other actions follow as described in the emergency operating functional restoration (FR)-C.1 procedure.

3.2.4 If ICTC temperatures are less than those indicative of an ICC condition, subcooling margin is low, and at least one RCP is running, then RVLIS is used to determine if a degraded core cooling condition exists.

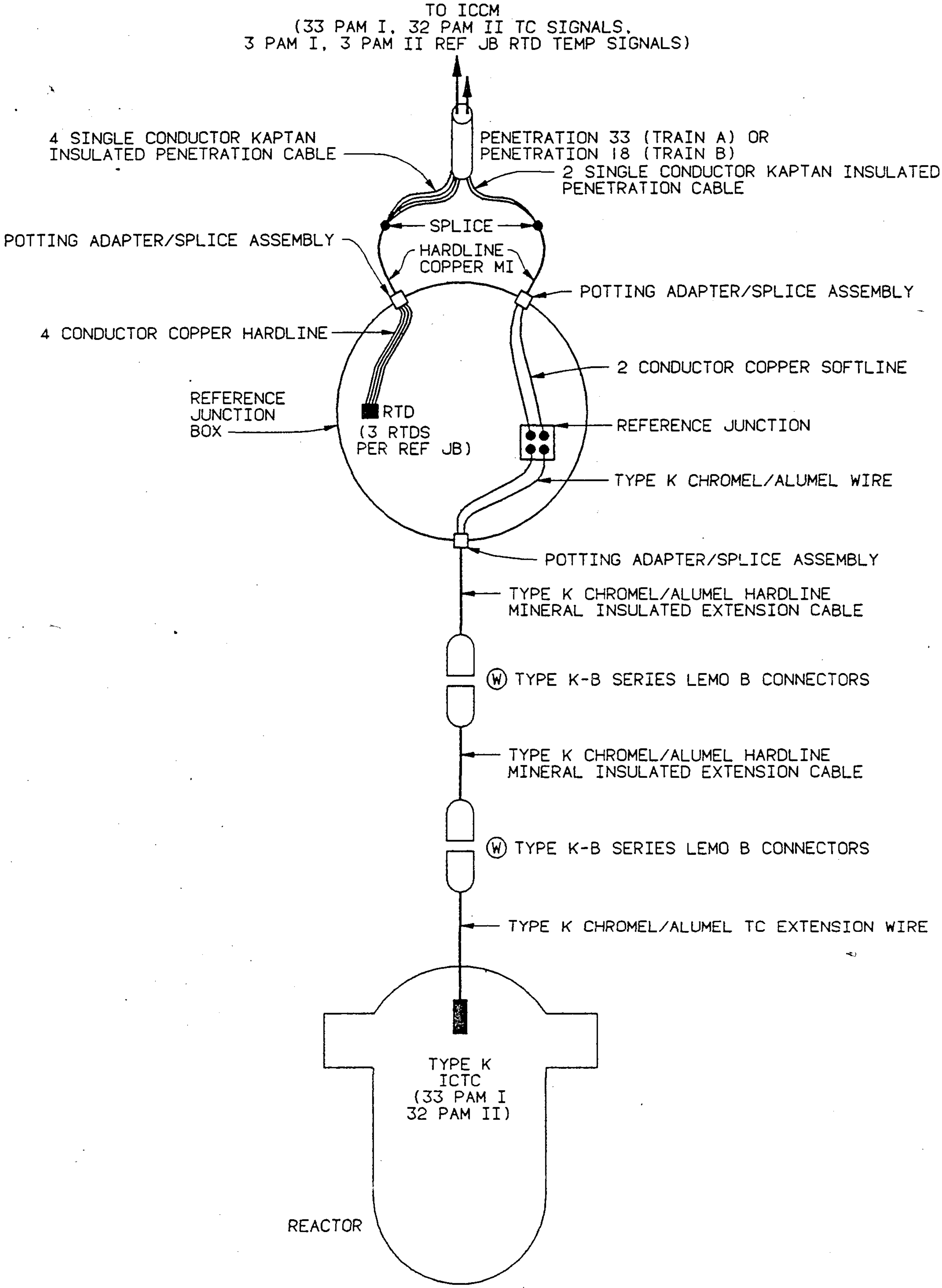

FIGURE 3-1
INCORE THERMOCOUPLE FIELD ASSEMBLY DETAILS

WBN CADAM MIS... GWJ

4. SUBCOOLING MARGIN MONITOR (SMM)

4.1 SMM System Design

4.1.1 The SMM function derives the primary coolant margin to saturation, an indicator of approach to boiling conditions, from various temperature and pressure inputs. These inputs include RCS wide-range pressure, RCS wide-range hot leg temperature, and ICTC temperature. The algorithms reside in the microprocessor memory of the ICCM (primary display driver with fully qualified backup) and in a mass memory disc unit in the plant computer (additional display device driver). Margin to saturation is derived in the Westinghouse ICCM system for output to the plasma displays (primary and backup displays), as well as qualified meters, and also derived in the Westinghouse P2500 computer for output to a printer or recorder (additional display).

