TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

January 30, 1984

Director of Nuclear Reactor Regulation
Attention: Ms. E. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Ms. Adensam:

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

Please refer to my letter to you dated April 15, 1983 which provided TVA's response to Supplement 1 to NUREG-0737 (Generic Letter 82-33) for the Watts Bar Nuclear Plant (WBN). In accordance with section 6.2 of the supplement, TVA committed to prepare a submittal which addresses the WBN compliance to Regulatory Guide (RG) 1.97 (Revision 2). Enclosed is TVA's WBN RG 1.97 (Revision 2) submittal.

If you have any questions concerning this matter, please get in touch with D. B. Ellis at FTS 858-2681.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills

L. M. Mills, Manager
Nuclear Licensing

Sworn to and subscribed before me
this 30th day of January 1984

Paulette H. White
Notary Public
My Commission Expires 9-5-84

Enclosure
cc: U.S. Nuclear Regulatory Commission (Enclosure)
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

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WATTS BAR NUCLEAR PLANT

REGULATORY GUIDE 1.97, (REVISION 2)

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ABBREVIATIONS AND ACRONYMS

NRC	- Nuclear Regulatory Commission
PAM	- Postaccident Monitoring
PAM1	- Postaccident Monitoring Channel 1
PAM2	- Postaccident Monitoring Channel 2
H_2	- Hydrogen
MCR	- Main Control Room
CRT	- Cathode Ray Tube
EOI	- Emergency Operating Instructions
RG	- Regulatory Guide
RCS	- Reactor Coolant System
ANS	- American Nuclear Society
EGTS	- Emergency Gas Treatment System
ERCW	- Essential Raw Cooling Water
10CFR50	- Title 10 Code of Federal Regulations part 50
10CFR100	- Title 10 Code of Federal Regulations part 100
GDC	- General Design Criteria

1.0 SCOPE

During initial plant operation, postaccident monitoring (PAM) shall consist of the instrumentation currently identified by reference 8.6. Based on NRC evaluation (see reference 8.13), this instrumentation has been found acceptable for initial plant operation.

1.1 Purpose

This document establishes TVA criteria for instrumentation used to assess plant and environs conditions during and following an accident at Watts Bar Nuclear Plant in accordance with the intent of Nuclear Regulatory Commission (NRC) Regulatory Guide (RG) 1.97 (revision 2) and the applicable requirements of General Design Criteria (GDC) 13, 19, and 64 of Appendix A to Title 10 Code of Federal Regulations Part 50 (10 CFR 50).

1.2 Identification

PAM shall consist of the instrumentation necessary to provide main control room (MCR) monitoring of the set of process variables required to ensure safety during and following an accident. Support instrumentation may provide additional information to the operator during and following an accident, but this information is not required. Attachment 1 of this document lists each specific PAM and support instrumentation variable with the variable type(s), range, qualification category, etc., as requested per Supplement 1 to NUREG-0737, Requirements for Emergency Response Capability (Generic Letter No. 82-33).

2.0 NOMENCLATURE

2.1 Category 1 - The design and qualification category for PAM instruments required to monitor type A, B, and C variables during and following an accident. This category is utilized to meet the requirements of GDC 13, 19, and 64 of Appendix A to 10 CFR 50.

2.2 PAM Instrumentation - The instrumentation necessary to monitor type A, B, and C variables in the MCR.

2.3 Support Instrumentation - The instrumentation necessary to monitor type D and E variables.

2.4 Type A - Those instruments that provide information required to identify the event and take preplanned manual actions.

2.5 Type B - Those instruments that provide information to monitor the process of accomplishing critical safety functions.

2.6 Type C - Those instruments that indicate the potential for breaching or the actual breach of barriers to fission product release (including high level radioactive release through identifiable release points, i.e., plant vents).

2.7 Type D - Those instruments that indicate the operation of individual safety systems or provide backup indication for type B and C variables.

2.8 Type E - Those instruments that provide information for use in determining the magnitude of the release of radioactive materials and for continuously assessing such releases.

