PSNH

SEABROOK STATION
Engineering Office

Public Service of New Hampshire

New Hampshire Yankee Division

February 24, 1986
SBN- 952
T.F. B7.1.2

United States Nuclear Regulatory Commission
Washington, DC 20555

Attention: Mr. Vincent S. Noonan, Project Director
PWR Project Directorate No. 5

References: (a) Construction Permits CPPR-135 and CPPR-136, Docket Nos. 50-443 and 50-444
(b) PSNH Letter, J. DeVincentis to G. W. Knighton, "Compliance with NUREG-0737: Clarification of TMI Action Plan Requirements," dated October 10, 1985

Subject: NUREG-0737 Task II.F.2, Instrumentation for Detection of Inadequate Core Cooling

Dear Sir:

In Reference (b), we indicated that the Seabrook Station will be equipped with Instrumentation for Detection of Inadequate Core Cooling System.

Enclosed herewith please find the description of this system (Attachment 1) and marked-up FSAR Pages 1.9-21 and 4.4-37e which indicate Seabrook's compliance with NUREG-0737, "Clarification of TMI Action Plan Requirements." The marked-up FSAR pages will be incorporated into the FSAR by a future amendment.

Should you or your staff have any questions, please do not hesitate to contact us. We do request that the acceptability of this system be reflected in the next supplement to Seabrook Station's SER.

Very truly yours,

John DeVincentis, Director
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Attachments

cc: Atomic Safety and Licensing Board Service List

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1/1

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See FSAR Subsection 4.4.6.5. In addition, a complete description of Seabrook's "Instrumentation for Detection of Inadequate Core Cooling" was submitted to the NRC via letter SBN-952 (dated February 24 1986).

Response:

~~The following instrumentation will be used at Seabrook to detect ICC:~~

~~Reactor Coolant Inventory Monitor,~~
~~Saturation Monitor, and~~
~~Core Exit Thermocouples~~

~~Seabrook Station will be using the Westinghouse design for detection of ICC.~~ Upon finalization of plant specific design details, more comprehensive information will be provided.

Task II.G.1 Emergency Power for Pressurizer Equipment (NUREG-0737)

Position:

Consistent with satisfying the requirements of General Design Criteria 10, 14, 15, 17, and 20, of Appendix A to 10 CFR, Part 50, for the event of loss-of-offsite power, the following positions shall be implemented.

Power Supply for Pressurizer Relief and Block Valves and Pressurizer Level Indicators

(1) Motive and control components of the Power Operated Relief Valves (PORVs) shall be capable of being supplied from either the off-site power source or the emergency power source when the off-site power is not available.

(2) Motive and control components associated with the PORV block valves shall be capable of being supplied from either the off-site power source or the emergency power source when the off-site power is not available.

(3) Motive and control power connections to the emergency buses for the PORVs and their associated block valves shall be through devices that have been qualified in accordance with safety grade requirements.

(4) The pressurizer level indication instrument channels shall be powered from the vital instrument buses. The buses shall have the capability of being supplied from either the off-site power source or the emergency source when off-site power is not available.

Response:

See FSAR Sections 7.5 and 8.3.1.

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Reg. Guide Position	Discussion
C.4.h	The procedures for performing channel check, channel functional test, and background noise measurements will be available for review six months prior to fuel load.
C.4.i	Radiation protection procedures have been developed to provide guidance and direction to station personnel for minimizing radiation exposure during maintenance, calibration, and diagnostic work activities. The overall radiation protection program is described in FSAR Chapter 12.
C.4.j	Seabrook's non-licensed training program will provide pertinent general and specific training for plant personnel involved with system operation, maintenance, and loose part diagnosis prior to station operation.
C.6	If the presence of a loose part is confirmed and is evaluated to have safety significance, it will be reported to the NRC in accordance with 10CFR50.72.

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4.4.6.5 (see Attachment).

4.4.7 References

1. Christensen, J. A., Allio, R. J. and Biancheria, A., "Melting Point of Irradiated UO_2," WCAP-6065, February, 1965.

2. Motley, F. E., Wenzel, A. H. and Cadek, F. F., "Critical Heat Flux Testing of 17 x 17 Fuel Assembly Geometry with 22 Inch Grid Spacing," WCAP-8536 (Proprietary), May, 1975 and WCAP-8537, May, 1975.

3. Hellman, J. M. (Ed.), "Fuel Densification Experimental Results and Model for Reactor Application," WCAP-8218-P-A (Proprietary) March, 1975 and WCAP-8219-A, March, 1975.

4. Tong, L. S., "Boiling Heat Transfer and Two-Phase Flow," John Wiley & Sons, New York, 1965.

5. Tong, L. S., "Boiling Crisis and Critical Heat Flux," AEC Critical Review Series, TID-25887, 1972.

6. Tong, L. S., "Critical Heat Fluxes on Rod Bundles," in "Two-Phase Flow and Heat Transfer in Rod Bundles," pp. 31-41, American Society of Mechanical Engineers, New York, 1969.

7. Chelemer, H., Weisman, J. and Tong, L. S., "Subchannel Thermal Analysis of Rod Bundle Cores," WCAP-7015, Revision 1, January, 1969.

ATTACHMENT TO FSAR PAGE 4.4-37e

4.4.6.5 Instrumentation for Detection of Inadequate Core Cooling

The Inadequate Core Cooling Monitoring System installed at Seabrook Station includes the following:

- Core Exit Thermocouple Monitoring
- Core Subcooling Margin Monitor
- Reactor Vessel Level Monitoring

The incore thermocouple/core cooling monitor has been installed to provide improved information presentation and display to the plant operators on the status of core heat removal capability. The system monitors all core exit thermocouples and calculates core subcooling margin utilizing redundant channels of instrumentation and Control Room displays.

The thermocouple/core cooling monitor utilizes inputs from all core exit thermocouples and Reactor Coolant System wide-range pressure. A microprocessor is employed to calculate saturation temperature from the wide-range pressure and core exit temperature inputs.

The Monitoring System displays several levels of information including: (a) bulk average core exit thermocouple trending; (b) a spatial map exhibiting the thermocouple temperature at its respective location in the core; (c) a core map showing minimum, average, and maximum quadrant temperatures; (d) subcooling margin; (e) a detailed data list exhibiting thermocouple location, tag designation, temperature; and (f) hot channel core exit temperature.

The Reactor Vessel Level Instrumentation System (RVLIS) consists of two redundant independent trains that monitor the reactor vessel water levels.

Each train provides two vessel level indications: full range and dynamic head. The full range RVLIS reading provides an indication of reactor vessel water level from the bottom of the vessel to the top of the vessel during natural circulation conditions. The dynamic head reading provides an indication of reactor core, internals, and outlet nozzle pressure drop for any combination of operating reactor coolant pumps. Comparison of the measured pressure drop with the normal, single phase pressure drop provides an approximate indication of the relative void content of the circulating fluid.

Attachment 1

Response to NUREG 0737, II.F.2

"Instrumentation for Detection of Inadequate Core Cooling"

The following documentation addresses the requirements of the "Documentation Required" section of NUREG-0737, Section II.F.2. The major section numbers below, identified by Roman numerals, correspond to the equivalent requirement section of the NUREG.

I. Description of System

The Inadequate Core Cooling (ICC) Monitoring System installed at Seabrook station includes the following:

- Core exit thermocouple (T/C) monitoring
- Core subcooling margin monitor
- Reactor vessel level monitoring

A detailed electrical and layout description of each of the above ICC monitoring subsystems is given below:

A. Core Exit Thermocouple System

The core exit thermocouple system is a part of the incore instrumentation system. The latter consists of 58 thimble assemblies, each with five fixed neutron detectors and one Type K chromel-alumel thermocouple at fixed core outlet positions. The core exit thermocouple monitoring system consists of two redundant

independent trains that monitor all 58 of the Seabrook Station chromel-alumel core exit thermocouples (29 on Train 'A' and 29 on Train 'B'). A layout sketch of the system is shown in Figure 1. The analog indicator on this figure, called "Hot channel CET," displays the third highest valid thermocouple temperature. This is consistent with the intent of the WOG Emergency Response Guidelines. The train and quadrant orientation of the thermocouples are presented in Table 1. The core exit thermocouples exit the core through the bottom. After exiting the vessel they are routed for mating with the extension wires (cables) through the seal table where the thermocouple wires are terminated with qualified connectors. Beyond the seal table the cables are routed in a manner consistent with the requirements of Regulatory Guide 1.75 to the containment penetrations. The uncompensated core exit thermocouple signals (29) for each train are then sent to their respective ICC Monitors. These monitors house the reference junction (cold junction) for the thermocouple monitor and thus the net thermal emf of the thermocouple system can be found.

The thermocouples have a range of greater than 0 to 2300°F. The thermocouple data is presented in various formats on the plasma displays for quick reference by the operating staff. The display pages contain the following information.

Core Cooling 1 (Figure 2) - Summary Display - core exit temperature and wide range RCS pressure including presentation of the operational bounds of reactor coolant saturation and the Technical Specification Appendix G, curve; summary of current RVLIS readings.

Core Cooling 2 (Figure 3) - Bulk Average CET Temperature Trending - a forty minute trend history of the bulk average CET temperature, including sensor quality data.

Core Cooling 3 (Figure 4) - Core Exit Thermocouple Map - spatially oriented thermocouple readings, and bulk average CET temperature; one display is provided for each train of thermocouples.

Core Cooling 4 (Figure 5) - Core Temperature Map - quadrant core exit thermocouple values (maximum, average, minimum), and subcooling margin.

Core Cooling 5 and 6 (Figures 6 and 7) - Core Exit Thermocouple Listing - lists thermocouple location, tag designation, and sensor reading per quadrant.

Core Cooling 7 and 8 (Figures 8 and 9) - Train A diagnostic pages with readings status codes for use in equipment servicing. Since these are primarily maintenance-related displays, the control room operating staff would not use these display pages.

B. Core Subcooling Margin Monitor

The inputs, on a train basis, to the core subcooling margin monitor include the following:

- Wide range RCS pressure (1 channel)
- Core exit compensated thermocouple values (29 channels)

The electrical layout of the subcooling margin monitor is shown in Figure 10. The analog indicator shown on this figure displays the subcooling margin. The RCS subcooling margin is calculated based upon the wide range RCS pressure and compensated core exit thermocouple readings. The value of RCS pressure utilized in the calculation is the output of the data quality algorithm implemented in the subcooling margin monitor. The value of core exit thermocouple temperature is based upon the auctioneered high thermocouple quadrant average temperatures. This averaged value is utilized in the calculation of the core subcooling margin because the quadrant average thermocouple temperature more accurately reflects the individual loop bulk temperature. Basing the core subcooling margin calculation on the highest thermocouple reading would not be indicative of the bulk loop temperatures. Use of the auctioneered high thermocouple quadrant average temperature in the calculation of core subcooling margin is consistent with the utilization in the WOG Emergency Response Guidelines (ERG). The subcooling margin calculated values are routed to both plasma displays and analog indicators. The cable routing from sensor input to display meet the requirements of Reg. Guide 1.75.

The upper and lower range limits of the core subcooling calculation are adjustable up to a reactor coolant system pressure of 3000 psia. The Regulatory Guide 1.97 limits of 200°F subcooling and 35°F superheat can be accomodated by this calculation. The calculated value, based on auctioneered high quadrant thermocouple input, is displayed on Core Cooling 1, 2, and 4 (Figures 2, 3, and 5, respectively).

