PSNH

SEABROOK STATION
Engineering Office

Public Service of New Hampshire

New Hampshire Yankee Division

August 30, 1985
SBN-864
T.F. B7.1.2

United States Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. George W. Knighton, Chief
Licensing Branch No. 3
Division of Licensing

References:
(a) Construction Permits CPPR-135 and CPPR-136, Docket Nos. 50-443 and 50-444
(b) PSNH letter (SBN-384), dated November 24, 1982, "Meeting Notes, Instrumentation and Control Systems Branch (ICSB)," J. DeVincentis to G. W. Knighton
(c) PSNH letter (SBN-499), dated April 14, 1983, "Response to Generic Letter 82-33; Supplement 1 to NUREG-0737," J. DeVincentis to D. G. Eisenhut

Subject: Accident Monitoring Instrumentation Review and Compliance with Regulatory Guide 1.97

Dear Sir:

Please find enclosed; revised FSAR Section 7.5 (Attachment I), an addition to the FSAR-Appendix 7A (Attachment II), and a marked-up FSAR Section 1.8 (Attachment III), which indicate Seabrook Station's compliance with Regulatory Guide 1.97, "Instrumentation for Light Water Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," Revision 3. This information will be incorporated into the FSAR by a future amendment.

The guidance provided in Regulatory Guide 1.97 and ANSI/ANS-4.5, 1980, "Criteria for Accident Monitoring Functions in Light-Water-Cooled Reactors," endorsed by Regulatory Guide 1.97, was used in selecting the Seabrook Accident Monitoring Instrumentation (AMI). Specific exceptions to or deviations from this guidance, with the associated justifications, are provided in the revised FSAR Section 7.5 and Appendix 7A.

As a result of the AMI review, we are replacing and relocating sensors and making circuit modifications. These modifications will be completed prior to fuel load.

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The enclosed completes our commitments made in RAIs 420.2, 420.49 and 420.51, as well as that provided in FSAR Section 1.8, regarding Seabrook's compliance to Regulatory Guide 1.97. This also satisfies Generic Letter No. 82-33, Supplement 1 to NUREG-0737, Requirement for Emergency Response Capability, Item No. 6 [Reference (c)]. Since any additional changes would adversely affect the project schedule, we request that you provide written notification of the acceptability of this submittal by September 30, 1985.

Very truly yours,

John DeVincentis, Director
Engineering and Licensing

Attachments

cc: Atomic Safety and Licensing Board Service List

SBN-864

ATTACHMENT I

(FSAR SECTION 7.5)

TABLE OF CONTENTS

LIST OF TABLES

7.5 SAFETY-RELATED DISPLAY INSTRUMENTATION

7.5.1 Introduction

Display instrumentation is provided in the Main Control Room to enable the operator to monitor plant status under all operating conditions and to take any necessary manual actions. This display instrumentation consists of analog and digital indicators, recorders, status lamps, indicating lights, Video Alarm System (VAS) alarms, video displays (CRT and plasma) and annunciators. Display instrumentation is also provided in the Technical Support Center (TSC) and the Emergency Operations Facility (EOF) to support the functions to be performed by the personnel in the TSC/EOF.

7.5.2 Definitions

Design Basis Accident Events

Those events postulated in the plant safety analyses, any one of which may occur during the lifetime of the plant, and those events not expected to occur, but postulated in the plant safety analyses because their consequences would include the potential for release of significant amounts of radioactive material to the environs. These events are listed in FSAR Chapter 15 as Conditions III and IV occurrences. Excluded are those events (defined as "normal" and "anticipated operational occurrences" in 10CFR50) expected to occur more frequently than once during the lifetime of the plant.

Task Analysis

Process of identifying and examining tasks that must be performed by the Control Room operating crew when interacting with the plant systems.

7.5.3 Discussion

An Accident Monitoring Instrumentation (AMI) list, Table 7.5-1, has been developed to define the instrumentation required by the operator for design basis accident events. The AMI enables the operator to monitor safety functions, take any manual actions required to support the accomplishment of safety functions and to determine the effect of manual actions during and following a design basis accident event. The AMI also enables the operator to maintain the plant in a hot shutdown condition, or to proceed to cold shutdown. Details are provided in Subsection 7.5.4.

Table 7.5-2 lists additional information available to the operator for monitoring conditions in the reactor, the Reactor Coolant System, the containment and key process systems throughout all normal operating conditions of the plant, including anticipated operational occurrences.

Status lamp arrays are used to indicate both a demand for a protective function/ESF actuation and the appropriate valve position and equipment status for ESF actuations. These arrays are functionally arranged on the Control Board to enable the operator to quickly and accurately monitor system status. Status lamp arrays are provided to monitor bistable trips for the following safety functions:

1. Reactor Trip
2. Safety Injection
3. Containment Isolation
4. Steam Line Isolation
5. Feedwater Line Isolation

To monitor valve position, actuated equipment status and emergency power availability, status lamp arrays are provided for the following:

1. Cold Leg Injection
2. Cold Leg Recirculation
3. Hot Leg Recirculation

4. Containment Isolation, Phase A
5. Containment Isolation, Phase B
6. Main Steam and Feedwater Isolation
7. Cooling Tower Actuation
8. Diesel Generator Status
9. Emergency Power Sequencer

A computer-based Video Alarm System (VAS) is provided to alert the operator when various process limits are exceeded. The incoming alarms are prioritized to allow the operators to focus on high priority alarms during major plant upsets. Three levels of priority have been established. Incoming alarms are also broken down into primary and secondary sides; primary side alarms are displayed on the alarm CRTs in Main Control Board Sections A and D, while secondary side alarms are displayed on the alarm CRTs in Sections F and I.

Various CRT-based dynamic displays are provided to serve the needs of the operating crew. These displays supplement those described above. CRT-based displays are provided in the Technical Support Center (TSC) and Emergency Operations Facility (EOF) to support the functions to be performed by the personnel in the TSC/EOF.

The computer system consists of two host computers, each of which is fed from a separate uninterruptible power supply. An automatic failover scheme is provided. The remainder of the system is configured such that system peripherals can be manually aligned to the available UPS.

Annunciators back up the VAS should a complete Computer System failure occur. The annunciators also have a limited "First Out" capability to assist the operator in determining the cause of a reactor trip or safety injection. A limited set of essential parameters is monitored for the following:

1. Reactor Trip Signals
2. ESF Actuation Signals
3. Certain Technical Specification Deviations
4. Important Systems

The Annunciators are powered from a vital instrument panel; this power source is independent of the power supply for the VAS.

Bypassed/inoperable condition of safety systems is displayed on the VAS and on status lamp arrays on the MCB - one per train. Refer to Subsection 7.1.2.6 for a complete discussion of compliance with Regulatory Guide 1.47.

7.5.4 Accident Monitoring Instrumentation

7.5.4.1 Compliance With Regulatory Guide 1.97

Regulatory Guide 1.97, Revision 3 endorses, subject to certain clarifications, ANSI/ANS 4.5-1980, "Criteria for Accident Monitoring Functions in Light-Water-Cooled Nuclear Reactors." The guidance provided in Regulatory Guide 1.97 and ANS 4.5, with certain exceptions, and NUREG-0737 has been used in selecting the Seabrook Accident Monitoring Instrumentation (AMI).

The exceptions to the guidance provided in Regulatory Guide 1.97 and ANSI/ANS 4.5 are:

1. Not all the variables recommended by Regulatory Guide 1.97, Table 3 have been included in the AMI List. Specific deviations and the associated justifications are provided in Appendix 7A.

2. Not all the AMI characteristics recommended by Regulatory Guide 1.97, Table 3 have been met. Specific deviations and the associated justifications are provided in Appendix 7A.

3. The determination of performance requirements for AMI did not follow the guidance of Regulatory Guide 1.97, Section C.2.4 in that:

   a) Required accuracy of measurement was not determined in procuring the instrumentation. Instead, the accuracy of the as-procured instrumentation was determined and then reviewed for acceptability. Further details are provided in Subsection 7.5.4.4.e.5.

b) Response characteristics (time) have not been determined for instrumentation channels that provide monitoring functions only. The response time for these channels is similar to the response time determined for ESF actuation channels since similar hardware is used. Therefore, determination of the response time for each channel is not necessary.

7.5.4.2 Description of Variable Types

a. Discussion

The accident monitoring variables are classified into five types (A, B, C, D or E) according to the monitoring function they perform. A definition of each type is provided in the following subsections.

b. Type A Variables

Type A variables for Seabrook Station are those variables to be monitored that provide the primary information for the Control Room operators to take specific pre-planned manual actions for which no automatic control is provided. These actions are required for safety systems to accomplish their safety function for design basis accident events. Actions taken as a result of equipment failures (e.g., the "Response Not Obtained" column in the Emergency Response Procedures (ERPs) are excluded.

c. Type B Variables

Type B variables provide the most direct indication to monitor the accomplishment of the CSFs. CSFs are those safety functions that are essential to prevent a direct and immediate threat to the health and safety of the public. The accomplishment of these functions ensures the integrity of the physical barriers against radiation releases.

The six CSFs for Seabrook are:

1) Subcriticality
2) Containment Integrity (including radioactive effluent control)
3) Heat Sink
4) Core Cooling
5) RCS Integrity
6) RCS Inventory

d. Type C Variables

Type C variables provide the most direct indication of the potential for or the actual breach of the barriers to fission product releases. These barriers are: fuel cladding; primary coolant pressure boundary, and containment.

e. Type D Variables

Type D variables are those variables that provide information to indicate the operation of individual safety systems and nonsafety systems used in the mitigation of design basis accidents.

f. Type E Variables

Type E variables are those variables to be monitored as required for use in determining the magnitude of the release of radioactive materials and continually assessing such releases.

7.5.4.3 Development of Accident Monitoring Instrument List

As part of the Detailed Control Room Design Review (DCRDR) a task analysis was performed on the ERPs to identify the needed instrumentation and controls to support the execution of these procedures. For each instrument needed, a determination of the variable type was made based on its use in the ERPs and the definitions for each variable type. The task analysis included the ERP contingency guidelines (ECAs); instrumentation used only to support the execution of the ECAs is not considered AMI.

For each variable, a determination is made whether it is a key variable or backup variable in accordance with the following criteria:

Key variables are those variables that provide the primary information required to permit the Control Room operating crew to:

1. Perform the diagnosis specified in the ERPs for design basis accidents.

2. Take any manual action required to mitigate the consequences of an accident.

3. Monitor the operation of safety systems.

Primary information is information that is essential for the direct accomplishment of the specified safety functions.

Backup variables are those variables that also provide information in addition to the key variables to assist the Control Room operating staff in:

1. Performing the diagnosis specified in the emergency operating procedures for design basis accidents.

2. Taking any manual actions required to mitigate the consequences of an accident.

3. Monitoring the status of individual components and ESF demand signals.

4. Resolving instrument ambiguity.

Variables are then assigned a design category using the following matrix:

Variable Type	Design Category: Key Variables	Design Category: Backup Variables
A	1	3
B	1	3
C	1	3
D	2 for safety systems 3 for nonsafety systems	3 3
E	3	3

The AMI list contains the instrumentation classified as Design Category 1 and 2, the instrumentation identified to monitor the performance of safety systems (Type D, Design Category 2) and Design Category 3 instrumentation included in Regulatory Guide 1.97, Table 3, Revision 3.

7.5.4.4 Design and Qualification Criteria

a. Discussion

The AMI are assigned design categories as discussed in Subsection 7.5.4.3. The design and qualification criteria for each design category are provided in the following subsections.

b. Design Category 1 - Design and Qualification Criteria

1. Equipment Qualification

Design Category 1 instrumentation is environmentally qualified in accordance with IEEE 323-1974 and associated daughter standards. This instrumentation is seismically qualified in accordance with IEEE 344-1975. Further details on the methods used and compliance with associated regulations and Regulatory Guides are provided in Sections 3.10 and 3.11 of the FSAR.

2. Redundancy

No single failure within the AMI, its auxiliary supporting features, or its power sources concurrent with the failures that are a condition or result of a specific accident, will prevent the operators from being presented the information necessary to determine the safety status of the plant and to bring the plant to and maintain it in a safe condition following that accident. The electrical independence and physical separation of redundant channels is discussed in Sections 8.3 and 7.1.

Where failure of one accident monitoring channel results in information ambiguity (i.e., the redundant displays disagree) that could lead operators to defeat or fail to accomplish a required safety function, backup information is provided to allow the operators to deduce the actual conditions in the plant. This is accomplished by providing additional independent channels of information of the same variable (an identical channel) or by providing an independent channel to monitor a different variable that bears a known relationship to the multiple channels (a diverse channel). Information on redundant/diverse channel availability is included in the operator training program.

For systems having redundant components, single channel monitoring of the redundant parts of the system is provided. Verifying the proper functioning of one of the redundant parts of the system is sufficient to monitor the accomplishment of the safety function.

3. Power Source

Design Category 1 instrumentation is powered from safety-related uninterruptible power sources.

4. Availability

The Design Category 1 instrumentation channels will be available prior to an accident except for testing and maintenance as provided in Paragraph 4.11 of IEEE Standard 279-1971 or as specified in the Technical Specifications.