3.0 DESIGN BASES

3.1 Variable Types

TVA has performed an independent study based on the general principles outlined in RG 1.97 (revision 2) using the following expanded definitions for variable types A, B, C, and D. The results of this study are basically the same as those of RG 1.97 (revision 2). TVA used the RG 1.97 definition of type E variables.

3.1.1 Type A Variables

Type A variables provide information required to identify and take preplanned manual actions for design basis events. The variables are categorized in three groups: (1) event identification, (2) event recovery to plant stabilization, and (3) maintaining stabilized conditions and event recovery to safe shutdown. Based on information obtained from monitoring type A variables, the operator can (1) take a preplanned manual action based on their indication (e.g., start hydrogen (H_2) recombiners when containment H_2 level exceeds 0.5%) or (2) take all the required actions to maintain a process (e.g., cooldown while on natural circulation). The type A variables were selected from a review of the emergency operating instructions (EOI) and basic functional requirements.

3.1.2 Type B Variables

The type B variables provide information required to monitor the success of completing the manual and automatic actions required to maintain the three fission product boundaries (i.e, fuel cladding, reactor coolant system (RCS) pressure boundary, and containment). The instrumentation for type B variables do not inform the operator of the actual integrity of the fission product boundary. The fission product boundary status monitors

are type C variables even though many of the indications will be the same as type B variables. The type B variables apply only to those actions that are required to prevent major failures (i.e., system function lost or 10 CFR 100 limits exceeded). Actions to prevent minor losses of integrity will not be monitored as type B variables. This position is supported by American Nuclear Society Standard ANS 4.5-1980 and implied by the variable list of RG 1.97. The safety functions are defined so that the major required actions are monitored; however, the essential supporting systems required for the safety function will be monitored by type D variables.

3.1.3 Type C Variables

The fission products are contained by three principle barriers which are (1) fuel cladding, (2) RCS pressure boundary, and (3) containment. Type C variables are those variables that indicate the potential for breaching and the actual breach of the barriers to fission product releases. The potential for boundary failure and the actual boundary failure were considered separately for each barrier.

The type C potential variables are closely related to the type B variables. Instrumentation for the type B variables monitor the 'success' of performing the safety functions which are required to maintain the barriers. Instrumentation for the type C potential failure variables monitor the challenges on the barriers which will include the 'failure' of performing the safety functions. The challenges on a barrier are not necessarily limited to only failures of safety functions. For type C variables that are monitored to indicate a failure of a safety function, the success and failure monitor may be the same variable. The type C variable might require an extended range to determine the extent of failure or level of challenge on the barrier.

3.1.4 Type D Variables

Type D variables provide required information to indicate operation of individual safety systems. The determination of specific variables was made by considering four categories of safety systems. The categories are (1) safety-related heat removal systems, (2) major components or systems required for type B safety functions, (3) auxiliary and support systems, and (4) type B and C backup variables. The third category is used to monitor the safety system not covered by the other categories.

3.1.5 Type E Variables

The type E variables provide information for use in determining the magnitude of the release of radioactive materials and for continuously assessing such releases.

3.2 Categorization of Instrumentation

Type A, B, and C variables are monitored by Category 1 instrumentation. Type D and E variables are monitored by commercial grade instrumentation as a minimum, but many of these variables are monitored by higher quality instrumentation for other design purposes not within the scope of safety functions provided by PAM.

3.2.1 Category 1 Instrumentation

Instrumentation monitoring type A, B, and C variables serve a primary safety function; therefore, indication of these variables is required during and following an accident. These variables are considered the complete set of PAM variables. They are used by the operator to assure (a) the capability to shut down the reactor and maintain it in a safe shutdown condition, (b) the integrity of the fission product boundaries, and (c) the capability to mitigate the consequences of accidents which could result in potential offsite exposures comparable to the exposure guidelines of 10CFR100. Instrumentation used to indicate the need for required operator actions that assure design basis behavior for the design basis events (accidents) shall be Category 1 instrumentation. Instrumentation used to monitor whether or not the events are following the design basis behavior and to indicate the need for major contingency actions if the event goes beyond the acceptable design basis behavior shall be Category 1 instrumentation.