C. Reactor Vessel Level Instrumentation System

The Reactor Vessel Level Instrumentation System (RVLIS) consists of two redundant independent trains that monitor the water level in the reactor vessel.

The system provides the operating staff with two instrumentation ranges. The full range RVLIS reading provides an indication of reactor vessel water level from the bottom of the vessel to the top of the vessel during natural circulation conditions. The dynamic head RVLIS reading provides an indication of reactor core, internals and outlet nozzle pressure drop for any combination of operating reactor coolant pumps. Comparison of the measured pressure drop with the normal, single phase pressure drop provides an approximate indication of the relative void content of the circulating fluid. The inputs to the RVLIS system on a train basis include the following:

1. Core exit compensated thermocouple values (29 channels)
2. RVLIS capillary line RTD (4 channels)
3. Wide range RCS pressure (1 channel)
4. Differential pressure (2 channels)
5. RVLIS hydraulic isolator contacts (2 channels)

A fluid diagram of one train of the Seabrook Station RVLIS system is shown in Figure 11 for the inputs associated solely with the RVLIS system. The electrical block diagram associated with the

total RVLIS system is shown in Figure 12. The two analog indicators on this figure display the RVLIS readings, one for dynamic head and one for full range.

Both trains of RVLIS readings are routed to train oriented plasma displays. The cable routing from sensor input to display meet the requirements of Reg. Guide 1.75.

The range of the dynamic head channels corresponds to 0 to 120% of the delta-p under the reference unvoided, 0% reactor power conditions. The range maximum was selected to bound the cases of operation under conditions differing from these reference conditions. The range of the full range corresponds to 0 to 120% of the reactor vessel height. This range will bound all conditions differing from the reference calibration condition.

RVLIS readings are presented on the core cooling summary display (Core Cooling 1, Figure 2) and on the following 3 displays dedicated to RVLIS indications.

RVLIS 1 (Figure 13) - RVLIS Dynamic and Full Range Trending - a thirty minute trend history of percent reading for Dynamic Head and present level Full Range Readings, including sensor quality data tagging.

RVLIS 2 (Figure 14) - Reactor Vessel Level Instrumentation Fluid System Layout Drawing - provides bulk average CET temperature, WR pressure, and subcooling margin.

RVLIS 3 (Figure 15) - Train A diagnostic page with readings and status codes for use in equipment servicing. Not used by the control room operating staff.

II. Design Analyses and Test Data

Several analyses have been performed to verify the design of the RVLIS system described in Item I.C. The results of these are discussed in the following documents:

A. Summary Report, Westinghouse Reactor Vessel Level Instrumentation System for Monitoring Inadequate Core Cooling, December 1980 submitted to the NRC via T. M. Anderson to Darrell G. Eisenhut, NS-TMA-2358, dated December 23, 1980, including informal responses to NRC Request for additional information on the Westinghouse RVLIS.

B. Supplemental Information on the Westinghouse RVLIS, submitted to the NRC via E. P. Rahe to L. E. Phillips, NS-EPR-2579, dated March 19, 1982.

In addition to the analyses conducted in the two references above, the hydraulic components of the RVLIS system were installed at the Semiscale Test Facility in Idaho so that transient response characteristics could be obtained during small-break LOCA and other accident conditions. A description of the tests conducted and a discussion of the test results are presented in the following documents:

C. Westinghouse Evaluation of RVLIS Performance at the Semiscale Test Facility, December 1981 submitted to the NRC via E. P. Rahe to L. E. Phillips, NS-EPR-2526, dated December 8, 1981.

D. Westinghouse Evaluation of RVLIS Performance at the Semiscale Test Facility for Test S-UT-8, January 1982 submitted to the NRC via E. P. Rahe to L. E. Phillips, NS-EPR-2542, dated January 13, 1982.

E. Westinghouse Evaluation of RVLIS performance at the Semiscale Test Facility for Test S-IB-7 submitted to the NRC via E. P. Rahe to L. E. Phillips, SED-SA-00081, dated June 28, 1982.

Core exit temperature and subcooling margin monitoring rely on direct RCS process measurement do not involve significantly new design principles. As such, no system testing is necessary.

III. Future Testing

The acceptability of the RVLIS transient response has been shown in the Idaho semiscale testing. As noted above, core exit temperature and subcooling margin monitoring do not involve significantly new design principles. As such, no additional testing is necessary for any of the 3 ICCI subsystems.

IV. Response to II.F.2, Attachment I, Design and Qualification Criteria for Pressurized Water Reactor Incore Thermocouples

A. Thermocouple Location

The Seabrook plant has 58 thermocouples, 29 per train, spread uniformly across the core. Locations are such that during the plant life, when power distributions vary from reload to reload, adequate information is provided to the staff to indicate a relative radial distribution of the core exit temperature. The radial distribution is as shown in Figure 4 (Core Cooling 3) for a single train. To determine enthalpy rise, core inlet temperatures can be approximated by use of wide range cold leg temperature in each loop displayed on the control board.

B. Primary Operator Display Capabilities

As shown in Figure 4 (Core Cooling 3), a spatially-oriented core map, available on demand, indicating temperature at the core exit, is provided for Train A as the primary operator display. Core exit temperature at each of the locations can be displayed continuously. In addition, the third highest valid thermocouple temperature is provided on Core Cooling 1 (Figure 2) and on the control board for use with the plant-specific inadequate core cooling procedures. Trending capability is provided for a period of 40 minutes, as shown in Figure 3, Core Cooling 2. Rapid access to the core exit temperature displays is provided by a single key to the core cooling displays and a page key allowing quick transfer from one display to another.

C. Backup Display Capability

The local display at the ICCM is the fully qualified backup display. The operators have access, via the thumbwheel switches, to all thermocouple values in engineering units and will be able to access four per quadrant in less than six minutes. The range is greater than 0 to 2300°F.

D. Types and Locations of Displays

The display pages are described in Section I, above, and shown in Figures 2-8 for core cooling and Figure 13-15 for RVLIS.

The readings displayed by the ICC can be used directly by the operating staff while implementing the emergency operating procedures. The "hot channel CET" presented is the third highest thermocouple reading, consistent with the emergency procedures. The subcooling and RVLIS readings can be used directly to evaluate the respective procedure steps using these indications.

Alarms for core exit thermocouples, RCS subcooling, and RVLIS are not utilized in the steps of the emergency procedures in order to alert the operating staff.

The ICCI displays are located on Section B-F (Train 'A') of the Seabrook Station control board and at the Shift Technical Advisor's console (Train 'B').

E. Design and Qualification for Accident Monitoring Instrumentation

1. Equipment Qualification

Listed below are the appropriate documents indicating the qualification tests conducted on the ICCI subsystems.

a. Core Exit Thermocouple Monitoring

Subsystem	Document
1. Connectors and penetrations	NHY EQ File No. 118-01-01 NHY EQ File No. 118-04-01
2. Microprocessors and cabinets	ESE-53
3. Plasma Display	ESE 61A ESE 61B
4. Control Board Indicators	Westinghouse Electric Corporation F.P. 72789

b. Core Subcooling Margin Monitoring

Subsystem	Document
1. Wide Range RCS Pressure	ESE-1A
2. Connectors and penetrations	NHY EQ File No. 118-01-01 NHY EQ File No. 118-04-01

3. Microprocessors	ESE-53
4. Plasma Display	ESE-61A ESE-61B

c. RVLIS Monitoring System

Subsystem	Document
1. Wide Range RCS Pressure	ESE-1A
2. Differential Pressure	ESE-4
3. Connectors and penetrations	NHY EQ File No. 118-01-01 NHY EQ File No. 118-04-01
4. Hydraulic Isolator	ESE-49
5. Reference Leg RTD's	ESE-42
6. Microprocessors	ESE-53
7. Plasma Display	ESE-63A
8. High Volume Sensor	ESE-48

2. Single Failure Criteria

RVLIS, subcooling margin monitors, and inadequate core cooling monitors are train oriented and therefore meet the single failure criteria.

3. Power Supply - The ICC monitors and plasma displays for both trains are powered by 120 VAC vital buses.

4. Channel Availability and Indication

   The operator has access to all ICCI channels at all times pre- and post-accident on the displays discussed in this report.

5. Quality Assurance

   All hardware associated with the Seabrook Station ICCI monitoring systems meets the applicable portions of the quality assurance regulatory guides. The software of these subsystems is covered by a verification plan that includes review of the associated documentation and testing of the software by verifiers independent of the designers.

6. Direct readout is provided through the plasma graphics. Hard copy capability is provided via data links to the main plant computer system.

7. Capability for Sensor Checks

   The Seabrook Station ICC Monitor provides the means for quality coding ICCI outputs. Quality codes are displayed on the various plasma display pages.

8. Capability for Test and Calibration

Servicing, testing, and calibration programs are specified to maintain the capability of the monitoring instrumentation. In addition, a self-testing capability has been provided. This consists of the sensor data checks described above, continuous program diagnostics and self-calibration. Program diagnostics check for system memory failure, mathematical errors, clock and timing errors. Self-calibration is performed serially on each channel. One channel is taken off line at a time to minimize the impact of the self-test on the ability of the system to monitor the plant. The self-calibration is initiated every 12 hours. By this self-calibration, the effects of drift are essentially eliminated in the analog portion of the hardware.

9. Channel Removal from Operation

Whenever means for removing channels from service are included in the design, the design facilitates administrative control of the access of such removal.

10. Access to Setpoints Adjustments, Calibration and Test Points

The design facilitates administrative control of the access to setpoint adjustments, module calibration adjustments, and test points.

11. Information Readout

The monitoring instrumentation design utilizes human-factored displays to minimize indications potentially confusing to the operator.

12. System Repair

The instrumentation is designed to facilitate the recognition, location, replacement, repair, or adjustment of malfunctioning components or modules.

13. Derivation of System Inputs

To the extent practicable, monitoring instrumentation inputs are from sensors that directly measure the desired variables. An indirect measurement is made only when it can be shown by analysis to provide unambiguous information.

14. Instrumentation Utilization

To the extent practical, the Seabrook Station ICCI monitoring system has been designed and located in such a manner that the operator uses the ICCI displays during both normal operation and post accident situations.

15. Periodic Testing

Periodic checking, testing, and calibration verification are in accordance with the applicable portions of RG 1.118.

V. Schedule

The Seabrook Station ICCI monitoring system is to be installed and tested prior to fuel load. Furthermore, the system will be calibrated prior to the plant achieving 5 percent power.

VI. Integration with Emergency Operating Procedures

Seabrook Station is adopting the format and content of the Westinghouse Owners Group (WOG) Emergency Response Guidelines for writing the plant specific procedures. Attachment I illustrates the generic WOG Critical Safety Function Status Tree for monitoring the status of plant core cooling. As seen, all variables necessary to implement the core cooling status tree are provided by the Seabrook Station ICC instrumentation system. The Functional Restoration Guideline, to which the operator is directed based upon the logic dictated by the tree, also utilizes the information provided by the ICC instrumentation. Attachment II provides a listing of the generic WOG guideline FR-C.1 "Response to Inadequate Core Cooling." Note the use of core exit thermocouple temperature in steps 5, 7, 16, and 18. Also note that the RVLIS indication is utilized in steps 6, 16, and 23. A review of Seabrook Station procedures FR-C.2, "Response to Degraded Core Cooling," and FR-C.3, "Response to Saturated Core Cooling," also demonstrates the extensive use of ICC instrumentation readings.

Attachment III provides a listing of the generic WOG guideline E-0, "Reactor Trip or Safety Injection". Note the use of core exit thermocouple temperature for calculating RCS subcooling margin in step 25. Similar subcooling margins are utilized throughout the generic guidelines.