5. Quality Assurance

Quality Assurance for Design Category 1 instrumentation is provided in accordance with the QA Program described in Chapter 17 of the FSAR. Conformance to appropriate regulatory guides is discussed both in Chapter 17 and Section 1.8 of the FSAR.

6. Display and Recording

Indication: For design Category 1 variables, continuous, redundant indication is provided. This indication meets the applicable requirements for design Category 1 instrumentation.

Recording: Recording of instrumentation readout information is provided for at least one of the redundant channels.

Trend Indication: Where direct and immediate trend or transient information is essential for operator information or action, this information is available from multiple displays such as:

1. Dedicated recorders, or

2. Dedicated ratemeters, or

3. CRT display (via the plant computer) available on demand, or

4. Plasma displays - available on demand by use of dedicated function push buttons.

For trend display channels, at least one of the display devices meets the applicable requirements for design Category 1 instrumentation.

7. Identification

Types A, B, and C instrumentation displays provided for operator use during accident conditions are identified by an orange nameplate containing black lettering.

8. Interfaces

The transmission of signals to the accident monitoring equipment from protection equipment is through isolation devices which are classified as part of the protection system.

No credible failure at the output of an isolation device will prevent the associated protection channel from meeting the minimum performance requirements considered in the design bases. Examples of credible failures include short circuits, open circuits, grounds, and the application of the maximum credible ac or dc potential (140 V dc or 129 V ac). Refer to FSAR Subsection 7.2.2.2.c.7 for further discussion.

c. Design Category 2 - Design and Qualification Criteria

1. Equipment Qualification

Design Category 2 instrumentation is environmentally qualified in accordance with IEEE 323-1974 and associated daughter standards. Further details on the methods used and compliance with associated regulations and Regulatory Guides are provided in Section 3.10.

2. Power Source

Design Category 2 instrumentation is powered from highly reliable power sources, very often Class 1E. Where momentary power interruption is not tolerable, uninterruptible power sources are used.

3. Quality Assurance

Quality Assurance for Design Category 2 instrumentation is provided by United Engineers and Constructors for the design, procurement and installation phases. Their QA Program contains the measures necessary to insure that the instrumentation has been properly specified, procured and installed. This program contains the applicable elements of 10CFR50, Appendix B.

Quality Assurance for the testing phase is provided by the standard testing procedures of the NHY Startup and Test Department. Auditable records are available for each Design Category 2 instrument.

Quality Assurance during the operational phase is provided under the NHY Operational Quality Assurance Program (OQAP). Further details are provided in Subsection 17.2.

4. Display and Recording

Indication

For Design Category 2 instruments, either display on demand or continuous indication is provided.

Recording

Effluent radioactivity and area radiation variables are recorded.

Trend Indication

Where direct and immediate trend or transient information is essential for operator information or action, trend indication is provided. This indication consists of either dedicated recorders or CRT displays.

5. Identification

Types A, B and C instrumentation displays provided for operator use during accident conditions are identified by an orange nameplate containing black lettering.

6. Channel Availability

Design Category 2 instrumentation channels will be available prior to an accident as provided in the plant administrative procedures.

7. Interfaces

Same as Design Category 1.

d. Design Category 3 - Design and Qualification Criteria

1. Quality Assurance

This instrumentation is of high-quality commercial grade and is selected to withstand the expected plant service environment.

2. Display and Recording

Indication

The information display can be either continuous or available on demand.

Recording

Effluent radioactivity variables and meteorological variables are recorded.

Trend Indication

Where direct and immediate trend or transient information is essential for operation information or action, trend information is provided. Trend information may be from a dedicated recorder or available on demand from the plant computer system.

e. Design and Qualification Criteria Applicable to Design Categories 1, 2, and 3

1. Range

The range of the readouts extends over the maximum expected range of the variable being measured. Where two or more instruments are needed to cover a particular range, overlapping of the instrument spans is provided.

2. Servicing, Testing, and Calibration

Means are provided for checking, with a high degree of confidence, the operational availability of each sensor during reactor operation.

This may be accomplished in various ways, for example:

1. By perturbing the monitored variable; or

2. By introducing and varying, as appropriate, a substitute input to the sensor of the same nature as the measured variable; or

3. By cross-checking between channels that bear a known relationship to each other and that have readouts available.

The AMI is designed to permit any channel to be maintained when required during power operation.

3. Human Factors

The AMI is designed to facilitate the recognition, location, replacement, repair, or adjustment of malfunctioning components or modules. The AMI is designed to minimize the development of conditions that cause meters, annunciators, recorders, etc., to give anomalous indications potentially confusing to the operator.

The displays are functionally arranged on the control board to provide the operator with ready understanding and interpretation of plant conditions. Comparisons between duplicate information channels or between functionally related channels will enable the operator to readily identify a malfunction in a particular channel.

In accordance with the guidance provided in NUREG-0737, an integrated effort for both the Detailed Control Room Design Review (DCRDR) and the AMI review was undertaken. The results of this effort identified the instrumentation needed by the operating crew during the course of an accident or in the recovery phase. The DCRDR reviewed the adequacy of these instrumentation displays for use by the operating crews against human factors criteria. The AMI review determined the adequacy of instrumentation channels against the design criteria stated in this subsection. Changes made after the completion of the DCRDR will be subjected to human factors review.

4. Direct Measurement

To the extent practicable, monitoring instrumentation inputs are from sensors that directly measure the desired variables. Indirect measurements are generally used to provide backup information only.

5. Instrument Accuracy

The plant-specific background documents prepared for the ERPs verify and document that the installed AMI has sufficient accuracy to support the ERPs.

The accuracy of the AMI is addressed as part of the Operator Training Program.

ACCIDENT MONITORING INSTRUMENTATION LIST

DATA TABLE LEGEND AND NOTES

Abbreviations:

EOF	Emergency Operations Facility
MCC	Motor Control Center
MCR	Main Control Room
TSC	Technical Support Center
UPS	Uninterruptible Power Supply

Explanatory Notes:

A. Under the "Actual Range" column:

The calibrated range of the sensor is listed unless otherwise noted.

B. Under the "Redundancy" column:

"Yes" means redundant fully qualified displays are available in the MCR. For Design Category 2 and 3 instrumentation, this column is marked "N/A" since there are no redundancy requirements for this instrumentation.

C. Under the "Power Supply" column:

The type of power supply for the instrumentation channels is listed. Since there are no specific provisions for the power supply for Design Category 3 instrumentation, "N/A" is marked in this column.

D. Under the "Display" column:

The tag number of the available MCR display instrumentation is listed. For the TSC/EOF, display will be via CRT's driven by the Main Plant Computer System (MPCS). Where an analog input to the MPCS is provided, its corresponding analog input number is specified. Where a digital input is provided, its corresponding digital input number is specified.

E. Under the "SB Category" column:

The plant-specific design category for this instrumentation as determined from the review described in Subsection 7.5.4, is listed.

F. Under the "Environmental Qualification" column:

"Yes" means the instrumentation is included in the environmental qualification program. The appropriate requirements for each instrument are determined as part of this program. For Design Category 3 instrumentation, "N/A" is entered since there are no specific provisions for environmental qualification.

ACCIDENT MONITORING INSTRUMENTATION LIST

DATA TABLE LEGEND AND NOTES (cont'd)

G. Under the "Seismic Qualification" column:

"Yes" means that the instrumentation has been seismically qualified in accordance with the criteria stated in Subsection 7.5.6.

For Design Category 2 and 3 instruments, "N/A" is entered since there are no specific provisions for seismic qualification.

H. Under the "QA" column:

"Yes" means the instrumentation meets the QA requirements detailed in the Design Criteria section for the applicable Design Category.

I. Under the "Trending" column:

"Yes" means that trend or transient information is required for operator information or action based on our review of the plant-specific emergency response procedures and is available. "N/A" means that trend or transient information is not required for operator information or action based on our review of the plant-specific emergency response procedures.

J. Under the "Remarks/Notes" column:

For each item number, any column entry with an asterisk is explained in the "Remarks/Notes" column.

FOOTNOTES

(1) MCB indicator identical to fully-qualified indicator.

(2) MCB recorder essentially similar to seismically-qualified recorder.

ACCIDENT MONITORING INSTRUMENTATION LIST

ITEM NUMBER	VARIABLE/SENSOR	R.G. 1.97 RECOMMENDED RANGE	R.G. 1.97 DESIGN CATEGORY	ACTUAL RANGE	REDUNDANCY	POWER SUPPLY	DISPLAY MCR VARIABLE	DISPLAY MCR TREND INDICATION	DISPLAY TSC, EOF COMPUTER
	PLANT-SPECIFIC TYPE A VARIABLES								
A1	Degrees of Subcooling RC-PT-403 RC-PT-405 IC-TE-1 through 58	200°F subcooling to 35°F superheat (from B10)	1	+300°F subcooling to 50°F superheat	Yes	Vital UPS	RC-TI-9424A RC-TI-9424B	RC-XX-7315 –	Available Through Data Link
A2	Steam Generator Pressure FW-PT-514 SG#1 FW-PT-515	From atmospheric pressure to 20% above the lowest safety valve setting (1425 psig) (from D18)	1	0-1300 psig*	Yes	Vital UPS			
							PI-514A PI-515A	XR-501 –	A0730 A0733
	FW-PT-524 SG#2 FW-PT-525						PI-524A PI-525A	– XR-502	A0740 A0743
	FW-PT-534 SG#3 FW-PT-535						PI-534A PI-535A	XR-503 –	A0750 A0753
	FW-PT-544 SG#4 FW-PT-545						PI-544A PI-545A	– XR-504	A0720 A0723
A3	Core Exit Temperature IC-TE-1 through 58	200°F to 2300°F (from B8)	1	0-2300°F*	Yes	Vital UPS	RC-TI-9423A RC-TI-9423B RC-XX-7315	RC-XX-7315** –	Available Through Data Link
A4	Steam Generator Level FW-LT-519 (NR) SG#1 FW-LT-501 (WR)	From tube sheet to separators (from D17)	1	Taps 348" and 581" above bottom reference for narrow range. Taps near tube sheet and above separators for wide range.	Yes	Vital UPS			
							LI-519 (NR) LI-501 (WR)	LR-519(2) –	A0734 A0737
	FW-LT-529 (NR) SG#2 FW-LT-502 (WR)						LI-529 (NR) LI-502 (WR)	LR-529(2) –	A0744 A0747
	FW-LT-537 (NR) SG#3 FW-LT-503 (WR)						LI-537 (NR) LI-503 (WR)	LR-539(2) –	A0756 A0757
	FW-LT-548 (NR) SG#4 FW-LT-504 (WR)						LI-548 (NR) LI-504 (WR)	LR-549(2) –	A0725 A0727
A5	Pressurizer Level RC-LT-459 RC-LT-460	Bottom to top (from D12)	1	Taps 6" from the top and bottom of the straight shell portion of the pressurizer*	Yes	Vital UPS	LI-459A LI-460A	LR-459** LR-460	A0332 A0333

ITEM NUMBER	VARIABLE	SB DESIGN CATEGORY	ENVIRONMENTAL QUALIFICATION	SEISMIC QUAL.	QA	TRENDING	REMARKS/NOTES
PLANT-SPECIFIC TYPE A VARIABLES							
A1	Degrees of Subcooling	1	Yes	Yes	Yes	Yes	
A2	Steam Generator Pressure	1	Yes	Yes	Yes	Yes**	* See Deviation No. 1 in Appendix 7A. ** Trending required based on use as a Type D variable.
A3	Core Exit Temperature	1	Yes	Yes	Yes	Yes	* Sensors are type K thermocouples that are calibrated to $1650^{0}F$. ** Individual sensor temperatures and spatial displays are provided on RC-XX-7315.
A4	Steam Generator Level	1	Yes	Yes	Yes	N/A	
A5	Pressurizer Level	1	Yes	Yes	Yes	Yes	* See Deviation No. 2 in Appendix 7A. ** The input signal to LR-459 is selectable to any one of the pressurizer level channels.