4.1.2 The primary and backup display device drivers for SMM are the redundant Westinghouse microprocessors for the ICCM system described in Section 2.1.5. The ICCM system calculates temperature margin to saturation, based on the RCS wide-range pressure and the ICTC auctioneered high core quadrant average temperature, with the option to use RCS wide-range hot leg temperature input. In addition, an analog output from each division of separation is provided for qualified control board meters. These outputs are dedicated to temperature margin to saturation indication.

4.1.3 The primary and backup display devices for SMM are the Westinghouse microprocessor-based ICCM displays described in Section 2.1.6. The subcooling margin displays available to the operator are as follows:

4.1.3.1 Subcooling margin trend page, indicating a 30-minute trend of calculated subcooling margin temperature. (The most recent 30-minute history file is retained by the display electronics package for use in generating the trend page.)

4.1.3.2 Heatup limit curve page, graphically exhibits the current subcooling margin (the value is shown digitally), the saturation curve (plot of the limiting subcooling margin for a given RCS pressure and calculation basis RCS temperature), and the 100°F per hour plant heatup curve.

4.1.3.3 Cooldown limit curve page, graphically exhibits the current calculated subcooling margin (the value is shown digitally), the saturation curve (plot of the limiting subcooling margin for a given RCS pressure and calculation basis RCS temperature), and the 100°F per hour plant cooldown curve.

4.1.3.4 Subcooling diagnostics page

An analysis of the inaccuracies associated with SMM function has been completed, with acceptable results (Reference 8.8). The minimal impact of cable leakage on accuracy is currently in the verification process.

4.1.4 Due to the importance of subcooling margin in the operators' determination of the approach to an ICC situation, subcooling margin is indicated continuously on separate qualified redundant digital meters on the control board. These meters are located together on a single main control board in the horseshoe. In addition, subcooling margin is indicated on the RVLIS summary page and on the ICTC quadrant summary page. The real time subcooling margin value is updated approximately every 2 seconds. The curve information is updated approximately every 20 seconds.

4.1.5 The Westinghouse P2500 computer is an additional display device driver for subcooling margin indication. The P2500 computer is capable of calculating and displaying pressure and temperature subcooling margins based on pressure and temperature inputs and saturation values, and initiating alarms based on the worst case output. Three system temperatures are used alternately in conjunction with the lowest RCS wide range pressure in order to arrive at three values for temperature margin to saturation and three values for pressure margin to saturation. The three temperature inputs used are the hottest hot leg temperature, the average ICTC temperature, and the hottest ICTC temperature. An alarm will occur on the main control board annunciator if any of the six calculated margins, based on the American Society of Mechanical Engineers (ASME) 1967 steam curves, are below the setpoint (margin too narrow).

4.1.6 The P2500 computer driven recorder can display the six calculated margins to saturation (see Section 4.1.5) as real time values or time trended graphs. A Cathode Ray Tube (CRT) display is also available for graphic representation of subcooling margin (e.g., by trending a system temperature and a saturation temperature value or a system pressure and a saturation pressure value).

4.2 Operator Action Based on Subcooling Margin

4.2.1 Subcooling margin is used by the operators as a primary indicator of the approach to or the existence of saturated conditions in the RCS. If the ICTC temperatures are less than those indicating the existence of ICC, the RCS subcooling margin is lost, and at least one RCP is running, subcooling margin or an approach to an ICC condition is based upon the RVL indication. These actions are defined by emergency operating status trees FR-C.

4.2.2 The subcooling margin channel inaccuracy, based upon ICTC temperature, is approximately 10°F larger than if it is based upon RCS wide-range hot leg temperatures. The subcooling margin channel inaccuracies have been calculated assuming both ICTC and RCS wide range hot leg temperature inputs. The appropriate errors have been incorporated into the Westinghouse setpoint document (Reference 8.13).

5. CONFORMANCE TO NUREG-0737, ITEM II.F.2

See Table 1.