VII. Integration with Control Room Design Review

The ICCI displays were reviewed as part of the Control Room Design Review. This review included a determination of the required characteristics of these displays to support the Emergency Response Procedures and then a verification that the available displays met these requirements. The ICCI displays were found acceptable from this review.

TRAIN A		TRAIN B	
LOCATION	SENSOR	LOCATION	SENSOR
	QUAD I		
B08	TE-35	B03	TE-57
C05	TE-33	B06	TE-39
C07	TE-28	C08	TE-27
D03	TE-42	D08	TE-15
F01	TE-51	E05	TE-20
F08	TE-05	F03	TE-30
G05	TE-11	F07	TE-07
	QUAD II		
A11	TE-54	A09	TE-47
D10	TE-23	B13	TE-58
D14	Te-49	D12	TE-31
G09	Te-03	E09	TE-12
G12	TE-17	E11	TE-21
H11	TE-09	F14	TE-40
H15	Te-43	H13	TE-24
	QUAD III		
J14	TE-36	J08	TE-01
K12	TE-22	J10	TE-06
L08	TE-10	L11	TE-18
L10	TE-13	L13	TE-32
N08	TE-25	L15	TE-52
N14	TE-55	N13	TE-45
R08	TE-44	P09	TE-37
R11	TE-53		
	QUAD IV		
H03	TE-26	H02	TE-34
J01	TE-46	H04	TE-14
J07	TE-02	H06	TE-04
L05	TE-19	K02	TE-38
N02	TE-56	K06	TE-08
N06	TE-29	M07	TE-16
P04	TE-48	N04	TE-41
		R06	TE-50

Table 1. Thermocouple Orientation by Train and Core Quadrant

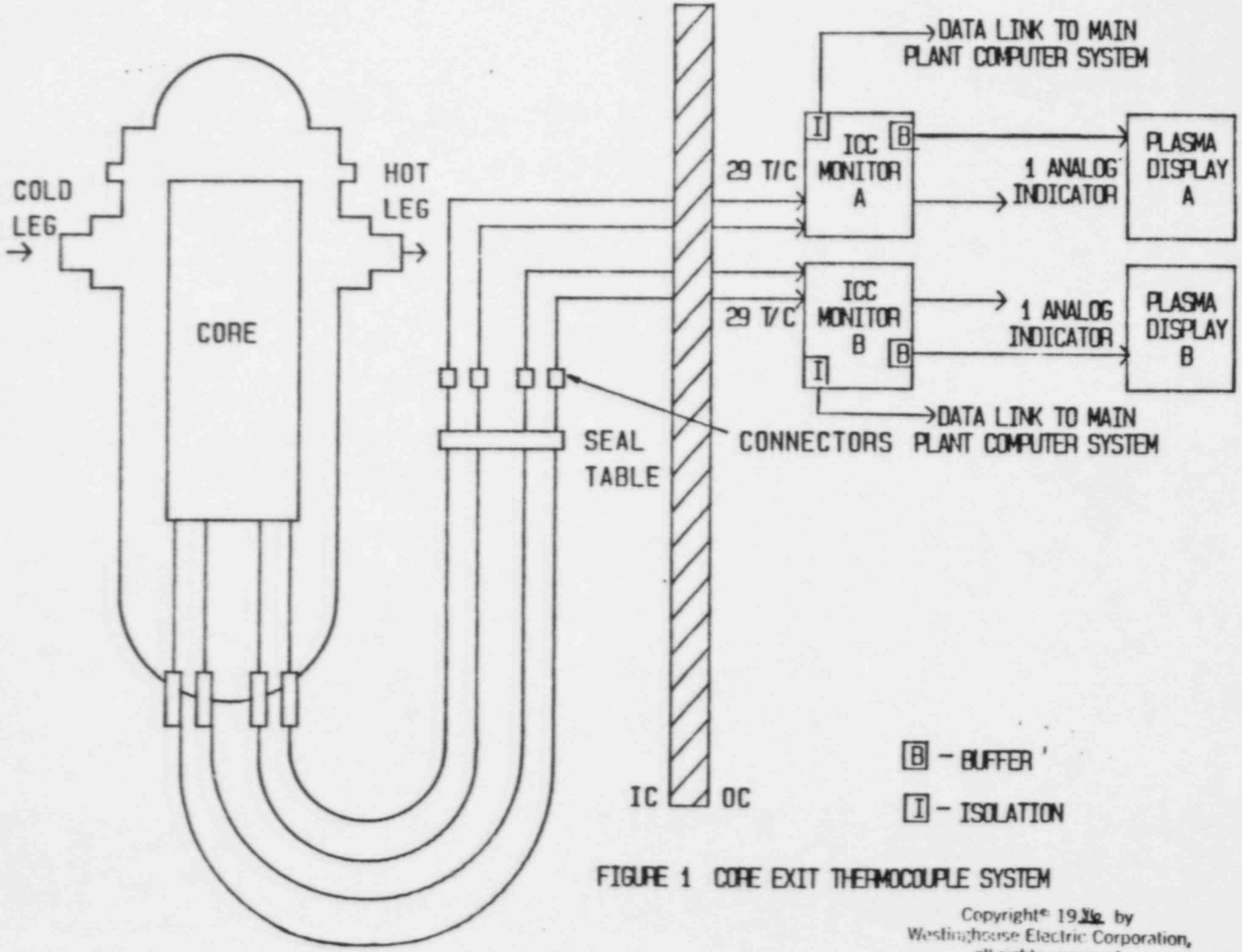

FIGURE 1 CORE EXIT THERMOCOUPLE SYSTEM

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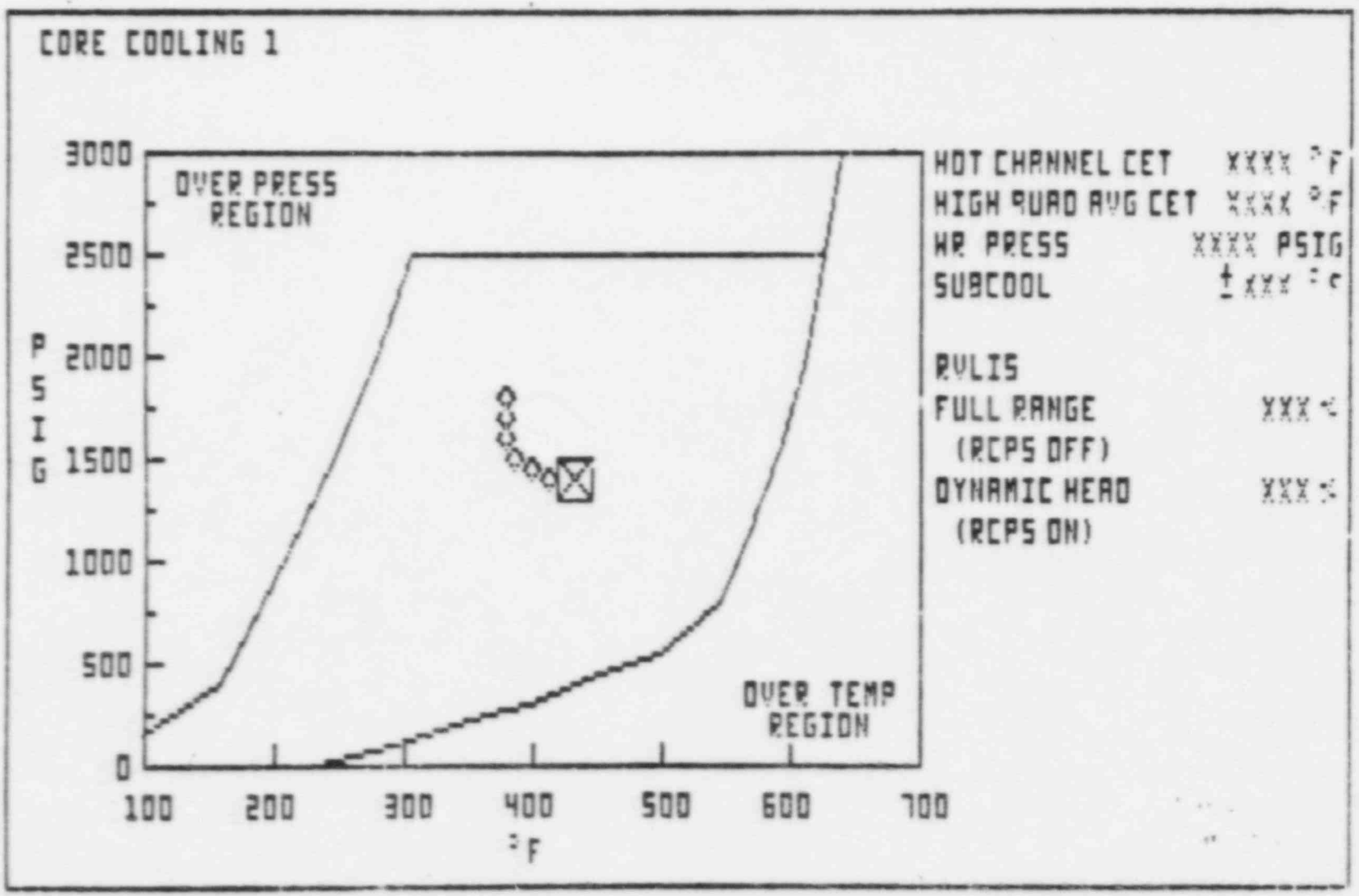

Figure 2. Core Cooling 1

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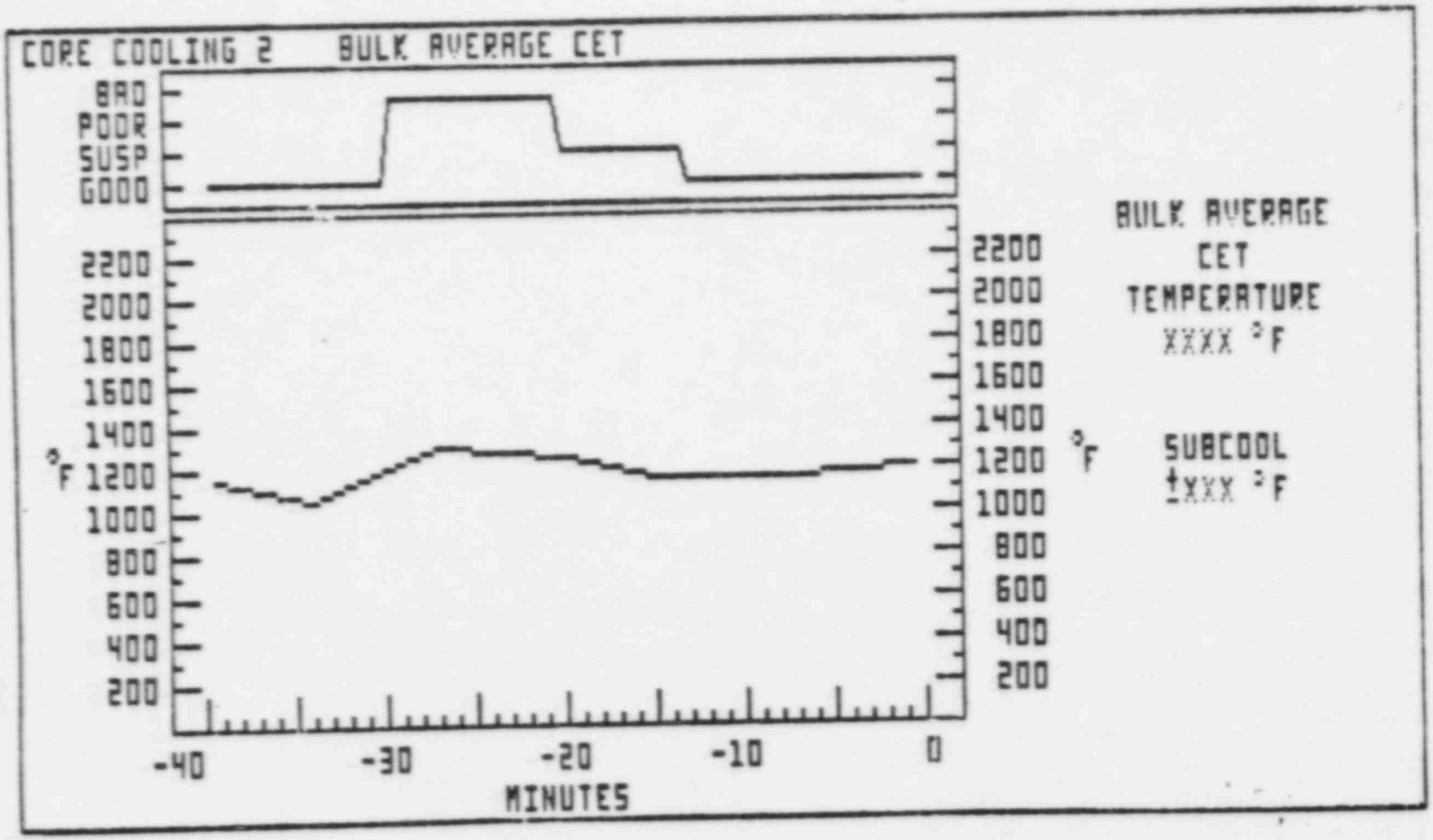