ITEM NUMBER	VARIABLE/SENSOR	R.G. 1.97 RECOMMENDED RANGE	R.G. 1.97 DESIGN CATEGORY	ACTUAL RANGE	REDUNDANCY	POWER SUPPLY	DISPLAY MCR VARIABLE	DISPLAY MCR TREND INDICATION	DISPLAY TSC, EOF COMPUTER
A6	RWST Level Storage Tank Level CBS-LT-2380 CBS-LT-2383	Top to bottom (from D9)	1	22,000 to * 486,000 gal	Yes	Vital UPS	 LI-2380 LI-2383	 LR-2384 LR-2385	 A0912 A0913
A7	RCS Pressure RC-PT-403 RC-PT-405	0 to 3000 psig (from B11 and B7)	1	0-3000 psig	Yes	Vital UPS	 PI-403 PI-405	 PR-403 PR-405(2)	 A0350 A0349
A8	Containment Hydrogen Concentration CGC-AIT-5828A CGC-AIT-5828B	0 to 10% volume (capable of operating from -5 psig to maximum design pressure 52 psig) (from C10)	1	0-10% H_2 0-20% H_2 dual range -5 psig to 60 psig operating capability	Yes	Vital UPS	 AI-5828A* AI-5828B*	 AR-5828A -	 A1445 A1446
REACTIVITY CONTROL									
B1	Neutron Flux NI-NE-6690 NI-NE-6691	10^{-6}% to 100% full power	1 -	10^{-8}-200% Full Power -1 to +7 DPM (Rate)	Yes	Vital UPS	NI-6690-1 NI-6691-1 - -	- - NI-6690-2 NI-6691-2	A1018 A1019 A1021 A1022
B2	Control Rod Position CP-U-7338	Full in or not full in	3	0-228 Steps (Full in to fully withdrawn)	N/A	N/A	UI-7338	-	I0036 through I0091
B3	RCS Soluble Boron Concentration* (Grab Sample)	0 to 6000 ppm	3	0-6000 ppm	N/A	N/A	-	-	-
B4	RCS Cold Leg Water Temperature	50°F to 400°F	3	See B6					

ITEM NUMBER	VARIABLE	SB DESIGN CATEGORY	ENVIRONMENTAL QUALIFICATION	SEISMIC QUAL.	QA	TRENDING		REMARKS/NOTES
A6	RWST Level Tank Level	1	Yes	Yes	Yes	N/A	*	See Deviation No. 3 in Appendix 7A.
A7	RCS Pressure	1	Yes	Yes	Yes	Yes		
A8	Containment Hydrogen Concentration	1	Yes	Yes	Yes	N/A	*	See Deviation No. 4 in Appendix 7A.
REACTIVITY CONTROL								
B1	Neutron Flux	1	Yes	Yes	Yes	Yes		
B2	Control Rod Position	3	N/A	N/A	Yes	N/A	*	Control rod position inputs to the computer are available but are not listed here.
B3	RCS Soluble Boron Concentration*	3	N/A	N/A	Yes	N/A	*	See Deviation No. 5 in Appendix 7A.
B4	RCS Cold Leg Water Temperature	See B6						

ITEM NUMBER	VARIABLE/SENSOR	R.G. 1.97 RECOMMENDED RANGE	R.G. 1.97 DESIGN CATEGORY	ACTUAL RANGE	REDUNDANCY	POWER SUPPLY	DISPLAY MCR VARIABLE	DISPLAY MCR TREND INDICATION	DISPLAY TSC, EOF COMPUTER
CORE COOLING									
B5	RCS Hot Leg Water Temperature	50°F to 700°F	1	0-700°F	NO*	Vital UPS			
	RC-TE-413A						TI-413A	TR-413A	A0339
	RC-TE-423A						TI-423A	-	A0340
	RC-TE-433A						TI-433A(1)	TR-433A(2)	A0341
	RC-TE-443A						TI-443A(1)	-	A0342
B6	RCS Cold Leg Water Temperature	50°F to 700°F	1	0-700°F	NO*	Vital UPS			
	RC-TE-413B						TI-413B	TR-413B	A0343
	RC-TE-423B						TI-423B	-	A0344
	RC-TE-433B						TI-433B(1)	TR-433B(2)	A0345
	RC-TE-443B						TI-443B(1)	-	A0346
B7	RCS Pressure	0-3000 psig	1	See A7					
B8	Core Exit Temperature	200°F to 2300°F	3	See A3					
B9	Reactor Coolant Inv. -Reactor Vessel Full Range Level (RCPs not running)	Bottom of hot leg to top of vessel;	1	0-120% (Full range; bottom to top of vessel)	Yes	Vital UPS			
	RC-LT-1311						RC-LI-1311	RC-XX-7315	Available Through Data Link
	RC-LT-1312						RC-LI-1312	-	
	-Reactor Vessel Dynamic Head (RCP's running)	Void trending		0-120% (dynamic head range; indicates normalized core dp)					
	RC-LT-1321						RC-LI-1321	RC-XX-7315	Available Through Data Link
	RC-LT-1322						RC-LI-1322	-	
B10	Degrees of Subcooling	200°F subcooling to 35°F superheat	2	See A1					
RCS INTEGRITY									
B11	RCS Pressure	0 to 3000 psig	1	See A7					
B12A	Containment Drainage Sump Water Level, Narrow Range*	Top to Bottom	2						

ITEM NUMBER	VARIABLE	SB DESIGN CATEGORY	ENVIRONMENTAL QUALIFICATION	SEISMIC QUAL.	QA	TRENDING		REMARKS/NOTES
CORE COOLING								
B5	RCS Hot Leg Water Temperature	1	Yes	Yes	Yes	Yes	*	All channels powered from UPS-I-A. See Deviation No. 6 in Appendix 7A.
B6	RCS Cold Leg Water Temperature	1	Yes	Yes	Yes	Yes	*	All channels powered from UPS-I-B. See Deviation No. 7 in Appendix 7A.
B7	RCS Pressure	See A7						
B8	Core Exit Temperature	See A3						
B9	Reactor Coolant Inventory	1	Yes	Yes	Yes	Yes		100% equals top of vessel or normal core dP with four reactor coolant pumps running.
B10	Degrees of Subcooling	See A1						
RCS INTEGRITY								
B11	RCS Pressure	See A7						
B12A	Containment Drainage Sump Water Level, Narrow Range*						*	See Deviation No. 23 in Appendix 7A.

ITEM NUMBER	VARIABLE/SENSOR	R.G. 1.97 RECOMMENDED RANGE	R.G. 1.97 DESIGN CATEGORY	ACTUAL RANGE	REDUNDANCY	POWER SUPPLY	DISPLAY MCR VARIABLE	DISPLAY MCR TREND INDICATION	DISPLAY TSC, EOF COMPUTER
B12B	Containment Building Level, Wide Range CBS-LIT-2384 CBS-LIT-2385	(plant-specific)	1	4" to 8'4" above base elevation	Yes	Vital UPS	 LI-2384 LI-2385	 LR-2384 LR-2385(2)	 A0930 A0931
CONTAINMENT INTEGRITY									
B13	Containment Pressure SI-PT-934, SI-PT-935	0 to design pressure (52 psig)	1	0-60 psig	Yes	Vital UPS	 PI-934 PI-935	 PR-934 PR-935	 A0500 A0501
B14	Containment Isolation Valve Position	Closed-not closed	1	Closed-not closed	Yes*	Vital DC	**	-	
	See FSAR Section 6.2.4 and Table 6.2-83 for complete information on the design of the Containment Isolation System and the listing of individual containment isolation valves.								
B15	Containment Pressure SI-PT-2576 SI-PT-2577	-5 psig to design pressure (52 psig)	1	See C11					
B16	Containment Enclosure Negative Pressure EAH-PDT-5782 EAH-PDT-5789	-	-	0-0.5 in WC	Yes	Vital UPS	 PDI-5782 PDI-5789		 A3778 A3779
B17	Main Steam Isolation Valve Position MS-V-86 MS-V-88 MS-V-90 MS-V-92	-	-	Open/Closed	Yes	Vital UPS	ZL-3005 ZL-3006 ZL-3007 ZL-3008 CS-3005 CS-3006 CS-3007 CS-3008	- - - - - - - -	D5222 D5224 D5226 D5228
B18	Feedwater Isolation Valve Position FW-V30 FW-V39 FW-V48 FW-V57	-	-	Open/Closed	Yes	Vital DC	CS-4212-1 CS-4222-1 CS-4232-1 CS-4242-1 CS-4212-4 CS-4222-4 CS-4232-4 CS-4242-4	- - - - - - - -	D4857 D4859 D4861 D4863 - - - -

ITEM NUMBER	VARIABLE	SB DESIGN CATEGORY	ENVIRONMENTAL QUALIFICATION	SEISMIC QUAL.	QA	TRENDING	REMARKS/NOTES
B128	Containment Building Level, Wide Range	1	Yes	Yes	Yes	Yes	
CONTAINMENT INTEGRITY							
B13	Containment Pressure	1	Yes	Yes	Yes	Yes	
B14	Containment Isolation Valve Position	1	Yes	Yes	Yes	N/A	* The redundancy provision for containment isolation valves is met on a systems basis. ** The primary indications of containment isolation valve position are status lamp arrays arranged on a functional basis. A tile is provided for each valve closed on either a Phase A or Phase B containment isolation signal. Valve position indicating lights are also provided with each valve control switch.
B15	Containment Pressure	See C11					
B16	Containment Enclosure Negative Pressure	1	Yes	Yes	Yes	N/A	
B17	Main Steam Isolation Valve Position	1	Yes	Yes	Yes	N/A	
B18	Feedwater Isolation Valve Position	1	Yes	Yes	Yes	N/A	

ITEM NUMBER	VARIABLE/SENSOR	R.G. 1.97 RECOMMENDED RANGE	R.G. 1.97 DESIGN CATEGORY	ACTUAL RANGE	REDUNDANCY	POWER SUPPLY	DISPLAY: MCR: VARIABLE	DISPLAY: MCR: TREND INDICATION	DISPLAY: TSC, EOF COMPUTER
FUEL CLADDING									
C1	Core Exit Temperature	200°F to 2300°F	1	See A3					
C2	Radioactive Concentration or Radiation Level in Circulating Primary Coolant*	1/2 Tech Spec limit to 100 times Tech Spec limit (50 to 10^4uCi/gm)	1						
C3	Analysis of Primary Coolant (Gamma Spectrum)	10 uCi/ml to 10^{-5} uCi/ml TID-14844 source term in coolant volume	3	See E18					
RCS BOUNDARY									
C4	RCS Pressure	0 to 3000 psig	1	See A7					
C5	Containment Pressure	-5 psig to design pressure (52 psig)	1	See C11					
C6A	Containment Drainage Sump Water Level Narrow-Range	Top to bottom of sump	2	See B12A					
C6B	Containment Recirculation Sump Water Level, Wide-Range	Wide-Range (plant-specific)	1	See B12B					
C7	Containment Area Radiation	1 R/hr to 10^4 R/hr	3	See E1					
C8	Effluent Radioactivity Noble Gas Effluent from Condenser Air Removal System Exhaust	10^{-6} uCi/cc to 10^{-2} uCi/cc	3	See E7					
CONTAINMENT									
C9	RCS Pressure	0 to 3000 psig	1	See A7					
C10	Containment Hydrogen Concentration	0 to 10% volume (capable of -5 psig to maximum design pressure (52 psig)	1	See A8					

ITEM NUMBER	VARIABLE	SB DESIGN CATEGORY	ENVIRONMENTAL QUALIFICATION	SEISMIC QUAL.	QA	TRENDING	REMARKS/NOTES
FUEL CLADDING							
C1	Core Exit Temperature	See A3					
C2	Radioactive Concentration or Radiation Level in Circulating Primary Coolant*						* See Deviation No. 8 in Appendix 7A.
C3	Analysis of Primary Coolant (gamma spectrum)	See E18					
RCS BOUNDARY							
C4	RCS Pressure	See A7					
C5	Containment Pressure	See C11					
C6A	Containment Drainage Sump Water Level, Narrow-Range	See B12A					
C6B	Containment Recirculation Sump Water Level, Wide-Range	See B12B					
C7	Containment Area Radiation	See E1					
C8	Effluent Radioactivity Noble Gas Effluent from Condenser Air Removal System Exhaust	See E7					
CONTAINMENT							
C9	RCS Pressure	See B7					
C10	Containment Hydrogen Concentration	See A8					

ITEM NUMBER	VARIABLE/SENSOR	R.G. 1.97 RECOMMENDED RANGE	R.G. 1.97 DESIGN CATEGORY	ACTUAL RANGE	REDUNDANCY	POWER SUPPLY	DISPLAY MCR VARIABLE	DISPLAY MCR TREND INDICATION	DISPLAY TSC, EOF COMPUTER
C11	Containment Pressure SI-PT-2576 SI-PT-2577	-5 psig pressure to 3 times design pressure for concrete (-5 to 156 psig)	1	(-)5-0-160 psig	Yes	Vital UPS	PI-2576 PI-2577	PR-934 PR-937	A0517 A0516
C12	Containment Effluent Radioactivity - Noble Gases from Identified Release Points	10^{-6} uCi/cc to 10^{-2} uCi/cc	2	See E7					
C13	Effluent Radio-activity Noble Gases (inside buildings or areas where penetrations or hatches are located) RM-RE-6566	10^{-6} uCi/cc to 10^{3} uCi/cc	2	10^{1}-10^{6}cpm* (corresponds to 6 x 10^{-4} uci/cc to 10 uci/cc)	N/A	Emerg. MCC	RM-6566	-	Available Through Data Link
TYPE D VARIABLES, SYSTEM OPERATION									
RHR									
D1	RHR System Flow RH-FT-618 RH-FT-619	0 to 110% design flow (4950 gpm)	2	0-5000 gpm	N/A	Vital UPS	FI-618 FI-619	- -	A0950 A0952
D2	RHR Heat Exchanger Outlet Temperature RH-TE-604 RH-TE-605	40°F to 350°F	2	50-400°F*	N/A	Vital UPS	- -	TR-612 TR-613	A0954 A0955
SAFETY INJECTION									
D3	Accumulator Tank Level*	10% to 90% volume	2						
D4	Accumulator Tank Pressure*	0 to 750 psig	2						

ITEM NUMBER	VARIABLE	SB DESIGN CATEGORY	ENVIRONMENTAL QUALIFICATION	SEISMIC QUAL.	QA	TRENDING		REMARKS/NOTES
C11	Containment Pressure	1	Yes	Yes	Yes	N/A		
C12	Containment Effluent Radioactivity - Noble Gases from Identified Release Points	See E7						
C13	Effluent Radioactivity Noble Gases (inside buildings or areas where penetrations or hatches are located)	2	Yes	N/A	Yes	N/A	*	See Deviation No. 9 in Appendix 7A.
TYPE D VARIABLES, SYSTEM OPERATION								
RHR								
D1	RHR System Flow	2	Yes	N/A	Yes	N/A		
D2	RHR Heat Exchanger Outlet Temperature	2	Yes	N/A	Yes	N/A	*	See Deviation No. 22 in Appendix 7A.
SAFETY INJECTION								
D3	Accumulator Tank Level*						*	See Deviation No. 10 in Appendix 7A.
D4	Accumulator Tank Pressure*						*	See Deviation No. 11 in Appendix 7A.