6. CONFORMANCE TO RG-1.97, REVISION 2

See Reference 8.3.

7. WBN SCHEDULE

7.1 The Westinghouse ICCM-86 and associated hardware will be installed before fuel loading of the respective unit.

7.2 Preliminary calibration and scaling of the ICC system will be performed before fuel loading of the respective unit.

7.3 Preoperational testing will be performed on the ICC system before fuel loading of the respective unit.

7.4 Final calibration scaling for the ICC system will be completed before initial criticality of the respective unit.

8. REFERENCES

8.1 Letter from TVA to NRC dated September 19, 1985, "Watts Bar Nuclear Plant Unit 1 - NUREG-0737, Item II.F.2, Instrumentation for Detection of Inadequate Core Cooling."

8.2 Westinghouse Summary Report dated December 1980, "Westinghouse Reactor Vessel Level Instrumentation System for Monitoring Inadequate Core Cooling." (Appendix A to TVA's letter to NRC dated August 12, 1982)

8. Continued

8.3 Letter from TVA to NRC dated August 31, 1990, "Watts Bar Nuclear Plant (WBN) Units 1 and 2 - Conformance to Regulatory Guide (RG) 1.97, Revision 2 (TAC No. 63645)."

8.4 Letter from Westinghouse to TVA dated October 11, 1989, "RVLIS Vessel Head Connections," Westinghouse letter number WAT-D-8057.

8.5 Exception EX-WB-DC-4-8, issued by DCN S-15370-A to Watts Bar Design Criteria WB-DC-30-4, "Separation/Isolation."

8.6 Westinghouse Technical Manual, "Technical Manual for Inadequate Core Cooling Monitor - 86," Watts Bar Units 1 and 2, December 1989, Volume 1.

8.7 Westinghouse Technical Manual, "Reactor Vessel Level Instrumentation System Manual, 3/DP Cell Design," October 1983, TVA letter W-5474.

8.8 Westinghouse Analysis Report, "Inadequate Core Cooling Monitoring (ICCM) System, Incore Thermocouple System Uncertainty Report," transmitted by Westinghouse letter number WAT-D-8692, dated November 8, 1991.

8.9 Westinghouse letter to NRC dated February 20, 1986, NS-NRC-86-3099, "Resolution of Reportable Item Under 10 CFR Part 21 - Accuracy Requirement Evaluation for Inadequate Core Cooling Instrumentation," transmitted to TVA by Westinghouse letter number WAT-D-6915.

8.10 Westinghouse Technical Manual WX-34794, "Thermocouple Reference Junction System Group 1," Purchase Order 546-GLJ-508437-BN.

8.11 Westinghouse Technical Manual for Incore Instrumentation, Volumes 1 and 2, Tennessee Valley Authority, Watts Bar Nuclear Plant Units 1 and 2, TVA letter numbers W-1594 and W-2390.

8.12 Letter from Westinghouse Domestic Customer Projects to TVA dated November 1, 1991, "RVLIS Uncertainty Results," Westinghouse letter number WAT-D-8682.

8.13 Westinghouse Document, "ICCM EOP Setpoints Documentation," Westinghouse letter number WAT-D-8700, dated November 27, 1991.

TABLE 1

INADEQUATE CORE COOLING MONITORING INSTRUMENTATION
CONFORMANCE TO NUREG-0737, ITEM II.F.2

	ITEM	SMM	RVL	ICTC
1.	Environmental Qualification	Yes (1)	Yes (1)	Yes (1)
2.	Single Failure Analysis	Yes (2)	Yes (3)	Yes (2)
3.	Class 1E Power Source	Yes	Yes	Yes
4.	Availability Prior to an Accident	Yes	Yes	Yes
5.	Quality Assurance	Yes (4)	Yes (4)	Yes (4)
6.	Continuous Indication	Yes	Yes (5)	Yes
7.	Recording of Instrument Outputs	Yes (6)	Yes (7)	Yes
8.	Identification of Instruments	Yes	Yes	Yes
9.	Isolation	Yes	Yes	Yes
10.	Check for Operational Availability	Yes	Yes	Yes
11.	Servicing, Testing, and Calibrating	Yes	Yes	Yes
12.	Administrative Control of Channel Removal	Yes	Yes	Yes
13.	Administrative Control of Access	Yes	Yes	Yes
14.	Anomalous Indication Minimization	Yes	Yes	Yes
15.	Malfunctioning Components Recognition	Yes	Yes	Yes
16.	Monitoring of Instrument Usage	Yes	Yes	Yes
17.	Normal and Accident Instrument Usage	Yes	Yes	Yes
18.	Periodic Testing Requirements	Yes	Yes	Yes

NOTES

1. The appropriate channel uncertainties have been incorporated into the appropriate procedure setpoints.

2. The ICTC cables do not meet minimum separation requirements inside the reactor upper head, the vessel penetration through the vessel via the conoseals, and inside the reactor vessel cavity biological shield wall. See Section 3.1.2.