Figure 3. Core Cooling 2

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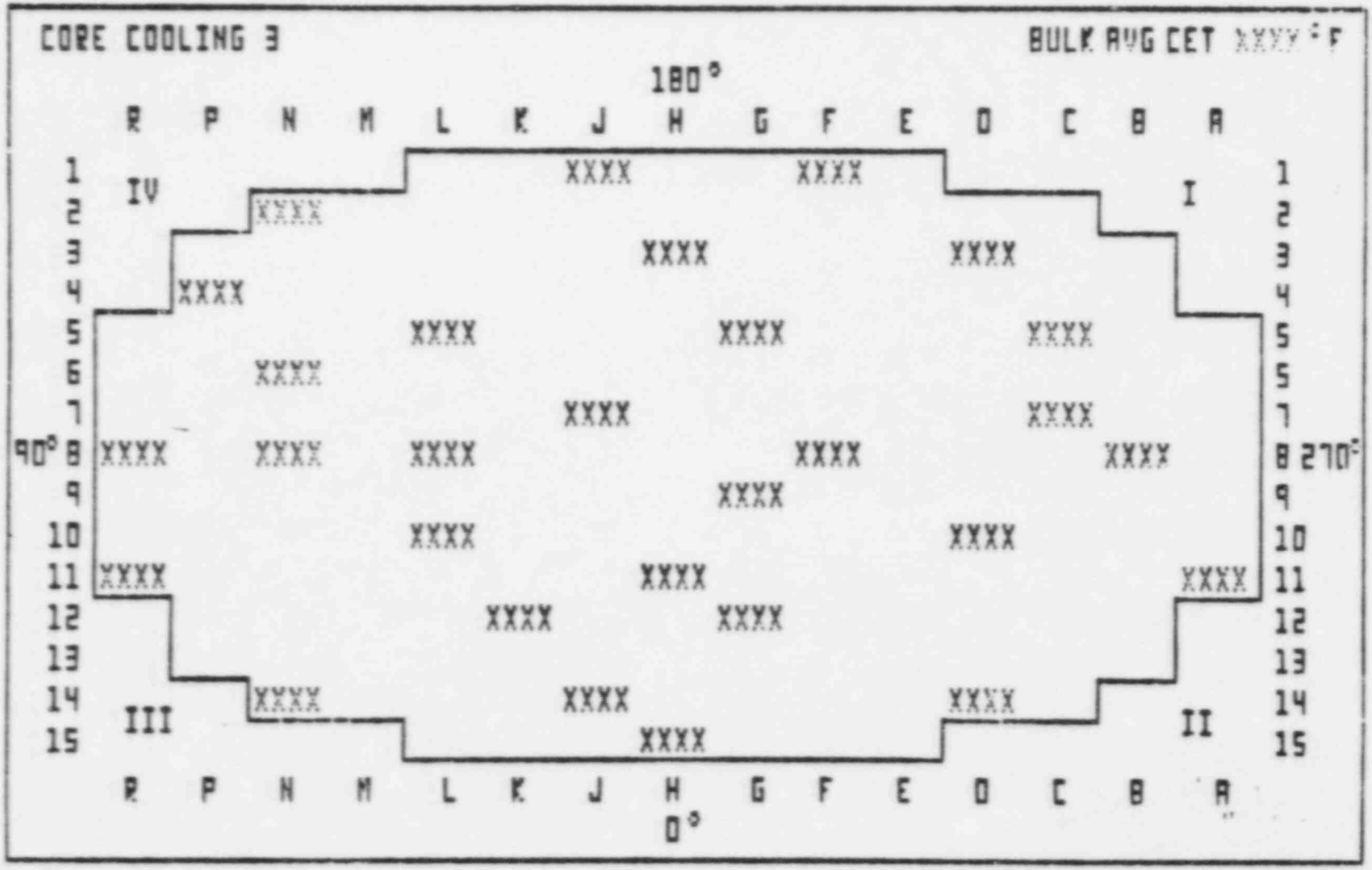

Figure 4. Core Cooling 3

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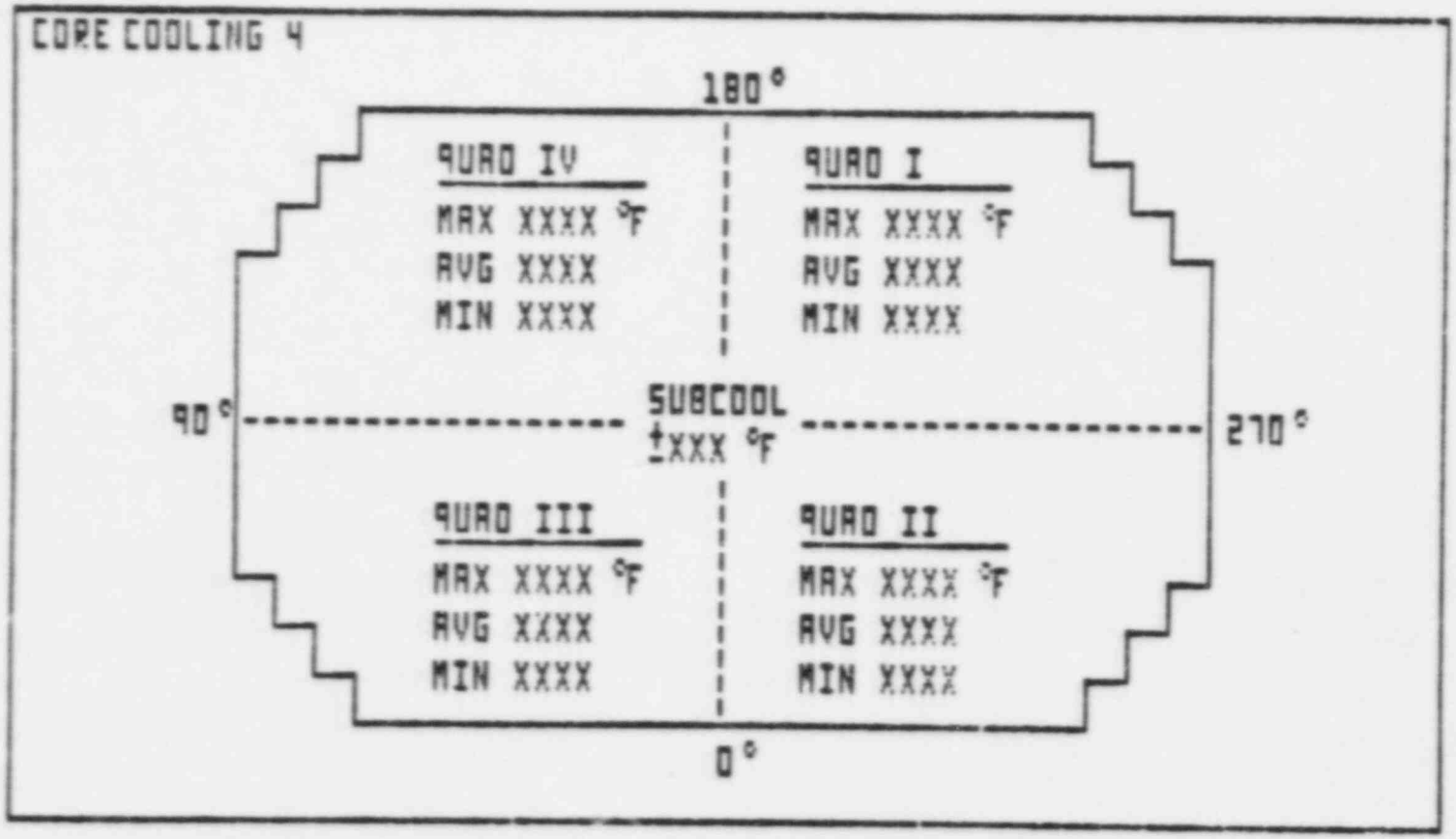

Figure 5. Core Cooling 4

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CORE COOLING 5

QUAD I			QUAD II		
LOC	SENSOR	°F	LOC	SENSOR	°F
B08	TE-35	XXXX	A11	TE-54	XXXX
C05	TE-33	XXXX	D10	TE-23	XXXX
C07	TE-28	XXXX	D14	TE-49	XXXX
D03	TE-42	XXXX	G09	TE-03	XXXX
F01	TE-51	XXXX	G12	TE-17	XXXX
F08	TE-05	XXXX	H11	TE-09	XXXX
G05	TE-11	XXXX	H15	TE-43	XXXX

Figure 6. Core Cooling 5

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CORE COOLING 6

QUAD III			QUAD IV		
LOC	SENSOR	°F	LOC	SENSOR	°F
J14	TE-36	XXXX	H03	TE-26	XXXX
K12	TE-22	XXXX	J01	TE-46	XXXX
			J07	TE-02	XXXX
L08	TE-10	XXXX			
L10	TE-13	XXXX	L05	TE-19	XXXX
N08	TE-25	XXXX	N02	TE-56	XXXX
N14	TE-55	XXXX	N06	TE-29	XXXX
R08	TE-44	XXXX	P04	TE-48	XXXX
R11	TE-53	XXXX			

Figure 7. Core Cooling 6

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Seabrook Thermocouple Diagnostic Page 1 Train A

CORE COOLING 7 TIME 09:45:56 MESSAGE 76

A11	603.379 30 00	G09	607.023 30 00	L08	607.391 30 00
B08	607.286 30 00	G12	608.012 30 00	L10	607.902 30 00
C05	605.002 30 00	H03	604.476 30 00	N02	607.294 30 00
C07	608.387 30 00	H11	607.294 30 00	N06	608.208 30 00
D03	608.739 30 00	H15	606.300 30 00	N08	608.000 30 00
D10	606.285 30 00	J01	605.251 30 00	N14	605.973 30 00
D14	606.835 30 00	J07	607.017 30 00	P04	608.924 30 00
F01	606.475 30 00	J14	606.374 30 00	R08	607.940 30 00
F08	607.173 30 00	K12	606.845 30 00	R11	608.947 30 00
G05	605.946 30 00	L05	607.763 30 00		