ITEM NUMBER	VARIABLE/SENSOR	R.G. 1.97 RECOMMENDED RANGE	R.G. 1.97 DESIGN CATEGORY	ACTUAL RANGE	REDUNDANCY	POWER SUPPLY	DISPLAY MCR VARIABLE	DISPLAY MCR TREND INDICATION	DISPLAY TSC, EOF COMPUTER
D4A	Accumulator Vent Valve Position	–	–	Open/Closed	N/A	Vital DC			
	SI-ZS-2475						CS-2475-1	–	D7361
	SI-ZS-2476						CS-2476	–	D7362
	SI-ZS-2482						CS-2482-1	–	D7364
	SI-ZS-2483						CS-2483	–	D7365
	SI-ZS-2477						CS-2477-1	–	D7366
	SI-ZS-2486						CS-2486	–	D7367
	SI-ZS-2495						CS-2495-1	–	D7369
	SI-ZS-2496						CS-2496	–	D7369
D5	Accumulator Isolation Valve Position	Closed or open	2	Open/Closed Open/Closed	N/A	Vital UPS			
	SI-ZS-2403-1			Open/Closed			ZL-2403-1	–	–
	SI-ZS-2413-1			Open/Closed			ZL-2413-1	–	–
	SI-ZS-2423-1						ZL-2423-1	–	–
	SI-ZS-2433-1						ZL-2433-1	–	–
D6	Boric Acid Charging Flow	0 to 110% design (0 to 85 gpm)	2	0-150 gpm	N/A	Vital UPS			
	CS-FT-183 (Emergency Boration Flow)						FI-183A	–	–
D7	Flow in HPI System	0 to 110% design	2	0-800 gpm	N/A				
	SI-FT-918	(0 to 605 gpm)				Vital	FI-918	–	A0512
	SI-FT-922					UPS	FI-922	–	A0514
	SI-FT-917 (CS pump)	(0 to 715 gpm)		0-1000 gpm			FI-917	–	A0510
D8	Flow in LPI System	0 to 110% design	2	See D1					
D9	Refueling Water Storage Tank Level	Top to bottom	2	See A6					
RCS									
D10	Reactor Coolant Pump Status	Motor current	3	0-400 amps	N/A	N/A			
	RC-AM-7300	(330 FLA)					AM-7300	–	–
	RC-AM-7304						AM-7304	–	–
	RC-AM-7306						AM-7306	–	–
	RC-AM-7308						AM-7308	–	–

ITEM NUMBER	VARIABLE	SB DESIGN CATEGORY	ENVIRONMENTAL QUALIFICATION	SEISMIC QUAL.	QA	TRENDING	REMARKS/NOTES
D4A	Accumulator Vent Valve Position	2	Yes	N/A	Yes	N/A	
D5	Accumulator Isolation Valve Position	2	Yes	N/A	Yes	N/A	
D6	Boric Acid Charging Flow	2	Yes	N/A	Yes	N/A	
D7	Flow in HPI System	2	Yes	N/A	Yes	N/A	
D8	Flow in LPI System	See D1					
D9	Refueling Water Storage Tank Level	See A6					
RCS							
D10	Reactor Coolant Pump Status	3	N/A	N/A	Yes	N/A	

ITEM NUMBER	VARIABLE/SENSOR	R.G. 1.97 RECOMMENDED RANGE	R.G. 1.97 DESIGN CATEGORY	ACTUAL RANGE	REDUNDANCY	POWER SUPPLY	DISPLAY MCR VARIABLE	DISPLAY MCR TREND INDICATION	DISPLAY TSC, EOF COMPUTER
D11	Primary System Safety Relief Valve Positions (including PORV and code safety valves)	Closed-not closed	2	Closed-Not closed	N/A				
	RC-PCV-456A					Vital	CS-456-A1	-	D-4495
	RC-PCV-456B					DC	CS-456-B1	-	D-4496
	VB-YE-6832-1					Emerg	YM-6832-1	-	
	VB-YE-6832-2					MCC	YM-6832-2	-	D-5791
D12	Pressurizer Level	Top to bottom	1	See A5					
D13	Pressurizer Heater Status, Power Monitor	Electric current	2	0-480 kW	N/A	N/A	-	-	A0386 A0387 A0388 A0389
D14	Pressurizer Relief Tank (Quench Tank) Level	Top to bottom	3	0-100" W.C.	N/A	N/A			
	RC-LT-470						LI-470	-	A0347
D15	Pressurizer Relief Tank (Quench Tank) Temperature	50°F to 750°F	3	50-250°F*	N/A	N/A			
	RC-TE-468						TI-468	-	A0376
D16	Pressurizer Relief Tank (Quench Tank) Pressure	0 to design pressure	3	0-100 psig	N/A	N/A			
	RC-PT-469	(0-100 psig)					PI-469	-	A0348
SECONDARY									
D17	Steam Generator Level	From tube sheet to separators	1	See A4					
D18	Steam Generator Pressure	From atmospheric pressure to 20% above the lowest safety valve setting (1425 psig)	2	See A2					

ITEM NUMBER	VARIABLE	SB DESIGN CATEGORY	ENVIRONMENTAL QUALIFICATION	SEISMIC QUAL.	QA	TRENDING	REMARKS/NOTES
D11	Primary System Safety Relief Valve Positions (including PORV and code safety valves)	2	Yes	Yes	Yes	N/A	Stem-mounted limit switches provide position indication for the PORVs. Acoustic Monitoring System Monitors status of both the PORVs and the safeties.
D12	Pressurizer Level	See A5					
D13	Pressurizer Heater Status, Power Monitor	3*	N/A	N/A	Yes	N/A	* See Deviation No. 24 in Appendix 7A.
D14	Pressurizer Relief Tank (Quench Tank) Level	3	N/A	N/A	Yes	N/A	
D15	Pressurizer Relief Tank (Quench Tank) Temperature	3	N/A	N/A	Yes	N/A	* See Deviation No. 12 in Appendix 7A.
D16	Pressurizer Relief Tank (Quench Tank) Pressure	3	N/A	N/A	Yes	N/A	
SECONDARY							
D17	Steam Generator Level	See A4					
D18	Steam Generator Pressure	See A2					

ITEM NUMBER	VARIABLE/SENSOR	R.G. 1.97 RECOMMENDED RANGE	R.G. 1.97 DESIGN CATEGORY	ACTUAL RANGE	REDUNDANCY	POWER SUPPLY	DISPLAY MCR VARIABLE	DISPLAY MCR TREND INDICATION	DISPLAY TSC, EOF COMPUTER
D19	Safety-Relief Valve Position or Main Steam Flow	Closed-not closed	2	Closed-not closed	N/A	Emerg MCC			
	VB-YE-6820 (SG #4)						YM-6820	–	D5788
	VB-YE-6821 (SG #3)						YM-6821	–	
	VB-YE-6822 (SG #2)						YM-6822	–	
	VB-YE-6823 (SG #1)						YM-6823	–	
D20	Main Feedwater Flow	0 to 110% design	3	0-5x10^6 Lb/hr	N/A	N/A			
	FW-FT-510 (SG #1)	flow		per SG			FI-510A	FR-510	A0728
	FW-FT-520 (SG #2)	(0-4.2 x 10^6 lb/hr)					FI-520A	FR-520	A0738
	FW-FT-530 (SG #3)						FI-530A	FR-530	A0748
	FW-FT-540 (SG #4)						FI-540A	FR-540	A0718
EMERGENCY FEEDWATER									
D21	Auxiliary or Emergency Feedwater Flow	0 to 110% design flow	2	0-500 gpm	N/A	Vital UPS			
	FW-FT-4214-2 (SG #1)	(0 to 390 gpm)					FI-4214-2	FR-4214	A0795
	FW-FT-4224-2 (SG #2)						FI-4234-2	FR-4214	A0796
	FW-FT-4234-2 (SG #3)						FI-4244-2	FR-4224	A0797
	FW-FT-4244-2 (SG #4)						FI-4224-2	FR-4224	A0798
D22	Condensate Storage Tank Water Level	Plant specific (0-40 ft)							
	FW-PT-4252		1	0-40 FT	Yes	Vital	PI-4252	–	A0704
	FW-PT-4257					UPS	PI-4257	–	A0706
CONTAINMENT COOLING									
D23	Containment Spray Flow	0 to 110% design flow (3400 gpm)	2						
	Containment Spray Pump Suction Pressure			0-60 psig*	N/A	Non-Vital UPS			
	CBS-PT-2312						PI-2312	–	A0922
	CBS-PT-2314						PI-2314	–	A0924
	Containment Spray Pump Discharge Pressure			0-500 psig*	N/A	Non-Vital UPS			
	CBS-PT-2313						PI-2313	–	A0923
	CBS-PT-2315						PI-2315	–	A0925
D24	Heat Removal by the Containment Fan Heat Removal System*	Plant-specific	2						

ITEM NUMBER	VARIABLE	SB DESIGN CATEGORY	ENVIRONMENTAL QUALIFICATION	SEISMIC QUAL.	QA	TRENDING	REMARKS/NOTES
D19	Safety-Relief Valve Position or Main Steam Flow	2	Yes	N/A	Yes	N/A	Acoustic Monitoring System monitors position of the SG safeties.
D20	Main Feedwater Flow	3	N/A	N/A	Yes	N/A	
EMERGENCY FEEDWATER							
D21	Auxiliary or Emergency Feedwater Flow	2	Yes	N/A	Yes	N/A	
D22	Condensate Storage Tank Water Level	1	Yes	Yes	Yes	N/A	Qualified indication of condensate storage tank level is provided by the EFW pump suction pressure indication. A correlation between suction pressure indication and CST level for both pump running and not running situations will be provided for the operating crew. This correlation will be easily accessible when reading the suction pressure indication. The use of this instrumentation will be addressed in the operator training program.
CONTAINMENT COOLING							
D23	Containment Spray Flow	2	Yes	N/A	Yes	N/A	* See Deviation No. 13 in Appendix 7A.
	Containment Spray Pump Suction Pressure						
	Containment Spray Pump Discharge Pressure	2	Yes	N/A	Yes	N/A	
D24	Heat Removal by the Containment Fan Heat Removal System*						* See Deviation No. 25 in Appendix 7A.

ITEM NUMBER	VARIABLE/SENSOR	R.G. 1.97 RECOMMENDED RANGE	R.G. 1.97 DESIGN CATEGORY	ACTUAL RANGE	REDUNDANCY	POWER SUPPLY	DISPLAY MCR VARIABLE	DISPLAY MCR TREND INDICATION	DISPLAY TSC, EOF COMPUTER
D25	Containment Atmosphere Temperature RC-TE-1313	40°F to 400°F	2	50-420°F*	N/A	Vital UPS RC-XX-7315		–	Available through data link.
D26	Containment Sump Water Temperature*	50°F to 250°F	2						
CHEMICAL AND VOLUME CONTROL									
D27	Makeup Flow-in CS-FT-121	0 to 110% design flow (150 gpm)	2	0-200 gpm	N/A	N/A FI-121A		–	A0622
D28	Letdown Flow-out CS-FT-132	0 to 110% design flow (135 gpm)	2	0-200 gpm	N/A	N/A FI-132		–	A0620
D29	Volume Control Tank Level CS-LT-185 CS-LT-112	Top to bottom (141")	2	0-80"*	N/A	N/A LI-185 LI-112		LR-185 –	– A0624
COOLING WATER									
D30	Component Cooling Water Temperature to ESF CC-TE-2171 ESF CC-TE-2271	40°F to 200°F	2	0-175°F*	N/A	Vital UPS TI-2171-1 TI-2271-1		– –	A0271 A0269
D31	Component Cooling Water Flow to ESF System CC-FT-2103 CC-FT-2203	0 to 110% design flow (11,500 gpm)	2	0-13,000 gpm	N/A	Non-Vital UPS FI-2103 FI-2203		– –	A0273 A0272
D31a	RHR and CBS Heat Exchanger PCCW Outlet Valves CC-V266 CC-V272 CC-V137 CC-V145	–	–	Closed/Open	N/A	Emerg. MCC CS-2245 CS-2244 CS-2145 CS-2144		– – – –	D7823 D7824 D7821 D7822
D32	Cooling Tower Sump Level SW-L-6129 SW-L-6139	–	–	0-60 FT	N/A	Vital UPS LI-6129 LI-6139		LR-6129 –	A1537 –