3.2.2 Support Instrumentation

Instrumentation monitoring type D and E variables does not serve a primary safety function; therefore, indication of these variables is not required during and following an accident. These variables are not considered PAM instrumentation, and they only provide additional information by indicating system operating status, diverse variables, and radiation releases. The additional information provided by this instrumentation allows the operator to improve the system operation over the minimum required for design basis behavior or determine what system has failed.

No special design requirements are specified for this instrumentation to comply with RG 1.97, but some special design requirements may be utilized for this instrumentation to provide functions not within the scope of safety functions provided by PAM.

3.3 Design Basis Events

3.3.1 Category 1 Instrumentation

Indication of type A variables is required for mitigation of design basis events where manual action is required. Indication of type B and C variables can be helpful in the mitigation of design basis events and events beyond the design basis, and the ranges of the instruments monitoring type C variables are selected to extend beyond the range of the parameter's expected value during design basis events. The analysis of design basis events is given in Chapter 15 of the Watts Bar Nuclear Plant Final Safety Analysis Report (reference 8.4).

3.4 Specific Instrumentation Requirements

3.4.1 Category 1 Instrumentation

3.4.1.1 Existing instrumentation shall be qualified in accordance with the methodology described in NUREG-0588, 'Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment.' The seismic portion of the qualification is as stated in attachment 1 of this document. New instrumentation shall be qualified in accordance with RG 1.89 (RO), 'Qualification of Class 1E Equipment for Nuclear Power Plants.'

Type C instruments shall be qualified in the same manner as other Category 1 instrumentation except for purposes of equipment qualification, the assumed maximum value of the monitored parameter shall be the value equal to the maximum range for the instrument. The monitored parameters shall be assumed to approach this peak by extrapolating the most severe ramp associated with the design basis accidents. The decay for this parameter shall be considered proportional to the decay for this parameter associated with the design basis accidents. The extended range qualification shall also address any other parameters which must necessarily increase if the measured

parameter increases. No additional qualification margin needs to be added to the extended range parameter (see figure 3.4-1). All environmental envelopes except that pertaining to the parameter measured by the instrument shall be those associated with the design basis accidents.

3.4.1.2 No single failure, within the PAM system, its auxiliary support equipment, or its power sources shall result in the loss of the PAM function.

3.4.1.3 Qualified continuous indication of all channels shall be provided. Qualification applies from sensor to display where the display is a direct indicating meter or recording device.

3.4.1.4 The instruments shall be specifically identified on the MCR panels so that the operator can easily discern that they are intended for use under accident conditions.

3.4.1.5 Transmission of PAM Category 1 analog signals to components not identified as PAM Category 1 components (see subsection 4.1) shall only be through an isolation device qualified to the requirements of subsection 3.4.1.1. The function performed by these isolators is to prevent electrical faults in nonqualified circuits, which derive their signals from qualified portions of PAM circuits, from propagating to the PAM circuit. In addition, transmission of PAM Category 1 analog signals from components which perform automatic safety control functions (i.e., reactor protection system) shall only be through isolation devices qualified to the requirements of subsection 3.4.1.1. These isolators shall prevent electrical faults in portions of circuits identified as PAM from propagating to qualified portions of the circuit not identified as PAM.

3.4.1.6 Recording of instrumentation read out information shall be provided. Variables in attachment 1 with dedicated recording indicated shall be analyzed on a case-by-case basis to determine the type of recorder necessary to prevent the loss of trend or transient information essential to the operator. Variables in attachment 1 that have inputs to the Technical Support Center (TSC) have trending capability. When specifically assigned by the operator for trending, these inputs are

available for display on demand in the form of a recent time-history plot. Only the current values are available for display on demand if trending is not assigned.

3.4.2 Support Instrumentation

3.4.2.1 The instrumentation shall be commercial grade as a minimum.

3.4.2.2 The instrumentation signal may be displayed on an individual instrument or it may be processed for display on demand by a computer based data acquisition and display system or by other appropriate means.