T/C REFERENCE JUNCTION RTD 70.374 30 00

DIAGNOSTIC INFORMATION

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Figure 8. Core Cooling 7

Seabrook Thermocouple Diagnostic Page 2 Train A

CORE COOLING 8 TIME 09:44:30 MESSAGE 45

MAX I	608.739 30 00	SUBCOOL	44.398 30 00
AVG I	607.001 30 00	BULK AVERAGE TEMP	606.981 30 00
MIN I	605.002 30 00	MAX QUAD AVERAGE	606.990 30 00
MAX II	608.012 30 00	HOT CHANNEL TEMP	608.739 30 00
AVG II	606.447 30 00		
MIN II	603.379 30 00		
MAX III	608.947 30 00	RC-TI-9424A	608.739
AVG III	607.422 30 00	RC-TI-9423A	+44.398
MIN III	605.973 30 00		
MAX IV	608.924 30 00		
AVG IV	606.990 30 00	HIGH INCORE TEMP ALARM STATUS	00
MIN IV	604.476 30 00	SUBCOOL MARGIN ALARM STATUS	00

DIAGNOSTIC INFORMATION

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Figure 9. Core Cooling 8

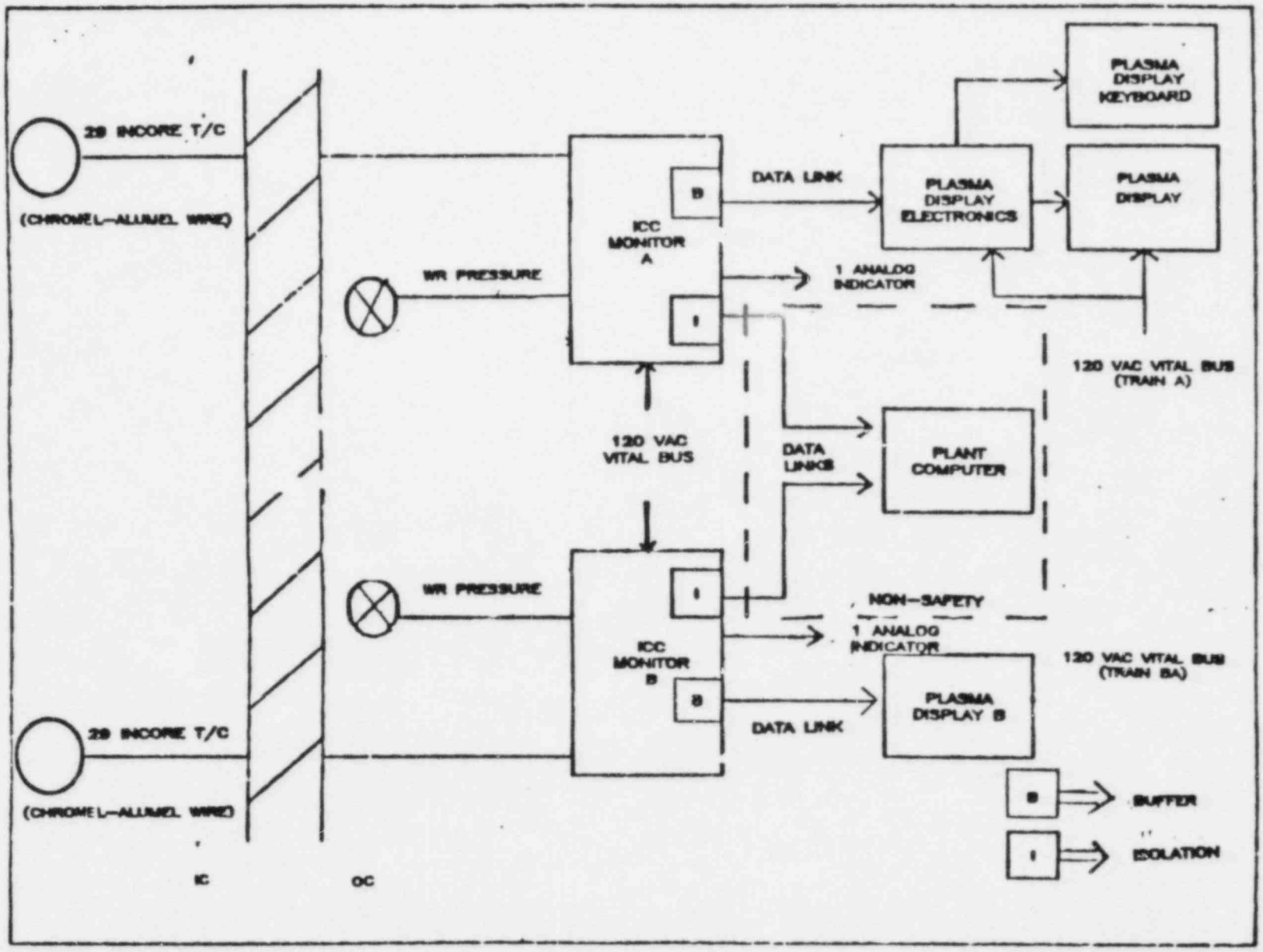

Figure 10. Block Diagram of Subcooling Margin Monitoring System

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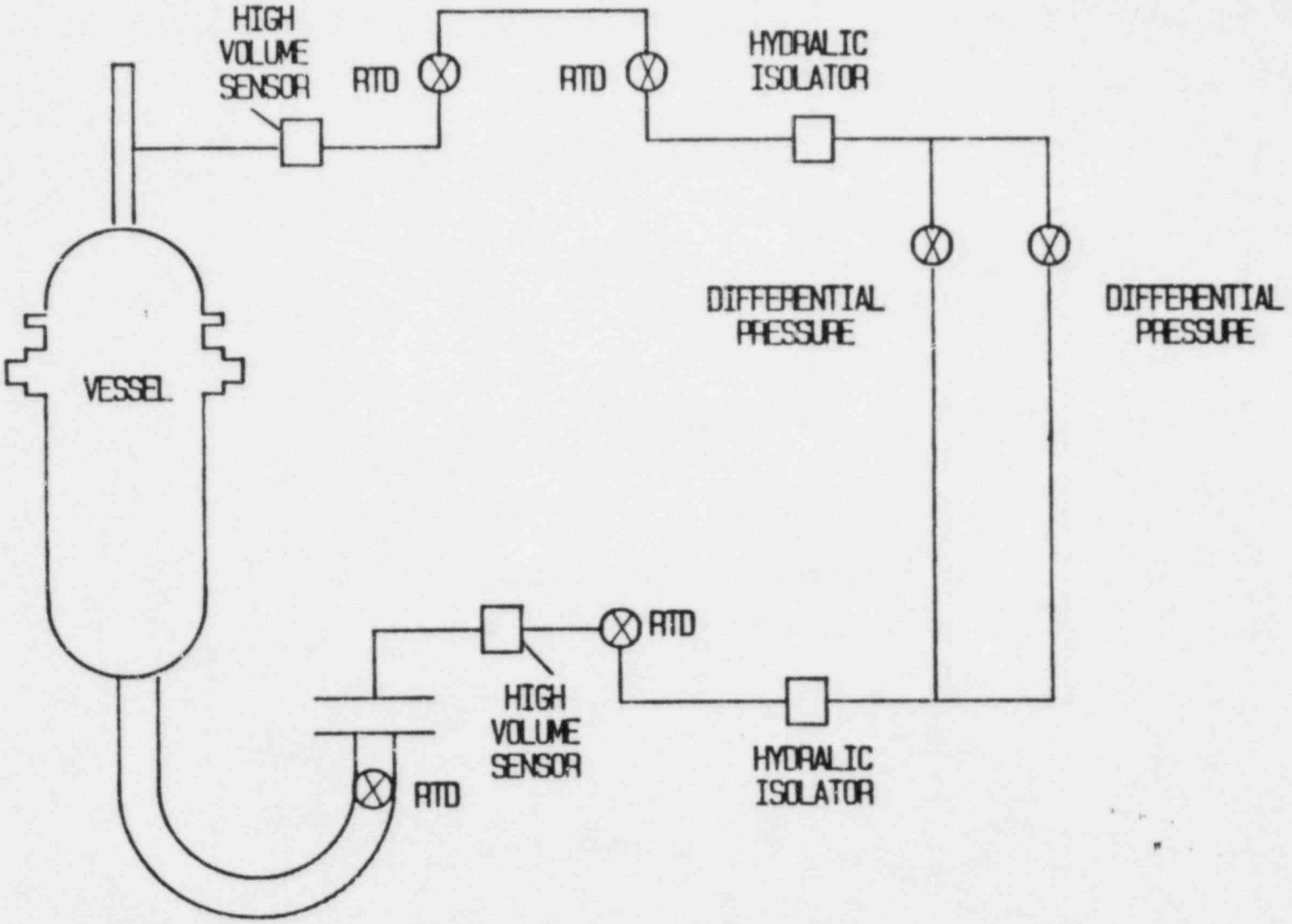

Figure 11. RVLIS Layout

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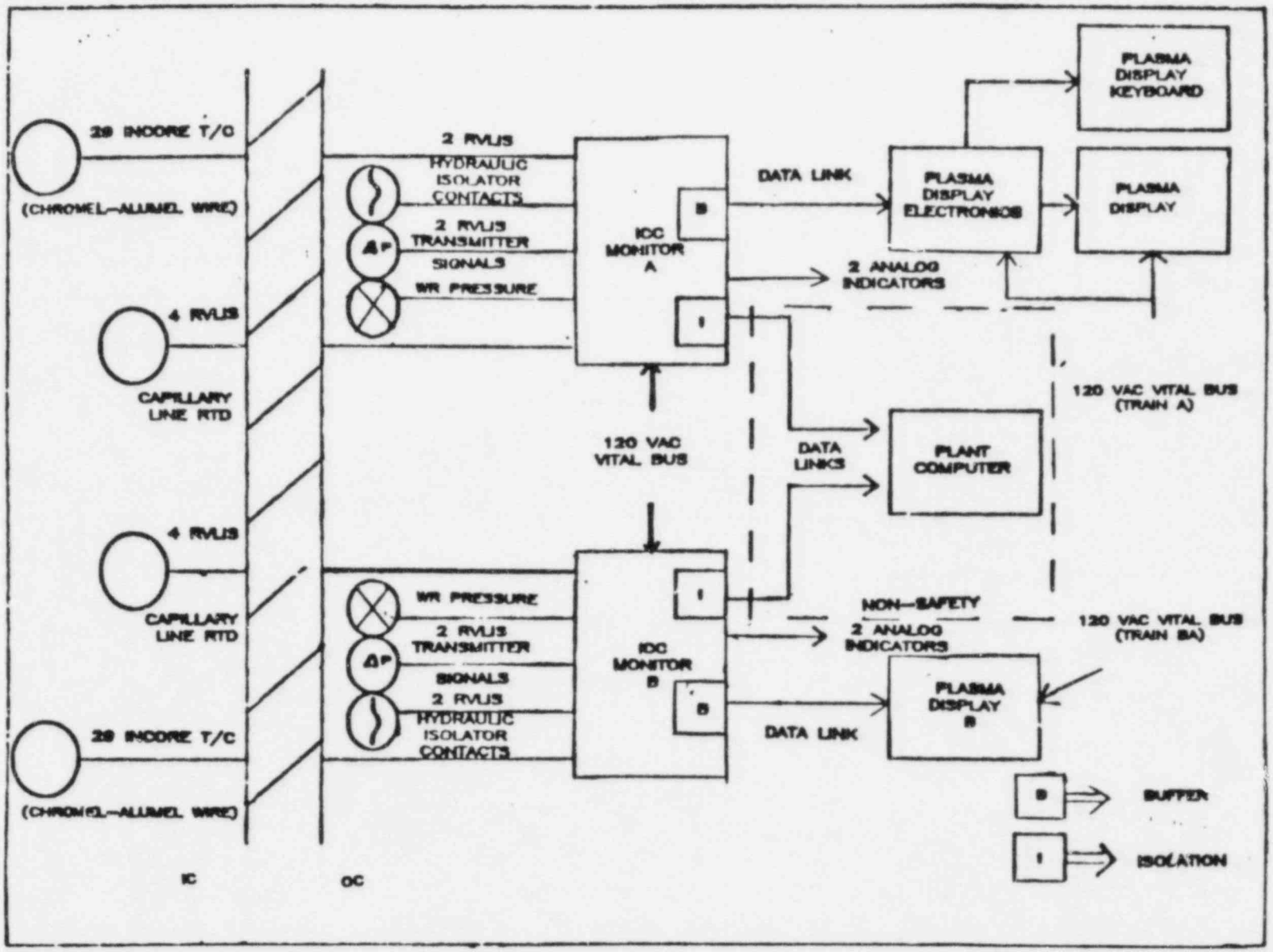