ITEM NUMBER	VARIABLE	SB DESIGN CATEGORY	ENVIRONMENTAL QUALIFICATION	SEISMIC QUAL.	QA	TRENDING		REMARKS/NOTES
D25	Containment Atmosphere Temperature	2	Yes	N/A	Yes	N/A	*	See Deviation No. 14 in Appendix 7A.
D26	Containment Sump Water Temperature*						*	See Deviation No. 15 in Appendix 7A.
CHEMICAL AND VOLUME CONTROL								
D27	Makeup Flow-In	3*	N/A	N/A	Yes	N/A	*	See Deviation No. 16 in Appendix 7A.
D28	Letdown Flow-Out	3*	N/A	N/A	Yes	N/A	*	See Deviation No. 17 in Appendix 7A.
D29	Volume Control Tank Level	3*	N/A	N/A	Yes	N/A	*	See Deviation No. 18 in Appendix 7A.
COOLING WATER								
D30	Component Cooling Water Temperature to ESF	2	Yes	N/A	Yes	N/A	*	See Deviation No. 19 in Appendix 7A.
D31	Component Cooling Water Flow to ESF System	2	Yes	N/A	Yes	N/A		
D31a	RHR and CBS Heat Exchanger PCCW Outlet Valves	2	Yes	N/A	Yes	N/A		
D32	Cooling Tower Sump Level	2	Yes	N/A	Yes	N/A		

ITEM NUMBER	VARIABLE/SENSOR	R.G. 1.97 RECOMMENDED RANGE	R.G. 1.97 DESIGN CATEGORY	ACTUAL RANGE	REDUNDANCY	POWER SUPPLY	DISPLAY MCR VARIABLE	DISPLAY MCR TREND INDICATION	DISPLAY TSC, EOF COMPUTER
D32a	Service Water Flow to DG Heat Exchanger	–	–	0–2500 gpm	N/A	Non-Vital			
	SW-FT-6181					UPS	FI-6181	–	–
	SW-FT-6191					Vital UPS	FI-6191	–	–
D32b	Cooling Tower Pump Discharge Temperature	–	–	0–150°F	N/A	Non-Vital			
	SW-TE-6184					UPS	TI-6184	–	A1503
	SW-TE-6194						TI-6194	–	A1505
RADWASTE									
D33	High-Level Radioactive Liquid (Floor Drain) Tank Level	Top to bottom (18 feet)	3	0–14 FT*	N/A	N/A			
	WL-LT-1462 (TK-59A)						LI-1462	–	A1285
	WL-LT-1466 (TK-59B)						LI-1466	–	–
D34	Radioactive Gas Holdup Tank Pressure*	0 to 150% design pressure	3						
VENTILATION									
D35	Emergency Ventilation Damper Position	Open–closed status	2	Closed–Not Closed	N/A	Vital UPS	ZL-5370-3	–	–
	PAH-DP-35A						ZL-5371-3	–	–
	PAH-DP-35B						ZL-5370-4	–	–
	PAH-DP-36A						ZL-5371-4	–	–
	PAH-DP-36B						ZL-5780-2	–	–
	EAH-DP-30A						ZL-5784-2	–	–
	EAH-DP-30B						ZL-5630-2	–	D5142
	CAH-DP-34A						ZL-5631-2	–	D5147
	CAH-DP-34B						ZL-5634	–	D5148
	CAH-DP-34C						ZL-5635	–	D5149
	CAH-DP-34D					Emerg. MCC	CS-5331	–	–
	CBA-DP-53A						CS-5329	–	–
	CBA-DP-53B							–	–
								–	–
D35a	Fan Status: Control Room Makeup Air Fans	–	–	Running/ Not Running	N/A	Emerg. MCC	CS-5328	–	D7034
	CBA-FN-27A						CS-5330	–	D7035
	CBA-FN-27B								

ITEM NUMBER	VARIABLE	SB DESIGN CATEGORY	ENVIRONMENTAL QUALIFICATION	SEISMIC QUAL.	QA	TRENDING		REMARKS/NOTES
D32a	Service Water Flow to DG Heat Exchanger	2	Yes	N/A	Yes	N/A		
D32b	Cooling Tower Pump Discharge Temperature	2	Yes	N/A	Yes	N/A		
RADWASTE								
D33	High-Level Radioactive Liquid (floor drain) Tank Level	3	N/A	N/A	Yes	N/A	*	See Deviation No. 20 in Appendix 7A.
D34	Radioactive Gas Holdup Tank Pressure*						*	See Deviation No. 26 in Appendix 7A.
VENTILATION								
D35	Emergency Ventilation Damper Position	2	Yes	N/A	Yes	N/A		
D35a	Fan Status: Control Room Makeup Air Fans	2	Yes	N/A	Yes	N/A		

ITEM NUMBER	VARIABLE/SENSOR	R.G. 1.97 RECOMMENDED RANGE	R.G. 1.97 DESIGN CATEGORY	ACTUAL RANGE	REDUNDANCY	POWER SUPPLY	DISPLAY MCR VARIABLE	DISPLAY MCR TREND INDICATION	DISPLAY TSC, EOF COMPUTER
D35b	Containment Enclosure Temperature MM-TE-1002A MM-TE-1002B	-	-	50-250°F	N/A	Vital UPS	RC-XX-7315	-	Available through Data Link
D35c	Primary Auxiliary Building Temperature MM-TE-1003A MM-TE-1003B	-	-	50-250°F	N/A	Vital UPS	RC-XX-7315	-	Available through Data Link
D35d	Diesel Generator Building Temperature DAH-TE-5688 DAH-TE-5689	-	-	0-200°F	N/A	Non-Vital UPS	TI-5688 TI-5689	-	-
D35e	Service Water Pumphouse Temperature SWA-TSHL 5612 SWA-TSHL 5608 SWA-TSHL 5609	-	-	0-140°F*	N/A	N/A	- - -	- - -	D6975 D6977 D6979
D35f	Cooling Tower Switchgear Area Temperature SWA-TSHL 5699 SWA-TSHL 5693 SWA-TSHL 5696	-	-	0-140°F*	N/A	N/A	- - -	- - -	D6993 D6989 D6991
D35g	Emergency Feedwater Pumphouse Temperature EPA-TSH-5434	-	-	0-140°F*	N/A	N/A	-	-	D7980
D35h	Control Building Temperature CBA-TSHL-5180 CBA-TSHL-5181 CBA-TSHL-5182 CBA-TSHL-5580 CBA-TSHL-5581	-	-	30°-110°F*	N/A	N/A	- - - - - -	- - - - - -	D7023 D7022 D7026 D7027 D7028
D35i	Containment Enclosure Emergency Exhaust Fan Discharge Flow EAH-FIT-5791	-	-	0-2500 scfm	N/A	Non-Vital UPS	FR-5791	FR-5791	A3777

TABLE 7.5-1
(Sheet 23 of 36)

ITEM NUMBER	VARIABLE	SB DESIGN CATEGORY	ENVIRONMENTAL QUALIFICATION	SEISMIC QUAL.	QA	TRENDING	REMARKS/NOTES
D35b	Containment Enclosure Temperature	2	Yes	N/A	Yes	N/A	
D35c	Primary Auxiliary Building Temperature	2	Yes	N/A	Yes	N/A	
D35d	Diesel Generator Building Temperature	2	Yes	N/A	Yes	N/A	
D35e	Service Water Pumphouse Temperature	2	Yes	N/A	Yes	N/A	*High Temperature alarm provided Setpoint: 104°F
D35f	Cooling Tower Switchgear Area Temperature	2	Yes	N/A	Yes	N/A	*High Temperature alarm provided Setpoint: 104°F
D35g	Emergency Feedwater Pumphouse Temperature	2	Yes	N/A	Yes	Yes	*High Temperature alarm provided Setpoint: 110°F
D35h	Control Building Temperature	2	Yes	N/A	Yes	Yes	*High Temperature alarm provided Setpoints: 5180, 5181, 5182 - 110°F 5580, 5581 - 95°F
D35i	Containment Enclosure Emergency Exhaust Fan Discharge Flow	2	Yes	N/A	Yes	N/A	

ITEM NUMBER	VARIABLE/SENSOR	R.G. 1.97 RECOMMENDED RANGE	R.G. 1.97 DESIGN CATEGORY	ACTUAL RANGE	REDUNDANCY	POWER SUPPLY	DISPLAY MCR VARIABLE	DISPLAY MCR TREND INDICATION	DISPLAY TSC, EOF COMPUTER
POWER SUPPLIES									
D36	Status of Standby Power								
	4160 Emergency Bus Availability	Plant-specific	2	0-5000 V	N/A	N/A			
	EDE-VTR-9708						VM-9708	-	A2306
	EDE-VTR-9718						VM-9718	-	A2309
	480 Emergency Bus Availability	Plant-specific	2	0-600 V	N/A	N/A			
	EDE-VTR-9784						VTR-9784	-	-
	EDE-VTR-9785						VTR-9785	-	-
	125 V DC	Plant-specific	2	0-150 V dc	N/A	Vital			
	ED-VTR-9750					UPS	VM-9750	-	A2052
	ED-VTR-9752						VM-9752	-	A2055
	ED-VTR-9754						VM-9754	-	A2058
	ED-VTR-9756						VM-9756	-	A2061
	120 V AC Vital Bus Voltage	Plant-specific	2	0-150 V	N/A	N/A	-	-	A1816 A1817
	Vital Bus 1A					N/A	-	-	A1818
	Vital Bus 1B								A1819
	Vital Bus 1C					N/A	-	-	A1820
	Vital Bus 1D								A1821
	Vital Bus 1E					N/A	-	-	
	Vital Bus 1F					N/A	-	-	
						N/A	-	-	
	Emergency Diesel Generator	Plant-specific	2	VM 0-5000 V FM 55-65 Hz	N/A	Emerg. MCC			
	EDE-VTR-9700-1 (DG A)			AM 0-2000 amp			VM-9700-1	XR-9700A	A 2712
	EDE-FTR-9700-3			WM 0-9000 KW			FM-9700-3	XR-9700B	A 2713
	EDE-ATR-9700-1						AM-9700-1	XR-9700A	A 2714
	EDE-WTR-9700-3						WM-9700-3	XR-9700B	A 2715
	EDE-VTR-9710-1 (DG B)						VM-9710-1	XR-9710A	A 2732
	EDE-FTR-9710-3						FM-9710-3	XR-9710B	A 2733
	EDE-ATR-9710-1						AM-9710-1	XR-9710A	A 2734
	EDE-WTR-9710-3						WM-9710-3	XR-9710B	A 2735

ITEM NUMBER	VARIABLE	SB DESIGN CATEGORY	ENVIRONMENTAL QUALIFICATION	SEISMIC QUAL.	QA	TRENDING	REMARKS/NOTES
POWER SUPPLIES							
D36	Status of Standby Power						
	4160 Emergency Bus Availability	2	Yes	N/A	Yes	N/A	
	480 Emergency Bus Availability	2	Yes	N/A	Yes	N/A	
	125 V DC	2	Yes	N/A	Yes	N/A	
	120 V AC	2	Yes	N/A	Yes	N/A	
	Emergency Diesel Generator	2	Yes	N/A	Yes	N/A	

ITEM NUMBER	VARIABLE/SENSOR	R.G. 1.97 RECOMMENDED RANGE	R.G. 1.97 DESIGN CATEGORY	ACTUAL RANGE	REDUNDANCY	POWER SUPPLY	DISPLAY MCR VARIABLE	DISPLAY MCR TREND INDICATION	DISPLAY TSC, EOF COMPUTER
COMBUSTIBLE GAS CONTROL									
D37	Hydrogen Recombiner: Temperature CGC-TE-2703A, B, C CGC-TE-2706A, B, C	-	-	0-2000°F	N/A	Emerg. MCC	 TI-2703 TI-2706	 - -	 - -
TYPE E VARIABLES, RELEASE ASSES									
CONTAINMENT RADIATION									
E1	Containment Area Radiation RM-RE-6576 A RM-RE-6576 B	1 R/hr to 10^7 R/hr	1	1 to 10^8 R/hr	Yes	Vital UPS	 RK-6576A RK-6576B	 RR-6576A RR-6576B	Available Through Data Link
AREA RADIATION									
E2	Radiation Exposure Rate (inside buildings or areas where access is required to service equipment important to safety) RM-R-6508-1, -2 (PAB High Range) RM-R-6563-1, -2 (PAB High Range) RM-R-6517-1, -2 (RHR Pump Vault 1&2 High Range) RM-R-6518 (Spent Fuel High Range)	10^{-1} R/hr to 10^4 R/hr	3	10^{-2} to 10^4 R/hr	N/A	N/A	RM-XM-6599	RM-XM-6599	Available Through Data Link
NOBLE GASES									
E3	Containment or Purge Effluent	10^{-6} uCi/cc to 10^5 uCi/cc (not needed if effluent discharges through common plant vent) 0 to 110% flow	2	See E7					
E4	Reactor Shield Building Annulus	10^{-6} uCi/cc to 10^4 uCi/cc (not needed if effluent discharges through common plant vent) 0 to 110% flow	2	See E7					

ITEM NUMBER	VARIABLE	SB DESIGN CATEGORY	ENVIRONMENTAL QUALIFICATION	SEISMIC QUAL.	QA	TRENDING	REMARKS/NOTES
COMBUSTIBLE GAS CONTROL							
D37	Hydrogen Recombiner: Temperature	2	Yes	N/A	Yes	N/A	
TYPE E VARIABLES, RELEASE ASSESSMENT							
CONTAINMENT RADIATION							
E1	Containment Area Radiation	1	Yes	Yes	Yes	Yes	
AREA RADIATION							
E2	Radiation Exposure Rate (inside buildings or areas where access is required to service equipment important to safety)	3	N/A	N/A	Yes	N/A	The high-range monitors have been installed to monitor the entrances to the PAB and RHR pump vault. The spent fuel pool area is also monitored with a high-range detector. Individual cubicles are not monitored. Portable instruments will be used for entry into high radiation areas (real or suspected).
NOBLE GASES							
E3	Containment or Purge Effluent	See E7					Discharge through plant vent stack.
E4	Reactor Shield Building Annulus	See E7					Discharges through plant vent stack.