3.4.2.3 Some support instrumentation variables will not be required to display in the MCR. The support instrumentation not required to display in the MCR can be categorized as portable or postaccident sampling instrumentation and some local control panel mounted instrumentation (see attachment 1). Access to the portable or postaccident sampling instrumentation and communication with the analysis facilities for these type of instrumentation shall be ensured in the postaccident environment.

3.4.2.4 Some levels of design and qualification are above the minimum specified for Support Instrumentation, since many of these variables are monitored by higher quality instrumentation for other design purposes not within the scope of safety functions provided by PAM.

3.4.3 Applicable to Both Category 1 and Support Instrumentation

3.4.3.1 Human factors principles shall be used in determining type and location of displays.

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

3.4.3.3 To the extent practical, the same instruments shall be used for accident monitoring as are used for the normal operations of the plant to enable the operators to use, during accident situations,

instruments with which they are most familiar. However, where the required range of monitoring instrumentation results in a loss of instrumentation sensitivity in the normal operating range, separate instruments shall be used.

3.5 Electrical Requirements

3.5.1 Category 1 Instrumentation

3.5.1.1 Circuits shall be divided into two redundant divisions of separation, PAM1 and PAM2. PAM1 cables shall be separated from PAM2 cables as noted in reference 8.6.

3.5.1.2 The control power supply for PAM1 is derived from the 125-V vital battery channel I or channel III. The control power supply for PAM2 is derived from the 125-V vital battery channel II or channel IV (reference 8.8). These control power cables shall be separated in accordance with subsections 3.5.1.1 of this document.

3.5.1.3 Specific variables which require three channels (identified in attachment 1) of information to be displayed in the MCR shall have the third channel cables routed and separated from PAM1 and PAM2 (see reference 8.6). The control power supply for these channels shall be derived from a 125-V vital battery channel not used by the other two channels monitoring the same variable.

3.5.2 Support Instrumentation

3.5.2.1 Separation and redundant circuitry is not required. The cable routing shall be in accordance with the requirements for nondivisional circuits from reference 8.6.

3.5.2.2 The control power supply for these circuits may be derived from nondivisional power sources.

3.5.2.3 Some circuits may have more stringent requirements placed upon them due to other design or regulatory requirements. The most stringent requirements shall apply.

3.6 Mechanical Requirements

3.6.1 Category 1 Instrumentation

3.6.1.1 Components located in Seismic Category I structures shall continue to function following a design basis seismic event.

3.6.1.2 Components not located in a Seismic Category I structure shall be designed and mounted to withstand seismic forces to the extent practical.

3.6.2 Support Instrumentation

3.6.2.1 Components shall be designed and mounted such that they do not have an adverse effect on safety systems during a design basis seismic event.

4.0 IDENTIFICATION

4.1 Category 1 Instrumentation

4.1.1 Where an indication is derived from a protection channel or trained channel, the identification shall only include the isolator, indicator, and associated cabling between the isolator and indicator.

4.1.2 PAM1 display devices, located in the MCR, shall be identified by the symbol P1 inscribed on their nameplates. PAM2 display devices, located in the MCR, shall be identified by the symbol P2 inscribed on their nameplates. A special symbol shall be provided for third channel indicators to be used in conjunction with the PAM1 or PAM2 symbol for use as an operator aide to indicate the availability of the third channel information.

4.1.3 Components which must be identified due to the requirements of subsections 4.1.1 and 4.1.2 shall have the symbols P1 for PAM1 components and P2 for PAM2 components inscribed on their nameplates. Third channel components shall be identified identical to PAM1 or PAM2 components dependent on the source of the channels control power supply with the exception of the indicator (see subsections 3.5.1.2 and 3.5.1.3).

5.0 TESTING AND SURVEILLANCE REQUIREMENTS

5.1 Testing Requirements Category 1 Instrumentation

5.1.1 All channels shall be provided with test procedures to verify proper operation of the channel.

5.1.2 Periodic testing and calibration requirements for all channels shall be specified.

5.1.3 For those instruments where the required interval between testing is less than the normal time interval between generating station shutdowns, a capability for testing during power operation shall be provided.