Figure 12. Block Diagram of RVLIS

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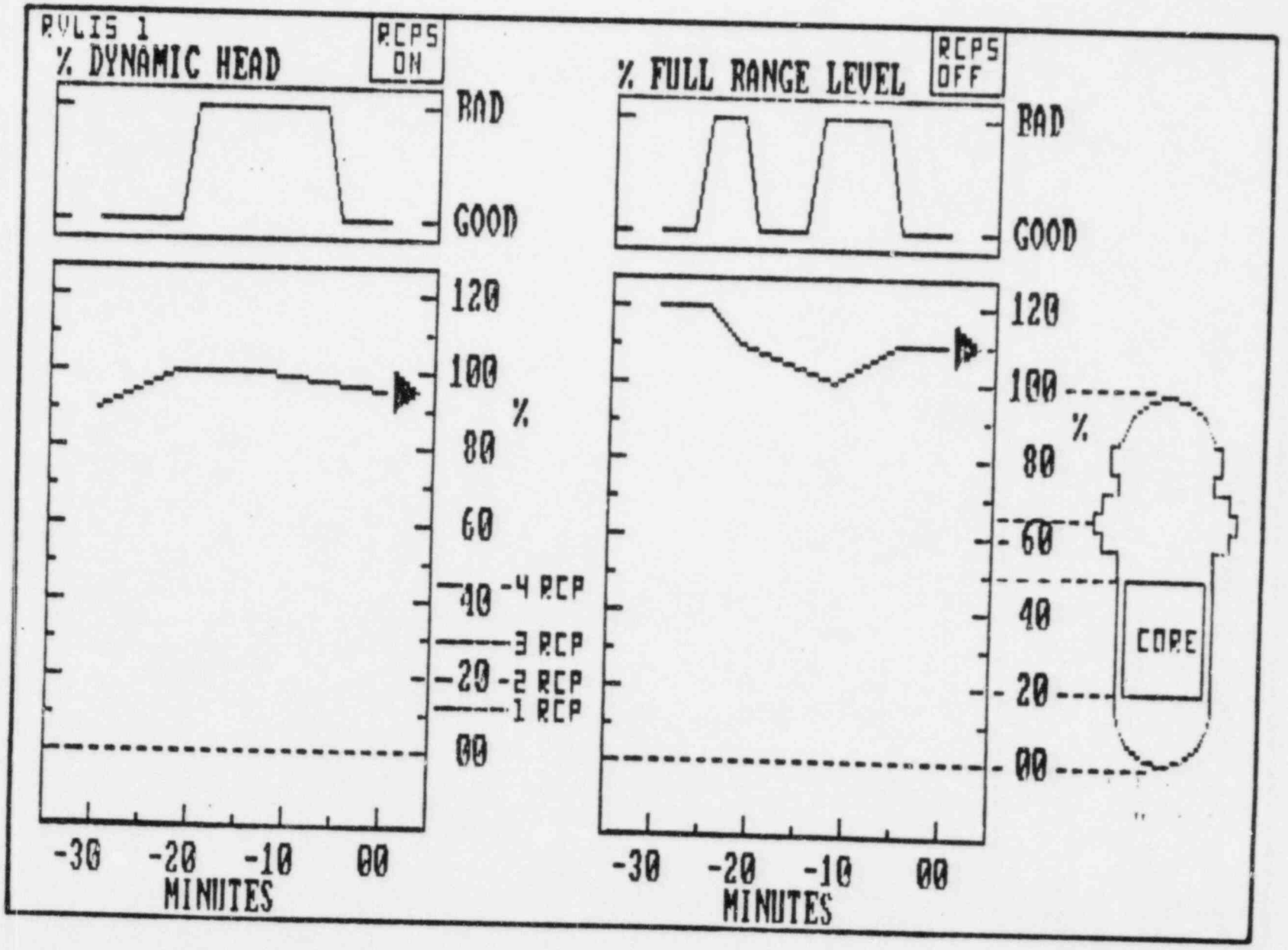

Figure 13. RVLIS 1

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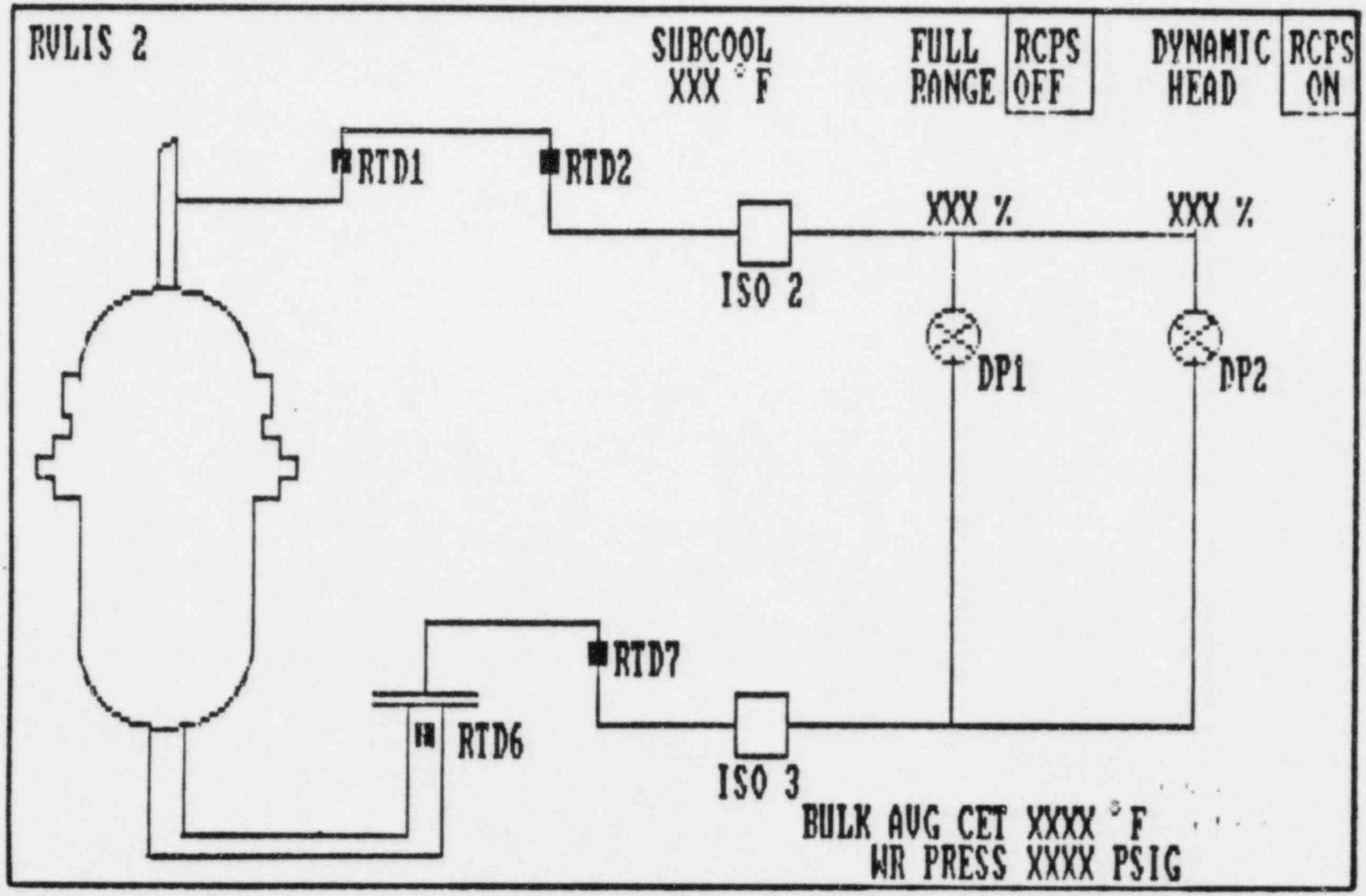

Figure 14. RVLIS 2

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Seabrook Rvlis Diagnostic Page Train A

```
RVLIS 3                                TIME 09:46:56          MESSAGE   50

LT-1311        -1.408 30 00      FULL RANGE       120.000 34 00
LT-1312        24.451 30 00      DYNAMIC HEAD     107.191 34 00

RC-TE-1313     90.347 30 00
RC-TE-1314     92.590 30 00      RC-LI-1311       120.000
RC-TE-1318     90.281 30 00      RC-LI-1312       107.191
RC-TE-1319     91.603 30 00

WR PRESS     2230.094 30 00      LIS-1311   00 00                    -
                                 LIS-1312   00 00



                                 FULL RANGE LOW LEVEL ALARM STATUS   00
                                 DYNAMIC HEAD LOW ALARM STATUS       00
                                 SYSTEM TROUBLE ALARM STATUS         00
DIAGNOSTIC INFORMATION
```