ITEM NUMBER	VARIABLE/SENSOR	R.G. 1.97 RECOMMENDED RANGE	R.G. 1.97 DESIGN CATEGORY	ACTUAL RANGE	REDUNDANCY	POWER SUPPLY	DISPLAY		
							MCR		
							VARIABLE	TREND INDICATION	TSC, EOF COMPUTER
E5	Auxiliary Building (including any building containing primary system gases, e.g., waste gas decay tank)	10^{-6} uCi/cc to 10^{3} uCi/cc (not needed if effluent discharges through common plant vent) 0 to 110% flow	2	See E7					
E6	Condenser Air Removal System Exhaust	10^{-6} uCi/cc to 10^{5} uCi/cc (not needed if effluent discharges through common plant vent) 0 to 110% flow	2	See E7					
E7	Common Plant Vent or Multipurpose Vent Discharging Any of Above Releases (if containment purge is included) RM-RE-6528-1, -2, -3 RM-FT-6577	10^{-6} uCi/cc to 10^{4} uCi/cc	2	10^{-7} to 10^{5} uCi/cc	N/A	Emerg. MCC	RK-6528 RM-XM-6599	RR-6528-1 RR-6528-2	Available Through Data Link
		0 to 110% flow (0 to 2×10^{5} scfm)	2	0 to 3.6×10^{5} scfm					
E8	Vent from Steam Generator Safety Relief Valves or Atmospheric Dump Valves RM-RE-6481-1,2; 6482-1,2	10^{-1} uCi/cc to 10^{3} uCi/cc (Duration of releases in seconds and mass of steam per unit time)	2	1 to 10^{5} mr/hr*	N/A	Emerg. MCC	RM-XM-6599	RM-XM-6599	Available Through Data Link
	Safety/Relief Valve Position YE-6820 YE-6821 YE-6822 YE-6823	See D19							
E9	All Other Identified Plant Release Points*								

ITEM NUMBER	VARIABLE	SB DESIGN CATEGORY	ENVIRONMENTAL QUALIFICATION	SEISMIC QUAL.	QA	TRENDING	REMARKS/NOTES
NOBLE GASES							
E5	Auxiliary Building (including any building containing primary system gases, e.g., waste gas decay tank)	See E7					Discharges through plant vent stack.
E6	Condenser Air Removal System Exhaust	See E7					Discharges through plant vent stack.
E7	Common Plant Vent or Multipurpose Vent Discharging Any of Above Releases (if containment purge is included)	2	Yes	N/A	Yes	Yes	Flow element provides a signal to the radiation monitors to permit the radiation monitors to calculate the microcuries per cubic centimeter flowing in the duct and microcuries per second released through the plant vent stack.
E8	Vent from Steam Generator Safety Relief Valves or Atmospheric Dump Valves	2	Yes	N/A	Yes	Yes	* Correlation from mr/hr to uci/cc is included in the procedure for off-site dose assessment. Direct readout in uci/cc is not required to support this procedure. The safety/relief valve position monitors can be used to determine the existence of flow through these valves.
E9	All Other Identified Plant Release Points*						* None Identified.

ITEM NUMBER	VARIABLE/SENSOR	R.G. 1.97 RECOMMENDED RANGE	R.G. 1.97 DESIGN CATEGORY	ACTUAL RANGE	REDUNDANCY	POWER SUPPLY	DISPLAY MCR VARIABLE	DISPLAY MCR TREND INDICATION	DISPLAY TSC, EOF COMPUTER
PARTICULATES AND HALOGENS									
E10	All Identified Plant Release Points (except steam generator safety relief valves or atmospheric steam dump valves and condenser air removal system exhaust). Sampling with On-site Analysis Capability. RM-SKD-53-2	10^{-3} uCi/cc to 10^{2} uCi/cc	3	$<10^{-3}$ uCi/cc to $>10^{2}$ uCi/cc	N/A	N/A	N/A	N/A	N/A
		0 to 110% flow (0 to 2 x 10^{5} scfm		0 to 3.6 x 10^{5} scfm	N/A	N/A	RM-XM-6599	–	Available Through Data Link
E12	Airborne Radiohalogens and Particulates (portable sampling with on-site analysis capability) Air Samplers: Low Volume High Volume Personnel Continuous Air Monitor	10^{-9} uCi/cc to 10^{-3} uCi/cc	3	$<10^{-9}$ uCi/cc to $>10^{-3}$ uCi/cc	N/A	N/A	N/A	–	–
E13	Plant and Environs Radiation (portable instrumentation) Ion Chamber (Low Range) Ion Chamber (Mid Range) Ion Chamber (High Range) Geiger Mueller Detector Geiger Mueller Detector Alpha Scintillation Tele-detector Rate Detector	10^{-3} R/Hr to 10^{4} R/Hr photons 10^{-3} rads/hr to 10^{4} rads/hr, beta radiations and low-energy photons	3	0-1 R/Hr beta/gamma	N/A	N/A	N/A	N/A	N/A
				0-1,000 R/Hr gamma		N/A	N/A	N/A	N/A
				Up to 10,000 R/Hr gamma		N/A	N/A	N/A	N/A
				0-50,000 CPM beta/gamma		N/A	N/A	N/A	N/A
				0-200 MR/Hr beta/gamma		N/A	N/A	N/A	N/A
				0-500,000 CPM alpha		N/A	N/A	N/A	N/A
				0.001-10 R/Hr neutron		N/A	N/A	N/A	N/A
E14	Plant and Environs Radioactivity (portable instrumentation)	(Isotopic analysis)	3	Multichannel gamma-ray spectrometer	N/A	N/A	N/A	N/A	N/A

ITEM NUMBER	VARIABLE	SB DESIGN CATEGORY	ENVIRONMENTAL QUALIFICATION	SEISMIC QUAL.	QA	TRENDING	REMARKS/NOTES
PARTICULATES AND HALOGENS							
E10	All Identified Plant Release Points (except steam generator safety relief valves or atmospheric steam dump valves and condenser air removal system exhaust). Sampling with On-Site Analysis Capability	3	N/A	N/A	Yes	N/A	
E12	Airborne Radiohalogens and Particulates (portable sampling with on-site analysis capability)	3	N/A	N/A	Yes	N/A	
E13	Plant and Environs Radiation (portable instrumentation)	3	N/A	N/A	Yes	N/A	
E14	Plant and Environs Radioactivity (portable instrumentation)	3	N/A	N/A	Yes	N/A	Function provided by gamma spectroscopy system located in the Counting Room. Portable air sampler used to obtain the air samples.

ITEM NUMBER	VARIABLE/SENSOR	R.G. 1.97 RECOMMENDED RANGE	R.G. 1.97 DESIGN CATEGORY	ACTUAL RANGE	REDUNDANCY	POWER SUPPLY	DISPLAY MCR VARIABLE	DISPLAY MCR TREND INDICATION	DISPLAY TSC, EOF COMPUTER
METEOROLOGY									
E15	Wind Direction 43 feet 209 feet	0 to 360° (±5° accuracy with a deflection of 10°). Starting speed less than 0.4 mps (1.0 mph) Damping ratio greater than or equal to 0.4 delay distance less than or equal to 2 meters.	3	0-540°* Accuracy: ±3.2° Threshold: 0.5 mph Damping Rates: 0.4 Distance Constant: 1.5 meters	N/A	N/A	Computer	Computer	A1630 A1627
E16	Wind Speed 43 feet 209 feet	0 to 22 mps (50 mph) ±0.2 mps (0.5 mph) accuracy for speeds less than 2 mps (5 mph), 10% for speeds in excess of 2 mps (5 mph), with a starting threshold of less than 0.4 mps (1.0 mph) and a distance constant not to exceed 2 meters.	3	0-100 mph Accuracy: ±0.32 mph @ 5 mph ±0.57 mph @ 50 mph Threshold: 0.5 mph Distance Constant: 1.5 meters	N/A	N/A	Computer	Computer	A1628 A1626
E17	Estimation of Atmospheric Stability 43 feet (temp) 4[illegible]-150 feet (delta-T) 43-209 feet (delta-T)	Based on vertical temperature difference from primary meteorological system, -5°C to 10°C (-9°F to 18°F) and ±0.15°C accurary per 50-meter intervals (±0.3°F accuracy per 164-foot intervals) or analogous range for alternative stability estimate.	3	Temperature -30° to 110°F Delta T -10°F to 18°F Accuracy: ±0.12°F	N/A	N/A	Computer	Computer	A1632 A1631

ITEM NUMBER	VARIABLE	SB DESIGN CATEGORY	ENVIRONMENTAL QUALIFICATION	SEISMIC QUAL.	QA	TRENDING	REMARKS/NOTES
METEOROLOGY							
E15	Wind Direction	3	N/A	N/A	Yes	Yes	Communication with the National Weather Service is available by telephone. * Range of 0-540° selected to minimize recorder pen travel for northerly wind directions.
E16	Wind Speed	3	N/A	N/A	Yes	Yes	Communication with the National Weather Service is available by telephone.
E17	Estimation of Atmospheric Stability	3	N/A	N/A	Yes	Yes	Communication with the National Weather Service is available by telephone.

ITEM NUMBER	VARIABLE/SENSOR	R.G. 1.97 RECOMMENDED RANGE	R.G. 1.97 DESIGN CATEGORY	ACTUAL RANGE	REDUNDANCY	POWER SUPPLY	DISPLAY MCR VARIABLE	DISPLAY MCR TREND INDICATION	DISPLAY TSC, EOF COMPUTER
ACCIDENT SAMPLING CAPABILITY									
E18	Primary Coolant and Sump	Grab sample	3	–	N/A	N/A	N/A	N/A	N/A
	Gross Activity	1 uCi/ml to 10 Ci/ml		1 uCi/ml to 10 ci/ml					
	Gamma Spectrum	(Isotopic Analysis)		Isotopic analysis					
	Boron Content	0 to 6000 ppm		0 to 6000 ppm					
	Chloride Content	0 to 20 ppm		0 to 20 ppm					
	Dissolved Hydrogen	0 to 2000CC (STP)/KG		0 to 2000CC (STP)/KG					
	Dissolved Oxygen	0 to 20 ppm		*					
	pH	1 to 13		1 to 13					
E19	Containment Air	Grab sample	3	–	N/A	N/A	N/A	N/A	N/A
	Hydrogen Content	0 to 10%		0 to 10%					
	Oxygen Content	0 to 30%		0 to 30%					
	Gamma Spectrum	(Isotopic analysis)		Isotopic analysis					

ITEM NUMBER	VARIABLE	SR DESIGN CATEGORY	ENVIRONMENTAL QUALIFICATION	SEISMIC QUAL.	QA	TRENDING		REMARKS/NOTES
ACCIDENT SAMPLING CAPABILITY								
E18	Primary Coolant and Sump	3	N/A	N/A	Yes	N/A	*	See Deviation No. 21 in Appendix 7A.
E19	Containment Air	3	N/A	N/A	Yes	N/A		

TABLE 7.5-2
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CONTROL ROOM INDICATORS AND/OR RECORDERS AVAILABLE TO THE OPERATOR TO MONITOR SIGNIFICANT PLANT PARAMETERS DURING NORMAL OPERATION INCLUDING OPERATIONAL OCCURENCES

Parameter	No. of Channels Available	Range	Indicated Accuracy(1)	Indicator/ Recorder	Location	Notes
NUCLEAR INSTRUMENTATION						
1. Source Range						
a. Count rate	2	1 to 10^6 counts/sec	±7% of the linear full scale analog voltage	Both channels indicated. Either may be selected for recording.	Control Board	One two-pen recorder is used to record any of the 8 nuclear channels (2 source range, 2 intermediate range and 4 power range)
b. Startup rate	2	0.5 to 5.0 decades/ min	±7% of the linear full scale analog voltage	Both channels indicated.	Control Board	
2. Intermediate Range						
a. Current	2	10^{-11} to 10^{-3}	± 7% of the linear full scale analog voltage and ±3% of the linear full scale voltage in the range of 10^{-4} to 10^{-3} amps	Both channels indicated. Either may be selected for recording using the recorder in Item 1 above.	Control Board	
b. Startup rate	2	0.5 to 5.0 decades/ min	±7% of the linear full scale analog voltage	Both channels indicated.	Control Board	
3. Power Range						
a. Uncalibrated ion chamber current (top and bottom uncompensated ion chambers)	4	0 to 120% of full power current	±1% of full power current	All 8 current signals indicated.	NIS racks in control room	