5.2 Surveillance Requirements Category 1 Instrumentation

5.2.1 All channels shall have an out-of-service interval specified.

5.2.2 Whenever the means of removing channels from service are included in the design, the design shall facilitate administrative control of the access to such removal means.

5.2.3 The design shall facilitate administrative control of the access to all setpoint adjustments, module calibration adjustments, and test points.

6.0 QUALITY ASSURANCE

6.1 Category 1 Instrumentation

A description of the Quality Assurance Program for Category 1 instrumentation is given in TVA Topical Report - TVA-TR75-1A, 'Quality Assurance Program Description for Design, Construction, and Operation of TVA Nuclear Power Plants,' (reference 8.10).

7.0 EXCEPTIONS

7.1 Core Exit Thermocouples

The design of the core exit thermocouple system is described in our response to NUREG-0737 Item II.F.2 (see reference 8.3). Acceptance of the system for the monitoring functions required by Item II.F.2 of NUREG-0737 will meet the intent of RG 1.97.

7.2 Shield Building Vent Radiation Monitor

The design of the shield building vent radiation monitor will meet the qualification levels discussed in the NUREG-0737 Item II.F.1 response (see reference 8.11).

8.0 REFERENCES

8.1 NRC RG 1.97 R2, Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident.

8.2 NUREG-0588 R1, Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment.

8.3 L. M. Mills letter to E. Adensam of NRC dated July 26, 1983.

8.4 Watts Bar Nuclear Plant Final Safety Analysis Report.

8.5 American Nuclear Society report ANS-4.5-1980, Functional Requirements for Postaccident Monitoring Capability for the Control Room Operator of a Nuclear Power Generating Station.

8.6 Watts Bar Nuclear Plant FSAR Section 7.5, Safety-Related Display Instrumentation.

8.7 NRC RG 1.89 RO, Qualification of Class IE Equipment for Nuclear Power Plants.

8.8 Watts Bar Nuclear Plant FSAR, Section 7.6, All Other Systems Required for Safety.

8.9 Watts Bar Nuclear Plant FSAR Section 3.10, Seismic Design of Category I Instrumentation and Electrical Equipment.

8.10 TVA-TR-75-1A, Quality Assurance Program Description for Design, Construction, and Operation of TVA Nuclear Power Plants.