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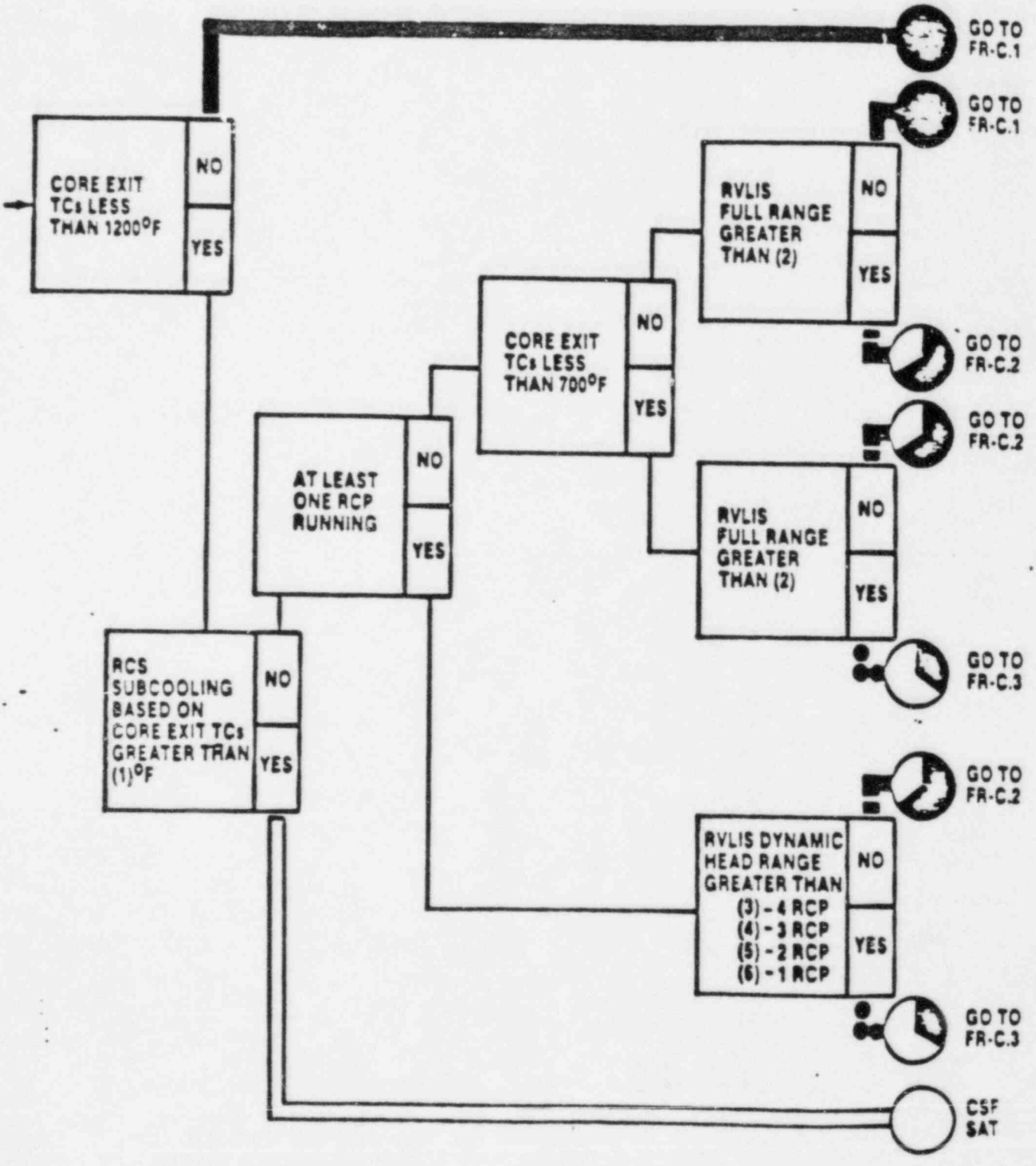
Figure 15. RVLIS 3

ATTACHMENT I

Number:	Title:	Rev. Issue/Date:
F-0.2	CORE COOLING	HP/LP, REV. 1 1 Sept., 1983



ATTACHMENT II

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	CAUTION • *If RWST level decreases to less than (1), the SI System should be aligned for cold leg recirculation using ES-1.3, TRANSFER TO COLD LEG RECIRCULATION.* • *Low-head SI pumps should not be run longer than (2) without CCW to the RHR heat exchangers.*	
1	**Verify SI Valve Alignment - PROPER EMERGENCY ALIGNMENT**	Manually align valves as necessary.
2	**Verify SI Flow in All Trains:** • Charging/SI pump flow indicators - CHECK FOR FLOW • High-head SI pump flow indicators - CHECK FOR FLOW • Low head SI pump flow indicators - CHECK FOR FLOW	Start pumps and align valves as necessary. Try to establish any other high pressure injection: [Enter plant specific list].
3	**Check RCP Support Conditions - AVAILABLE** [Enter plant specific list]	Try to establish support conditions.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4	**Check SI Accumulator Isolation Valve Status:**	
	a. Power to isolation valves - AVAILABLE	a. Restore power to isolation valves.
	b. Isolation valves - OPEN	b. Open isolation valves unless closed after accumulator discharge.
5	**Check Core Exit TCs - LESS THAN 1200°F**	Go to Step 8.
6	**Check RVLIS Full Range Indication:**	
	a. Indication - GREATER THAN *(3)*	a. IF increasing, THEN return to Step 1. IF NOT, THEN go to Step 7.
	b. Return to guideline and step in effect	
7	**Check Core Exit TCs:**	
	a. Temperature - LESS THAN 700°F	a. IF decreasing THEN return to Step 1. IF NOT, THEN go to Step 8.
	b. Return to guideline and step in effect	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	NOTE *This guideline should be continued while obtaining hydrogen sample in Step 8.*	
8	**Check Containment Hydrogen Concentration:** a. Obtain a hydrogen concentration measurement: [Enter plant specific means] b. Hydrogen concentration - LESS THAN 6.0% IN DRY AIR c. Hydrogen concentration - LESS THAN 0.5% IN DRY AIR	b. Consult plant engineering staff for additional recovery actions. Go to Step 9. c. Turn on hydrogen recombiner system.
	CAUTION • *Alternate water sources for AFW pumps will be necessary if CST level decreases to less than (4).* • *A faulted or ruptured SG should not be used in subsequent steps unless no intact SG is available.*	
9	**Check Intact SG Levels:** a. Narrow range level - GREATER THAN (5)% [(6)% FOR ADVERSE CONTAINMENT] b. Control feed flow to maintain narrow range level between (5)% [(6)% for adverse containment] and 50%	a. Increase total feed flow to restore narrow range level greater than (5)% [(6)% for adverse containment]. IF total feed flow less than (7) gpm, THEN go to Step 18. OBSERVE NOTE PRIOR TO STEP 18.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10	**Check RCS Vent Paths:**	
	a. Power to PRZR PORV block valves - AVAILABLE	a. Restore power to block valves.
	b. PRZR PORVs - CLOSED	b. Manually close PRZR PORVs. IF any valve can NOT be closed, THEN manually close its block valve.
	c. Block valves - AT LEAST ONE OPEN	c. Open block valve unless it was closed to isolate an open PRZR PORV.
	d. Other RCS vent paths - CLOSED [Enter plant specific list]	d. Close any open RCS vent path.
	NOTE Partial uncovering of SG tubes is acceptable in the following steps.	
11	**Depressurize All Intact SGs To *(8)* PSIG:**	
	a. Dump steam to condenser at maximum rate	a. Dump steam at maximum rate using SG PORVs.
	b. Check SG pressures - LESS THAN *(8)* PSIG	b. IF SG pressure decreasing, THEN return to Step 9. IF NOT, THEN go to Step 18. OBSERVE NOTE PRIOR TO STEP 18.
	c. Check RCS hot leg temperatures - AT LEAST TWO LESS THAN 400°F	c. IF RCS hot leg temperatures decreasing, THEN return to Step 9. IF NOT, THEN go to Step 18. OBSERVE NOTE PRIOR TO STEP 18.
	d. Stop SG depressurization	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12	**Check If SI Accumulators Should Be Isolated:**	
	a. At least two RCS hot leg temperatures - LESS THAN 400°F	a. Go to Step 18. OBSERVE NOTE PRIOR TO STEP 18.
	b. Close all SI accumulator isolation valves	b. Vent any unisolated accumulator.
13	**Stop All RCPs**	
14	**Depressurize All Intact SGs To Atmospheric Pressure:**	
	a. Dump steam to condenser at maximum rate	a. Dump steam at maximum rate using SG PORVs.
15	**Verify SI Flow:**	Continue efforts to establish SI flow. Try to establish any other high pressure injection:
	• Charging/SI pump flow indicators - CHECK FOR FLOW	[Enter plant specific list].
	—OR—	IF core exit TCs less than 1200°F, THEN return to Step 14. IF NOT, THEN go to Step 18. OBSERVE NOTE PRIOR TO STEP 18.
	• High-head SI pump flow indicators - CHECK FOR FLOW	
	—OR—	
	• Low-head SI pump flow indicators - CHECK FOR FLOW	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16	**Check Core Cooling:**	
	a. Core exit TCs - LESS THAN 1200°F	a. Go to Step 18. OBSERVE NOTE PRIOR TO STEP 18.
	b. At least two RCS hot leg temperatures - LESS THAN 350°F	b. Return to Step 14.
	c. RVLIS full range indication - GREATER THAN *(9)*	c. Return to Step 14.
17	**Go To E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 12**	
	NOTE Normal conditions are desired but not required for starting the RCPs.	
18	**Check Core Exit TCs - LESS THAN 1200°F**	Start RCPs as necessary until core exit TCs less than 1200°F. IF core exit TCs greater than 1200°F and all available RCPs running, THEN open all PRZR PORVs and block valves. IF core exit TCs greater than 1200°F and all PRZR PORVs and block valves open, THEN open all other RCS vent paths to containment.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19	**Try To Locally Depressurize All Intact SGs To Atmospheric Pressure:** • Use PORV —OR— • [Enter plant specific means]	Use faulted or ruptured SG.
20	**Check If SI Accumulators Should Be Isolated:**	
	a. Low-head SI pump flow indicators - AT LEAST INTERMITTENT FLOW	a. Return to Step 18.
	b. Close all SI accumulator isolation valves	b. Vent any unisolated accumulator.
21	**Check If RCPs Should Be Stopped:**	
	a. At least two RCS hot leg temperatures - LESS THAN 350°F	a. Go to Step 22.
	b. Stop all RCPs	
22	**Verify SI Flow:** • Charging/SI pump flow indicators - CHECK FOR FLOW —OR— • High-head SI pump flow indicators - CHECK FOR FLOW —OR— • Low-head SI pump flow indicators - CHECK FOR FLOW	Continue efforts to establish SI flow. Try to establish any other high pressure injection: [Enter plant specific list]. Return to Step 18.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23	**Check Core Cooling:** • RVLIS full range indication - GREATER THAN *(9)* • At least two RCS hot leg temperatures - LESS THAN 350°F	Return to Step 18.
24	**Go To E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 12**	

--END--

FOOTNOTES

(1) *Enter plant specific value corresponding to RWST switchover setpoint in plant specific units.*

(2) *Enter plant specific time.*

(3) *Enter plant specific value which is 3-1/2 feet above the bottom of active fuel in core with zero void fraction, plus uncertainties.*

(4) *Enter plant specific value corresponding to CST low level switchover setpoint in plant specific units.*

(5) *Enter plant specific value showing SG level just in the narrow range, including allowances for normal channel accuracy.*

(6) *Enter plant specific value showing SG level just in the narrow range, including allowances for normal channel accuracy, post accident transmitter errors, and reference leg process errors, not to exceed 50%.*

(7) *Enter the minimum safeguards AFW flow requirement for heat removal, plus allowances for normal channel accuracy (typically one MD AFW pump at SG design pressure).*

(8) *Enter plant specific value which is 200 psig, minus allowances for normal channel accuracy.*

(9) *Enter plant specific value which is above the top of active fuel in core with zero void fraction, plus uncertainties.*

ATTACHMENT III

Number:	Title:	Rev Issue Date:
E-0	REACTOR TRIP OR SAFETY INJECTION	HP-Rev. 1 1 Sept. 1983

A. PURPOSE

This guideline provides actions to verify proper response of the automatic protection systems following manual or automatic actuation of a reactor trip or safety injection, to assess plant conditions, and to identify the appropriate recovery guideline.

B. SYMPTOMS OR ENTRY CONDITIONS

1) The following are symptoms that require a reactor trip, if one has not occurred:
[Enter plant specific setpoints and requirements].