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TABLE 7.5-2
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Parameter	No. of Channels Available	Range	Indicated Accuracy(1)	Indicator/ Recorder	Location	Notes
b. Calibrated ion chamber current (top and bottom uncompensated ion chambers)	4	0 to 125% of full power current (0 to 5mA)	±2% full power current	All 8 current signals recorded on four 2 pen recorders). Recorder 1 - upper currents for two diagonally opposed detectors. Recorder 2 - upper currents for remaining detectors. Recorder 3 - lower currents for two diagonally opposed detectors. Recorder 4 - lower currents for remaining detectors.	Control Board	
c. Upper and lower ion chamber current difference	4	-60 to 60%	±3% of full power	Diagonally opposed channels may be selected for recording at the same time using recorder in Item 1.	Control Board	
d. Average flux of the top and bottom ion chamber (% full power)	4	0 to 120% of full power	±3% of full power for indication ±2% for recording	All 4 channels indicated. Any 2 of the four channels may be recorded using recorder in Item 1 above.	Control Board	
e. Average flux of the top and bottom ion chambers (power range overpower)	2	0 to 200% of full power	±2% of full power to 120% ±6% of full power to 200%	Both channels recorded.	Control Board	
f. Flux difference of the top and bottom ion chambers	4	-30 to 30%	±4%	All 4 channels indicated.	Control Board	

TABLE 7.5-2
(Sheet 3 0f 6)

Parameter	No. of Channels Available	Range	Indicated Accuracy(1)	Indicator/ Recorder	Location	Notes
REACTOR COOLANT SYSTEM						
1. $T_{average}$ (measured)	1/loop	530° - 630°F	±4°F	All channels indicated.	Control Board	
2. ΔT (measured)	1/loop	0 to 150% of full power ΔT	±4% of full power ΔT	All channels indicated. One channel is selected for recording.	Control Board	
a. T_{cold} or T_{hot} (measured, wide range)	1-T_{hot}, 1-T_{cold} per loop	0 to 700°F	±4%	4 T_{hot} channels are recorded on 2 - two pen recorders. 4 T_{cold} channels are recorded on 2 - two pen recorders.	Control Board	
3. Overpower ΔT Setpoint	1/loop	0 to 150% of full power ΔT	±4% of full power ΔT	All channels indicated. One channel is selected for recording.	Control Board	
4. Overtemperature ΔT Setpoint	1/loop	0 to 150% of full power ΔT	±4% of full power ΔT	All channels indicated. One channel is selected for recording.	Control Board	
5. Pressurizer Pressure	4	1700 to 2500 psig	±28 psi	All channels indicated.	Control Board	
6. Pressurizer Level	3	Entire distance between taps	±3.5% ΔP level at 2250 psia	All channels indicated. One channel is selected for recording	Control Board	Two pen recorder used, second pen records reference level signal
7. Primary Coolant Flow	3/loop	0 to 120% of rated flow	Repeatability of ±4.5% of full flow.	All channels indicated.	Control Board	
8. Reactor Coolant Pump Motor Current	1/loop	0 to 400 ac amps	±1.8%	All channels indicated.	Control Board	One channel for each pump
9. System Pressure Wide Range	2	0 to 3000 psig	±1.8%	All channels indicated and recorded.	Control Board	

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Parameter	No. of Channels Available	Range	Indicated Accuracy(1)	Indicator/ Recorder	Location	Notes
REACTOR CONTROL SYSTEM						
1. Rod Speed	1	5 to 75 steps/min.	±2%	The one channel is indicated.	Control Board	
2. Auctioneered T_{avg}	1	530° to 630°F	±4°F	The one channel is recorded.	Control Board	Any one of the T_{avg} channels into the auctioneer may be bypassed
3. $T_{reference}$	1	530° to 630°F	±4°F	The one channel is recorded.	Control Board	
4. Control Rod Position						If system not available, borate and sample accordingly.
a. Number of steps of demanded rod withdrawal	1/group	0 to 230 steps	±1 step	Each group is indicated during rod motion.	Control Board	These signals are used in conjuction with the measured position signals (4b) to detect deviation of any individual rod from the demanded position. A deviation will actuate an alarm and annunciator.
b. Full length rod measured position	1 for each rod	0 to 228 steps	±4 steps	Each rod position indicated.	Control Board	
5. Control Rod Bank Demanded Position	4	0 to 230 steps	±2.5% of total bank travel	All 4 control rod bank positions are recorded along with the low-low limit alarm for each bank.	Control Board	1. One channel for each control bank. 2. An alarm and annunciator is actuated when the last rod control bank to be withdrawn reaches the withdrawal limit, when any rod control bank reaches the low insertion limit, and when any rod control bank reaches the low-low insertion limit.

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TABLE 7.5-2
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Parameter	No. of Channels Available	Range	Indicated Accuracy(1)	Indicator/ Recorder	Location	Notes
CONTAINMENT SYSTEM						
1. Containment Pressure	2 2	0 to 60 psig -5 to 160 psig	±1.8%	All 4 channels indicated and 1 is recorded.	Control Board	
FEEDWATER AND STEAM SYSTEMS						
1. Emergency Feedwater Flow	1/feed line	0 to 300 gpm	(later)	All channels indicated and recorded.	Control Board	One channel to measure the flow to each steam generator.
2. Steam Generator Level (narrow range)	3/steam generator	0 to 100%	±4% of ΔP Level (hot)	All channels indicated. The channels used for control are recorded.	Control Board	
3. Steam Generator Level (wide range)	1/steam generator	0 to 100%	±5% of level (cold)	All channels recorded.	Control Board	
4. Steam Generator level signal		+7 to -5 feet	±4%	The one channel is indicated.		
5. Main Feedwater Flow	2/steam generator	0 to 5 X 10^6 lbs/hr	±5%	All channels indicated. The channels used for control are recorded.	Control Board	
6. Magnitude of Signal Controlling Main and Bypass Feedwater Control Valves	1/main 1/bypass	0 to 100% of valve opening	±1.5%	All channels indicated.	Control Board	1. One channel for each main and bypass feedwater control valve 2. OPEN/CLOSED indication is provided in the control room for each main and bypass feed water control valve
7. Steam Flow	2/steam generator	0 to 5 X 10^6 lbs/hr	±5.5%	All channels indicated. The channels used for control are recorded.	Control Board	Accuracy is equipment capability; however, absolute accuracy depends on applicant calibration against feedwater flow.

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TABLE 7.5-2
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Parameter	No. of Channels Available	Range	Indicated Accuracy(1)	Indicator/ Recorder	Location	Notes
8. Steam Line Pressure	3/loop	0 to 1300 psig	±4%	All channels indicated and 1 is recorded.	Control Board	
9. Steam Dump Demand	1	0-100% of steam dump valves open	±1.5%	The one channel is indicated.	Control Board	OPEN/CLOSED indication is provided in the control room for each steam dump valve
10. Turbine Impulse Chamber Pressure	2	0 to 860 psig	±3.5%	Both channels indicated.	Control Board	OPEN/CLOSED indication is provided in the control room for each turbine stop valve

(1) Includes channel accuracy and environmental effects

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ATTACHMENT II

(FSAR APPENDIX 7A)

APPENDIX 7A

Deviations and Justifications

Appendix 7A contains a listing of all Accident Monitoring Instrumentation (AMI) variables that have deviations from the design criteria stated in Subsection 7.5.4.4 or the recommendations in Regulatory Guide 1.97. The "Data Table" headings in Appendix 7A refer to Table 7.5-1 items.

AMI variables not included in Appendix 7A have no deviations from the above criteria.

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REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 1

Variable	Data Table Item No.
Steam Generator Pressure	A2, D18

Deviation From Regulatory Guide 1.97 Guidance

The range deviates from the recommended range for Type D variable. Actual range is 0-1300 psig, versus 0-1425 psig recommended (based on 20% margin above lowest safety valve setpoint - 1185 psig).

Justification

The range of the installed instruments extends beyond the lowest safety valve setting with a margin of approximately 10%. This range envelopes the highest safety valve setting (1255 psig). Therefore, the existing range is adequate to monitor the expected steam generator pressures.

In addition to these instruments, nonqualified main steam pressure indication with a range of 0-1500 psig for each steam generator is available at the MCB. This envelopes the recommended range of 0-1425 psig. The transmitters are MS-PT-3001, 3002, 3003, 3004.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 2

Variable	Data Table Item No.
Pressurizer Level	A5, D12

Deviation From Regulatory Guide 1.97 Guidance

Actual range is 61.75"-581.25" above the bottom reference versus a recommended range from the bottom to the top.

Justification

This range covers from approximately 10% to 94% of the pressurizer volume and is sufficient for the required monitoring function.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 3

Variable	Data Table Item No.
RWST Level	A6

Deviation From Regulatory Guide 1.97 Guidance

The actual range starts at 22,000 gallons versus the recommended range starting at the bottom of the tank.

Justification

The indicated range measures the usable volume of the RWST and is adequate for the required monitoring function.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 4

Variable	Data Table Item No.
Containment Hydrogen Concentration	A8

Deviation From Regulatory Guide 1.97 Guidance

Continuous indication is not provided since the hydrogen analyzer is normally isolated from the containment.

Justification

The hydrogen analyzer is normally in the "Standby" mode to preclude a long warm-up time. The analyzer can be operational within 30 minutes of the initiation of an SI signal as required by NUREG-0737, Item II.F.1.

Since hydrogen buildup is a slow process and sufficient time is available to put the analyzer into operation, continuous indication is not required during power operation.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 5

Variable	Data Table Item No.
RCS Soluble Boron Concentration	B3

Deviation From Regulatory Guide 1.97 Guidance

This variable is not considered AMI.

Justification

Under accident conditions, determination of boron concentration will be made by analysis of samples obtained via the post-accident sample panel. Analysis capability is available to envelope the recommended range of 0-6000 ppm boron. The Seabrook-specific ERPs do not require that the operating crew monitor this variable with on-line instrumentation; therefore, it is not considered AMI.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 6

Variable	Data Table Item No.
RCS Hot Leg Water Temperature	B5

Deviations From Regulatory Guide 1.97 Guidance

All four channels (indication and recording) are powered from the same power supply.

Justification

The hot leg RTDs provide the primary temperature measurement for each hot leg. Diverse measurement is provided by the core exit thermocouples. The core exit thermocouples are redundant, thereby assuring the availability of this indication in the event UPS-I-1A is lost.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 7

Variable	Data Table Item No.
RCS Cold Leg Water Temperature	B4, B6

Deviation From Regulatory Guide 1.97 Guidance

All channels (indication and recording) are powered from the same power supply.

Justification

The cold leg RTDs provide the primary temperature measurement for each cold leg. Diverse measurement is provided by the steam generator pressure channels. The Westinghouse Nuclear Steam Supply System is designed such that the cold leg temperature approximates the saturation temperature corresponding to secondary pressure. It has been confirmed that there would be only a small variance between the actual cold leg temperature and the saturation temperature corresponding to steamline pressure during cooldown to cold shutdown.[1] This correlation has been verified during actual plant operations.

The steam generator pressure channels (Item No. A2) are redundant, thereby assuring the availability of this indication in the event power to the cold leg RTDs is lost.

1. Letter from J. J. Sheppard, Westinghouse Owner's Group to D. G. Eisenhut, U.S. Nuclear Regulatory Commission, OG-94 (revised), dated June 14, 1983.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 8

Variable	Data Table Item No.
Radiation Level in Circulating Primary Coolant	C2

Deviation From Regulatory Guide 1.97 Guidance

This variable is not considered AMI.

Justification

The post-accident sampling system and analysis will be used to obtain measurements of the radiation levels in the primary coolant loops to satisfy ERP requirements. The Seabrook-specific ERPs do not require that the operating crew monitor this variable with on-line instrumentation; therefore, it is not considered AMI.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 9

Variable	Data Table Item No.
Effluent Radioactivity - Noble Gases (Inside buildings or areas where penetrations or hatches are located.)	C13

Deviation From Regulatory Guide 1.97 Guidance

The installed range, 10^{1} to 10^{6} CPM (corresponding to 6×10^{-4} to 10^{1} uCi/cc), does not envelope the recommended range (10^{-6} to 10^{3} uCi/cc).

Justification

The containment structure and all penetration/hatch areas are surrounded by the containment enclosure building. The exhaust from the containment enclosure building is monitored for gross activity. The containment enclosure building exhaust is routed to the main plant vent stack, where it is monitored (10^{-7} - 10^{5} uCi/cc) prior to discharge.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 10

Variable	Data Table Item No.
Accumulacor Tank Level	D3

Deviation From Regulatory Guide 1.97 Guidance

This variable is not considered AMI.

Justification

The primary function of these indications is to assure adequate volume in the accumulators prior to any transient requiring injection. This indication, in conjunction with accumulator tank pressure and outlet isolation valve position indication, will ensure that these accumulators are capable of performing their safety function which is to inject water into the cold legs upon major depressurization of the RCS.

Assuming that the isolation valves are open, there is no action that the operating crew can take in an accident situation if these accumulators do not perform their intended safety function. Therefore, this instrumentation does not have to be designed for accident-monitoring service.