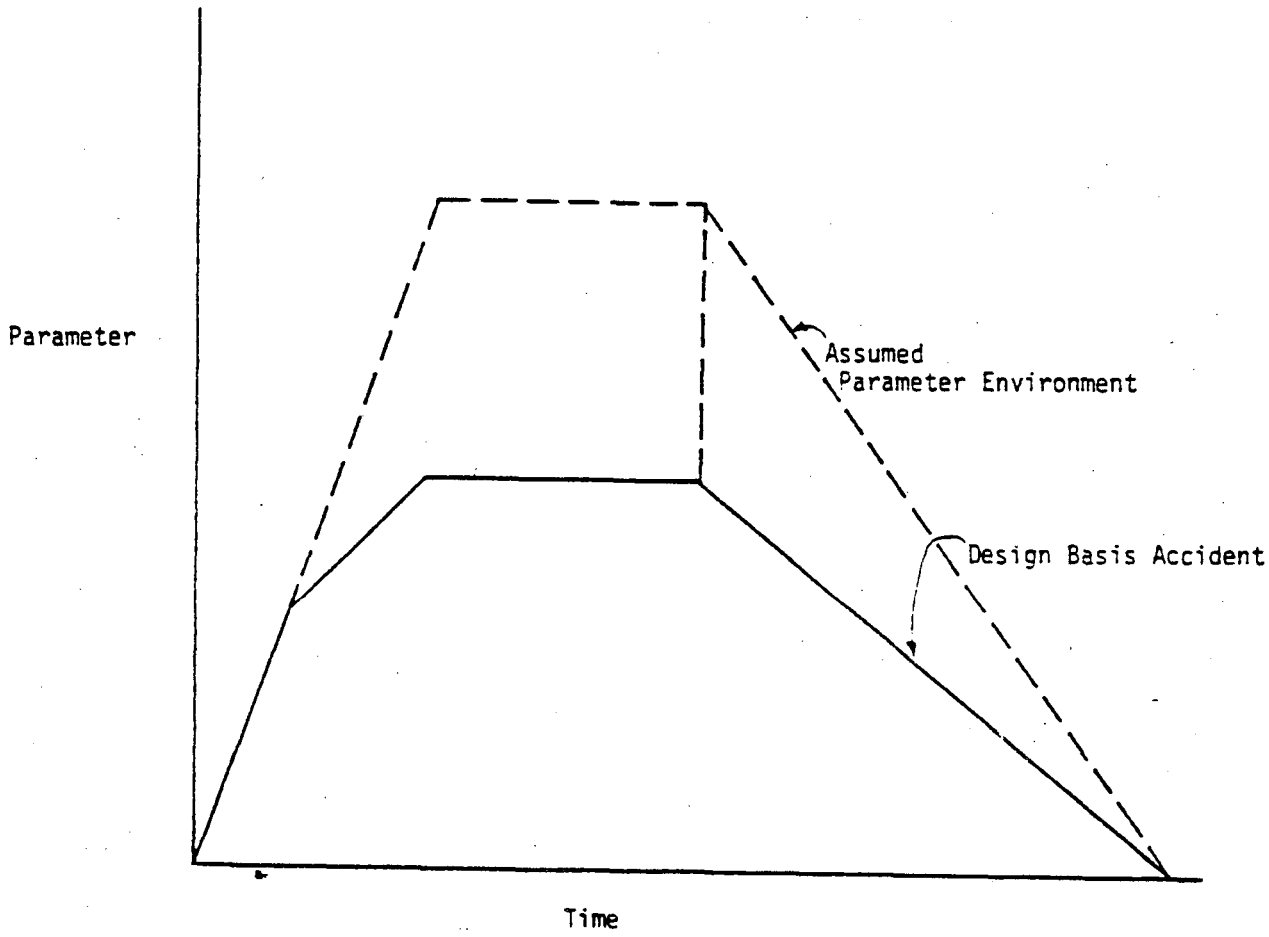
8.11 L. M. Mills letter to E. Adensam of NRC dated June 7, 1983.

8.12 L. M. Mills letter to E. Adensam of NRC dated October 29, 1981.

8.13 NUREG-0847, Safety Evaluation Report for Watts Bar Nuclear Plant Units 1 and 2 dated June, 1982.

FIGURE 3.4-1

TYPICAL ENVIRONMENTAL QUALIFICATION
ENVELOPE FOR TYPE C INSTRUMENTS



ATTACHMENT 1

Variable	Watts Bar NP Cat	Watts Bar NP Type(s)	Reg. Guide 1.97 Cat	Reg. Guide 1.97 Type(s)	Instrument Number	Environmental Qualification	Seismic Qualification	QA	Redundancy	Range	Sensor Loc.	Power Supply	Location of Display	Schedule	Comments
RCS Pressure Wide Range	1	A,B,C	1	B,C	PT-68-66 PT-68-68 PT-68-69	Will comply with 10CFR50.49 (see Note 1)	See Note 2	Complies	3 channels	0-3000 psig	RB	1E	MCRP indicators- 3 channels recorder- 1 channel. TSC input	Installed*	See Note 8
Pressurizer Level	1	A,D	1	B,D	LT-68-335 LT-68-339 LT-68-320	Will comply with 10CFR50.49 (see Note 1)	See Note 2	Complies	3 channels	0-100%	RB	1E	MCRP indicators- 3 channels recorder- 1 channel. TSC input	Installed*	
RCS Temperature T Hot	1	A,D	1	B	TE-68-1 TE-68-24 TE-68-43 TE-68-65	Will comply with 10CFR50.49 (see Note 1)	See Note 2	Complies	4 channels 1 per loop	50-700°F	RB	1E	MCRP indicators- 4 channels recorders- 4 channels. TSC input	Installed*	
T Cold	1	A,B,C,D	3	B	TE-68-18 TE-68-41 TE-68-60 TE-68-83	Will comply with 10CFR50.49 (see Note 1)	See Note 2	Complies	4 channels 1 per loop	50-700°F	RB	1E	MCRP indicators and recorders 4 channels. TSC input	Installed*	
Nuclear Instrumentation Source Range	1	A,B	1	B	NE-31 NE-32	Will comply with 10CFR50.49 (see Note 1)	See Note 2	Complies	2 channels	$1-10^{6}$ cps	RB	1E	MCRP indicators- 2 channels 1 recorder- 2 pens, 1 channel/pen	Installed*	
Intermediate Range	1	B	1	B	NE-35 NE-36	Will comply with 10CFR50.49 (see Note 1)	See Note 2	Complies	2 channels	10^{-11} to 10^{-3} amps	RB	1E	MCRP indicators- 2 channels 1 recorder- 2 pens, 1 channel/pen	Installed*	