3. The RVLIS upper head tap and the seal table guide tube connections do not meet minimum separation requirements as they are shared between trains. See Section 2.1.2.

4. TVA's Quality Assurance Program is described in the Nuclear Quality Assurance (NQA) Plan (TAC No. 72833). This plan was approved by the NRC in a letter from Suzanne C. Black, Assistant Director for Projects, to Oliver D. Kingsley, Jr., dated January 18, 1989.

5. RVLIS is one of three sets of graphic displays on the plasma display in the main control room.

6. The plasma display (primary/backup display) has available a 30-minute trend of subcooling margin. Continuous recording of subcooling margin is available through assignable pen recorders driven by the plant computer.

7. A 30-minute trend graph is available on the plasma display.

ATTACHMENT A

INADEQUATE CORE COOLING QUALIFICATION DOCUMENTATION
WATTS BAR NUCLEAR PLANT (WBN) UNIT 1

ATTACHMENT A

LIST OF WBN UNIT 1 INADEQUATE CORE COOLING (ICC)
QUALIFICATION DOCUMENTATION

	DOCUMENT SUBJECT	SSM	RVL	ICTC
		APPLICABLE FUNCTIONS		
1.	WBNEQ-PENT-003 TVA EQ Binder Conax Penetrations	X	X	X
2.	WBNEQ-ITE-001 TVA EQ Binder Minco Strap-on RTDs		X	
3.	WBNEQ-ITE-005 TVA EQ Binder ICTC System	X		X
4.	Westinghouse WCAP-8587 EQDP-ESE-48A, Revision 1 Barton High Volume Sensor: Qual Group A		X	
	Westinghouse WCAP-8687, Supp 2 EQTR-E48A, Revision 1 Barton High Volume Sensor - Group A		X	
5.	Westinghouse WCAP-8587 EQDP-ESE-49A, Revision 1 Barton DP Indicating Switch: Qual Group A		X	
	Westinghouse WCAP-8687, Supp 2 EQTR-E49A, Revision 1 Barton DP Indicating Switch - Group A		X	
6.	WBNEQ-CABL-017 TVA EQ Binder Eaton Cable	X	X	X
7.	WBNEQ-CABL-055 TVA EQ Binder Rockbestos Cable	X	X	X
8.	WBNEQ-CABL-056 TVA EQ Binder MI Incore T/C Cable Assemblies	X		X

ATTACHMENT A

LIST OF WBN UNIT 1 INADEQUATE CORE COOLING (ICC)
QUALIFICATION DOCUMENTATION

DOCUMENT SUBJECT	APPLICABLE FUNCTIONS SSM	RVL	ICTC
9. Westinghouse WCAP-8587 EQDP-ESE-53, Revision 2 Plant Safety Monitoring System	X	X	X
Westinghouse WCAP-8687, Supp 2 EQTR-E53A, Revision 0 Plant Safety Monitoring System	X	X	X
10. Westinghouse WCAP-8587 EQDP-ESE-E53B, Revision 1 Plant Safety Monitoring System (PSMS) Components	X	X	X
Westinghouse WCAP-8687, Supp 2 EQTR-E53B, Revision 0 Plant Safety Monitoring System (PSMS) Components	X	X	X
11. Westinghouse WCAP-11340 Noise, Fault, Surge, and Radio Frequency Interference Test Report for Eagle-21 Digital Family	X	X	X
12. Westinghouse WCAP-8587 EQDP-ESE-61B, Revision 1 Modular Plasma Display	X	X	X
Westinghouse WCAP-8687, Supp 2 EQAR-E61B, Revision 0 Modular Plasma Display	X	X	X
13. S164-RP-01 Southern Testing Contract 75376A Analogic Corporation Digital Panel Meter	X		
14. Westinghouse WCAP-8701, Supp 1 CQTR-5A, Revision 0 Yokagawa Recorders Micro R100			X

ATTACHMENT B

TECHNICAL MANUAL FOR
INADEQUATE CORE COOLING MONITOR 86 (ICCM-86)
SECTION 5
REMOTE DISPLAY INFORMATION