2) The following are symptoms of a reactor trip:

   a. Any reactor trip annunciator lit.

   b. Rapid decrease in neutron level indicated by nuclear instrumentation.

   c. All shutdown and control rods are fully inserted. Rod bottom lights are lit.

3) The following are symptoms that require a reactor trip and safety injection, if one has not occurred:
[Enter plant specific setpoints and requirements].

4) The following are symptoms of a reactor trip and safety injection:

   a. Any SI annunciator lit.

   b. SI pumps running.

   c. [Enter plant specific list].

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE • *Steps 1 through 14 are IMMEDIATE ACTION steps.*

• *Foldout page should be open.*

1	**Verify Reactor Trip:** • Rod bottom lights - LIT • Reactor trip and bypass breakers - OPEN • Rod position indicators - AT ZERO • Neutron flux - DECREASING	Manually trip reactor. IF reactor will NOT trip, THEN go to FR-S.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS, Step 1.
2	**Verify Turbine Trip:** a. All turbine stop valves - CLOSED	a. Manually trip turbine.
3	**Verify Power To AC Emergency Busses:** a. AC emergency busses - AT LEAST ONE ENERGIZED	a. Try to restore power to at least one ac emergency bus. IF power can NOT be restored to at least one ac emergency bus, THEN go to ECA-0.0, LOSS OF ALL AC POWER, Step 1.
	b. AC emergency busses - ALL ENERGIZED	b. Try to restore power to deenergized ac emergency busses.
4	**Check If SI Is Actuated:** [Enter plant specific means]	Check if SI is required. IF SI is required, THEN manually actuate. IF SI is NOT required, THEN go to ES-0.1, REACTOR TRIP RESPONSE, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5	**Verify FW Isolation:** • Flow control valves - CLOSED • Flow control bypass valves - CLOSED • FW isolation valves - CLOSED • SG blowdown isolation valves - CLOSED • SG sample isolation valves - CLOSED	Manually close valves as necessary.
6	**Verify Containment Isolation Phase A:**	
	a. Phase A - ACTUATED	a. Manually actuate Phase A.
	b. Phase A valves - CLOSED	b. Manually close valves.
7	**Verify AFW Pumps Running:**	
	a. MD pumps - RUNNING	a. Manually start pumps.
	b. Turbine-driven pump - RUNNING IF NECESSARY	b. Manually open steam supply valves.
8	**Verify SI Pumps Running:** • Charging/SI pumps - RUNNING • High-head SI pumps - RUNNING • Low-head SI pumps - RUNNING	Manually start pumps.
9	**Verify CCW Pumps - RUNNING**	Manually start pumps.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10	**Verify Service Water Pumps - RUNNING**	Manually start pumps.
11	**Verify Containment Fan Coolers - RUNNING IN EMERGENCY MODE**	Manually start fan coolers in emergency mode.
12	**Verify Containment Ventilation Isolation:**	
	a. Dampers - CLOSED	a. Manually close dampers.

[Appropriate steps for verification of other essential equipment as required by the specific plant design should be placed after Step 12.]

13	**Check If Main Steamlines Should Be Isolated:**	
	a. [Enter plant specific means or setpoints]	a. Go to Step 14.
	b. Verify main steamline isolation and bypass valves - CLOSED	b. Manually close valves.
14	**Verify Containment Spray Not Required:**	
	a. Containment pressure - HAS REMAINED LESS THAN *(1)* PSIG	a. Perform the following: 1) Verify containment spray initiated. IF NOT, THEN manually initiate. 2) Verify containment isolation Phase B valves closed. IF NOT, THEN manually close valves. 3) Stop all RCPs.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15	**Verify SI Flow:**	
	a. Charging/SI pump flow indicators - CHECK FOR FLOW	a. Manually start pumps and align valves.
	b. RCS pressure - LESS THAN *(2)* PSIG [*(3)* PSIG FOR ADVERSE CONTAINMENT]	b. Go to Step 16.
	c. High-head SI pump flow indicators - CHECK FOR FLOW	c. Manually start pumps and align valves.
	d. RCS pressure - LESS THAN *(4)* PSIG [*(5)* PSIG FOR ADVERSE CONTAINMENT]	d. Go to Step 16.
	e. Low-head SI pump flow indicarors - CHECK FOR FLOW	e. Manually start pumps and align valves.
16	**Verify AFW Flow - GREATER THAN** *(6)* **GPM**	Manually start pumps and align valves as necessary. IF AFW flow greater than *(6)* gpm can NOT be established, THEN go to FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, Step 1.
17	**Verify AFW Valve Alignment - PROPER EMERGENCY ALIGNMENT**	Manually align valves as necessary.
18	**Verify SI Valve Alignment - PROPER EMERGENCY ALIGNMENT**	Manually align valves as necessary.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19	**Check RCS Average Temperature - STABLE AT OR TRENDING TO *(7)*°F**	IF temperature less than *(7)*°F and decreasing, THEN: a) Stop dumping steam. b) IF cooldown continues, THEN control total feed flow. Maintain total feed flow greater than *(6)* gpm until narrow range level greater than *(8)*% [*(9)*% for adverse containment] in at least one SG. c) IF cooldown continues, THEN close main steamline isolation and bypass valves. IF temperature greater than *(7)*°F and increasing, THEN: • Dump steam to condenser. —OR— • Dump steam using SG PORVs.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20	**Check PRZR PORVs And Spray Valves:**	
	a. PORVs - CLOSED	a. IF PRZR pressure less than *(10)* psig, THEN manually close PORVs. IF any valve can NOT be closed, THEN manually close its block valve. IF block valve can NOT be closed, THEN go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.
	b. Normal PRZR spray valves - CLOSED	b. IF PRZR pressure less than *(11)* psig, THEN manually close valves. IF valves can NOT be closed, THEN stop RCP(s) supplying failed spray valve(s).
	NOTE Seal injection flow should be maintained to all RCPs.	
21	**Check If RCPs Should Be Stopped:**	
	a. SI pumps - AT LEAST ONE RUNNING • Charging/SI —OR— • High-head SI	a. Go to Step 22.
	b. RCP Trip Parameter - LESS THAN *(12)* [*(13)* FOR ADVERSE CONTAINMENT]	b. Go to Step 22.
	c. Stop all RCPs	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
22	**Check If SGs Are Not Faulted:** a. Check pressures in all SGs – • NO SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER • NO SG COMPLETELY DEPRESSURIZED	a. Go to E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1.
23	**Check If SG Tubes Are Not Ruptured:** • Condenser air ejector radiation – NORMAL • SG blowdown radiation – NORMAL	Go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.
24	**Check If RCS Is Intact:** • Containment radiation – NORMAL • Containment pressure – NORMAL • Containment recirculation sump level – NORMAL	Go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
25	**Check If SI Flow Should Be Reduced:**	
	a. RCS subcooling based on core exit TCs - GREATER THAN *(14)*°F	a. DO NOT STOP SI PUMPS. Go to Step 27.
	b. Secondary heat sink: • Total feed flow to SGs - GREATER THAN *(6)* GPM —OR— • Narrow range level in at least one SG - GREATER THAN *(8)*%	b. IF neither condition satisfied, THEN DO NOT STOP SI PUMPS. Go to Step 27.
	c. RCS pressure - STABLE OR INCREASING	c. DO NOT STOP SI PUMPS. Go to Step 27.
	d. PRZR level - GREATER THAN *(15)*%	d. DO NOT STOP SI PUMPS. Try to stabilize RCS pressure with normal PRZR spray. Return to Step 25a.
26	**Go To ES-1.1, SI TERMINATION, Step 1**	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
27	**Initiate Monitoring Of Critical Safety Function Status Trees**	
	CAUTION Alternate water sources for AFW pumps will be necessary if CST level decreases to less than (16).	
28	**Check SG Levels:**	
	a. Narrow range level - GREATER THAN *(8)*%	a. Maintain total feed flow greater than *(6)* gpm until narrow range level greater than *(8)*% in at least one SG.
	b. Control feed flow to maintain narrow range level between *(8)*% and 50%	b. IF narrow range level in any SG continues to increase in an uncontrolled manner, THEN go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.
29	**Check Secondary Radiation - NORMAL** [Enter plant specific means]	Go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.
30	**Check Auxiliary Building Radiation - NORMAL**	Evaluate cause of abnormal conditions. IF the cause is a loss of RCS inventory outside containment, THEN go to ECA-1.2, LOCA OUTSIDE CONTAINMENT, Step 1.
31	**Check PRT Conditions - NORMAL**	Evaluate cause of abnormal conditions.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	CAUTION *If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment.*	
32	**Reset SI**	
33	**Reset Containment Isolation Phase A And Phase B**	
34	**Establish Instrument Air To Containment**	Start one air compressor and establish instrument air to containment.
	CAUTION *RCS pressure should be monitored. If RCS pressure decreases to less than (4) psig the low-head SI pumps must be manually restarted to supply water to the RCS.*	
35	**Check If Low-Head SI Pumps Should Be Stopped:** a. Check RCS pressure: 1) Pressure - GREATER THAN (4) PSIG 2) Pressure - STABLE OR INCREASING b. Stop low-head SI pumps and place in standby	1) Go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1. 2) Go to Step 36.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
36	**Check If Diesel Generators Should Be Stopped:**	
	a. Verify ac emergency busses - ENERGIZED BY OFFSITE POWER	a. Try to restore offsite power to ac emergency busses. IF offsite power can NOT be restored, THEN load the following equipment on ac emergency busses: [Enter plant specific list].
	b. Stop any unloaded diesel generator and place in standby	
37	**Return To Step 19**	

— END —

FOOTNOTES

(1) *Enter plant specific containment pressure setpoint for spray actuation.*

(2) *Enter plant specific value for the shutoff head pressure of the high-head SI pumps, plus allowances for normal channel accuracy.*

(3) *Enter plant specific value for the shutoff head pressure of the high-head SI pumps, plus allowances for normal channel accuracy and post accident transmitter errors, not to exceed 2000 psig.*

(4) *Enter plant specific value for the shutoff head pressure of the low-head SI pumps, plus allowances for normal channel accuracy.*

(5) *Enter plant specific value for the shutoff head pressure of the low-head SI pumps, plus allowances for normal channel accuracy and post accident transmitter errors.*

(6) *Enter the minimum safeguards AFW flow requirement for heat removal, plus allowances for normal channel accuracy (typically one MD AFW pump capacity at SG design pressure).*

(7) *Enter plant specific no-load temperature.*

(8) *Enter plant specific value showing SG level just in the narrow range, including allowances for normal channel accuracy.*

(9) *Enter plant specific value showing SG level just in the narrow range, including allowances for normal channel accuracy, post accident transmitter errors, and reference leg process errors, not to exceed 50%.*

(10) *Enter PRZR PORV pressure setpoint.*

(11) *Enter PRZR Spray pressure setpoint.*

(12) *Enter plant specific RCP trip parameter and setpoint, including allowances for normal channel accuracy. Refer to document RCP TRIP/RESTART in Generic Issues section of Executive Volume.*

(13) *Enter plant specific RCP trip parameter and setpoint, including allowances for normal channel accuracy and post accident transmitter errors. Refer to document RCP TRIP/RESTART in Generic Issues section of Executive Volume.*

(14) *Enter sum of temperature and pressure measurement system errors, including allowances for normal channel accuracies, translated into temperature using saturation tables.*

(15) *Enter plant specific value showing PRZR level just in range, including allowances for normal channel accuracy.*

(16) *Enter plant specific value corresponding to CST low level switchover setpoint in plant specific units.*