The only operator action relative to the accumulators in an accident situation is to isolate them. The instrumentation used to make this determination is RCS hot leg temperature and RCS subcooling. If RCS subcooling is greater than 80^{o}F, and RCS hot leg temperature is less than 400^{o}F, then the operator is directed to isolate the accumulator. This action occurs whether or not the accumulator has discharged. The successful

Justification (cont'd)

completion of this step requires monitoring the position of the isolation valves. If an isolation valve fails to fully close, then the operator is directed to vent the unisolated accumulator by opening the vent valves. An open vent valve is sufficient to determine successful completion of this step.

The Seabrook-specific ERPs do not require that the operating crew monitor accumulator level in an emergency; therefore, it is not considered AMI.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 11

Variable	Data Table Item No.
Accumulator Tank Pressure	D4

Deviation From Regulatory Guide 1.97 Guidance

This variable is not considered AMI.

Justification

The primary function of this instrumentation is to assure that the accumulators are pressurized to their normal operating pressure during plant operation. This indication, in conjunction with accumulator level and outlet isolation valve position, will ensure that these accumulators are capable of performing their passive safety function which is to inject water into the cold legs upon major depressurization of the RCS.

Assuming that the isolation valves are open, there is no action that the operating crew can take in an accident situation if these accumulators do not perform their intended safety function. Therefore, this instrumentation does not have to be designed for accident-monitoring service.

The only operator action relative to the accumulators in an accident situation is to isolate them. The instrumentation used to make this determination is RCS hot leg temperature and RCS subcooling. If RCS subcooling is greater than 80^{o}F, and RCS hot leg temperature is less than 400^{o}F, then the operator is directed to isolate the accumulator. This action occurs whether or not the accumulator has discharged. The successful completion of this step requires monitoring the position of the isolation valves. If an isolation valve fails to fully close, then the operator is directed to vent the unisolated accumulator by opening the vent valves. Open

Justification (cont'd)

vent valve position indication is sufficient to determine successful completion of this step.

The Seabrook-specific ERPs do not require that the operating crew to monitor accumulator pressure in an emergency; therefore, it is not considered AMI.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 12

Variable	Data Table Item No.
Pressurizer Relief Tank Temperature (Quench Tank Temperature)	D15

Deviation From Regulatory Guide 1.97 Guidance

The actual range (50-250°F) deviates from the recommended range (50-750°F).

Position

The Pressurizer Relief Tank (PRT) temperature measurement is used in conjunction with PRT level and pressure indication to determine if PRT conditions are "normal." This determination is used to aid the operating crew in event diagnosis.

The temperature range provided is sufficient to indicate a change from normal operating conditions. Fully enveloping the expected temperatures to be encountered is not necessary in this case. The operating crews will be made aware of the limitations of this measurement in their training program. Therefore, this instrumentation is adequate for the required monitoring function.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 13

Variable	Data Table Item No.
Containment Spray Flow	D23
(a) Containment Spray Pump Suction Pressure	
(b) Containment Spray Pump Discharge Pressure	

Deviation From Regulatory Guide 1.97 Guidance

A direct indication of containment spray flow is not provided.

Justification

Containment spray pump head can be determined from the containment spray pump suction and discharge pressure indications provided side by side on the MCB. The operating crews will be trained in the use of this instrumentation to verify proper operation of the Containment Spray System. Quantitative determination of flow is not required to support the Seabrook-specific ERPs.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 14

Variable	Data Table Item No.
Containment Atmosphere Temperature	D25

Deviation From Regulatory Guide 1.97 Guidance

The range of the Containment Air Temperature Monitoring System is 50°F to 420°F versus the recommended range of 40°F to 400°F.

Justification

The minimum containment air temperature will be greater than 50°F when this instrumentation is required to function (during and/or after an accident). Therefore, the range of this instrumentation is adequate for its intended monitoring function.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 15

Variable	Data Table Item No.
Containment Sump Water Temperature	D26

Deviation From Regulatory Guide 1.97 Guidance

This variable is not considered AMI.

Justification

1 Seabrook-specific ERPs do not require that the operating crew monitor containment sump water temperature; therefore, it is not considered AMI.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 16

Variable	Data Table Item No.
Makeup Flow-In	D27

Deviation From Regulatory Guide 1.97 Guidance

Makeup flow-in is classified as a Design Category 3 variable as opposed to Design Category 2 in Regulatory Guide 1.97.

Justification

Normal charging and letdown is not required in the mitigation of design basis accidents. It is classified as a nonsafety system and is used to assist in recovery if it can be placed in service. Therefore, the monitoring of charging flow is classified as Design Category 3.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 17

Variable	Data Table Item No.
Letdown Flow-Out	D28

Deviation From Regulatory Guide 1.97 Guidance

"Letdown flow-out" is classified as a Design Category 3 variable as opposed to Design Category 2 in Regulatory Guide 1.97.

Justification

Normal charging and letdown is not required in the mitigation of design basis accidents. It is classified as a nonsafety system and is used to assist in recovery if it can be placed in service. Therefore, the monitoring of letdown flow is classified as Design Category 3.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 18

Variable	Data Table Item No.
Volume Control Tank Level	D29

Deviation From Regulatory Guide 1.97 Guidance

1. Volume control tank level is classified as a Design Category 3 variable as opposed to Design Category 2 in Regulatory Guide 1.97.

2. The range of this measurement is 0 inches - 80 inches versus a recommended range of top to bottom (141 inches total).

Justification

1. Normal charging and letdown are not required in the mitigation of design basis accidents. If charging and letdown can be re-established, then they will be used to assist in the recovery. Therefore, the volume control tank level is not required for accident-monitoring service. It will be used only if charging and letdown are re-established. Therefore, the monitoring of Volume Control Tank Level is classified as Design Category 3.

2. The level channel monitors the straight shell portion of the tank only. The hemispherical heads are not monitored, since the volume to level ratio is not linear. The range of this channel is acceptable for the intended monitoring functions.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 19

Variable	Data Table Item No.
Component Cooling Water Temperature	D30

Deviation From Regulatory Guide 1.97 Guidance

The actual range ($0^{\circ}F$-$175^{\circ}F$) deviates from the recommended range ($40^{\circ}F$-$200^{\circ}F$).

Justification

The maximum design temperature for component cooling water under accident conditions is $120^{\circ}F$. The actual range envelopes this temperature with substantial margin. Therefore, this instrumentation is adequate for the required monitoring function.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 20

Variable	Data Table Item No.
High-Level Radioactive Liquid Tank Level	D33

Deviation From Regulatory Guide 1.97 Guidance

The range of this measurement is (0-14 feet) versus a recommended range of top to bottom of the tank (18 feet total).

Justification

The range covers the top 14 feet of these tanks. The bottom section of the tank is hemispherical. The volume-to-level ratio is not linear in this region, therefore, is not in the span of the instrument. The range is acceptable for the intended monitoring function.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 21

Variable	Data Table Item No.
Dissolved Oxygen in Primary Coolant (Grab Sample)	E18

Deviation From Regulatory Guide 1.97 Guidance

The O_2 concentration in the Primary Coolant System is not analyzed.

Justification

NUREG-0737, Item II.B.3, Criterion (4) states that measuring O_2 concentration is recommended but not mandatory. In NHY letter from J. DeVincentis to G. W. Knighton, SBN-648, dated April 16, 1984, the clarification on Criterion (4) provided by the NRC staff to NHY was restated as follows:

NRC Criterion (4) Clarification

The determination of dissolved oxygen can be satisfied by analyzing a post-accident gas sample from the Reactor Coolant System for dissolved hydrogen. If the reactor coolant dissolved hydrogen concentration is greater than 10 cc/kg, the NRC considers the dissolved oxygen level to be less than 100 ppb. If the post-accident dissolved hydrogen level is less than 10 cc/kg, the NRC will require NHY to provide justification that no damage to plant systems has occurred prior to plant startup, but considers the analysis requirement for oxygen satisfied.

Justification (cont'd)

The NHY response was as follows:

NHY Response

The amount of dissolved gases in the reactor coolant will be determined by extracting a gaseous sample from the post-accident sampling panel using a shielded syringe if necessary. This sample will be analyzed for hydrogen and gamma spectrum only.

This has been accepted in the Safety Evaluation Report, Supplement 3, Section 9.3.4.3.

REGU.ATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 22

Variable	Data Table Item No.
RHR Heat Exchanger Outlet Temperature	D2

Deviation From Regulatory Guide 1.97 Guidance

The lower end of the temperature range extends down to 50°F as opposed to a recommended lower end of 40°F.

Justification

The RHR heat exchangers are cooled by the component cooling water system. The normal operating temperature is 85°F, automatic temperature control is provided by a safety-related temperature control loop. VAS alarms are provided should the temperature of the component cooling water drop below 75°F. This allows sufficient time for corrective action before the component cooling water temperature drops to 60°F, which is the minimum temperature for this system. Thus, the installed range is adequate since it will remain on-scale at all times.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 23

Variable	Data Table Item No.
Containment Drainage Sump Water Level	B12A

Deviation From Regulatory Guide 1.97 Guidance

This variable is not considered AMI.

Justification

Containment drainage sump water level instrumentation is provided that meets the guidance in Regulatory Guide 1.45, Reactor Coolant Pressure Boundary Leakage Detection System and NUREG-0737, Item II.F.1. The purpose of these instruments is to detect abnormal leakage into the containment when the leakage rate is insufficient to actuate the engineered safety features (Condition II events).

The Seabrook-specific ERPs do not require that the operating crew monitor this variable during a design basis accident event; therefore, it is not considered AMI.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 24

Variable	Data Table Item No.
Pressurizer Heater Status, Power Monitor	D13

Deviation From Regulatory Guide 1.97 Guidance

This variable is designated as Design Category 3, as opposed to Design Category 2 in Regulatory Guide 1.97.

Justification

Pressurizer heaters are not required for the mitigation of design basis accidents. They are classified as nonsafety related and are used to assist in recovery if they can be placed in service. Therefore, the monitoring of pressurizer heater status is classified as Design Category 3.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 25

Variable	Data Table Item No.
Heat Removal by the Containment Fan Heat Removal System	D24

Deviation From Regulatory Guide 1.97 Guidance

This variable is not considered AMI.

Justification

Operation of the containment fan/coolers is not required for the mitigation of design basis accident events. The Seabrook-specific ERPs do not require that the operating crew monitor this variable in an emergency; therefore, it is not considered AMI.

REGULATORY GUIDE 1.97, REVISION 3 REVIEW

Deviation No. 26

Variable	Data Table Item No.
Radioactive Gas Holdup Tank Pressure	D34

Deviation From Regulatory Guide 1.97 Guidance

This variable is not considered AMI.

Justification

Holdup of radioactive gas for decay is provided by carbon delay beds instead of pressurized storage tanks. Therefore, this variable is not applicable.

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ATTACHMENT III

(FSAR SECTION 1.8)

MARK UP

Regulatory Guide 1.96 (Rev. 1, 6/76) — Design of Main Steam Isolation Valve Leakage Control Systems for Boiling Water Reactor Nuclear Power Plants

This regulatory guide is not applicable to Seabrook Station.

Regulatory Guide 1.97 ~~(Rev. 1, 8/77)~~ — Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant Conditions During and Following an Accident

The presently identified post-accident monitoring (PAM) instrumentation complies with the guidance provided in Regulatory Guide 1.97, Rev. 1, with exceptions as discussed below:

1. The maximum range of the radiation level measurement inside containment is 10^7 R/hr vs. 10^8 R/hr recommended by the Reg. Guide.

2. The maximum range of the reactor coolant pressure measurement is 3000 psig vs. 3 times design pressure recommended by the Reg. Guide.

3. The primary vent stack radiation monitor is single channel vs. redundant channels recommended by the Reg. Guide.

For Items 1 and 3, the installed instrumentation complies with the requirements of NUREG 0737, Item II.F.1.

For Item 2, the recommended range of 3 times design pressure is unrealistic due to the design of the reactor coolant system. Overpressure protection is provided by power operated relief valves (PORV's) and code safety valves. The PORV's receive a signal to open at 2335 psig and the safety valves begin to open at 2485 psig, the system design pressure. The pressure measurement ranges up to 120% of design pressure (3000 psig) which is adequate based on system design.

The design of the PAM instrumentation includes redundant channels for monitored variables; both channels are indicated while one channel is recorded. The PAM instrument channels are environmentally and seismically qualified and are fed from the emergency power supplies.

A complete description of the PAM instrumentation is provided in FSAR Section 7.5.

PSNH is in the process of selecting the post-accident monitoring (PAM) instrumentation vis-a-vis the guidance of ANSI/ANS-4.5-1980, "Criteria for Accident Monitoring Functions in Light Water Cooled Reactors," as endorsed by Regulatory Guide 1.97, Revision 3.

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REPLACE WITH ATTACHED INSERT A

INSERT A

Regulatory Guide 1.97
(Revision 3, May 1983)

Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant Conditions During and Following an Accident

Regulatory Guide 1.97, Revision 3 endorses ANSI/ANS-4.5-1980, "Criteria for Accident Monitoring Functions in Light-Water-Cooled Reactors." With minor exceptions, the above guidance has been followed in selecting accident monitoring instrumentation. These exceptions are provided in Subsection 7.5.4.

A complete description of the Seabrook AMI is provided in Section 7.5.