ATTACHMENT 1

Variable	Watts Bar NP Cat	Watts Bar NP Type(s)	Reg. Guide 1.97 Cat	Reg. Guide 1.97 Type(s)	Instrument Number	Environmental Qualification	Seismic Qualification	QA	Redundancy	Range	Sensor Loc.	Power Supply	Location of Display	Schedule	Comments
Steam Generator Pressure	1	A,B,D	2	D	PT-1-2A PT-1-2B PT-1-27A PT-1-27B	Complies with 10CFR50.49	See Note 2	Complies	2 channels per SG	0-1200 psig	AB	1E	MCRP indicators- 2 channels per SG TSC input	See Note 3	
					PT-1-20A PT-1-20B PT-1-9A PT-1-9B	Will comply with 10CFR50.49 (see Note 1)									
Steam Generator Level Narrow Range	1	A, B	1	D	LT-3-39	Complies with 10CFR50.49	See Note 2	Complies	8 channels 2 per SG	0-100%	RB	1E	MCRP indicators- 8 channels 2 per SG. TSC input	Installed*	
					LT-3-38 LT-3-51 LT-3-52 LT-3-93 LT-3-94 LT-3-106 LT-3-107	Will comply with 10CFR50.49 (see Note 1)								See Note 3	
Steam Generator Level Wide Range	SI	D	2	D	LT-3-43 LT-3-56 LT-3-98 LT-3-111	Complies with 10CFR50.49	See Note 2	Complies	4 channels 1 per SG	0-100%	RB	1E	MCRP indicators- 2 per channel 2 recorders- 2 pens each, 1 channel per pen. TSC input	See Note 3	

ATTACHMENT 1

Variable	Watts Bar NP Cat	Watts Bar NP Type(s)	Reg. Guide 1.97 Cat	Reg. Guide 1.97 Type(s)	Instrument Number	Environmental Qualification	Seismic Qualification	QA	Redundancy	Range	Sensor Loc.	Power Supply	Location of Display	Schedule	Comments
Condenser Vacuum Pump Exhaust Radiation	1	A,D	2	E	RE-90-99 RE-90-119	Note 11	See Note 5	Complies	1 channel (See Note 12)	2.3×10^{-7} to 10^{3} uCi/cc (XE-133)	TB	See Note 6	MCRP indicator- 1 channel recorder- 1 channel. TSC input	See Note 3	
Containment Pressure Narrow Rage	1	A,B,C	1	B,C	PDT-30-42 PDT-30-43 PDT-30-44 PDT-30-45	Complies with 10CFR50.49	See Note 2	Complies	4 channels	-1 to 15 psig	RB	1E	MCRP indicators- 4 channels. TSC input	Installed*	
Wide Range	1	C	1,3	B,C	PT-30-310 PT-30-311	Will comply with 10CFR50.49 (see Note 1)	See Note 2	Complies	2 channels	-5 to 60 psig	RB	1E	MRCP indicators- 2 channels. TSC input	Installed*	
Steam Generator Blowdown Line Radiation	1	A	2	E	RE-90-120 RE-90-121 RE-90-124	Complies with 10CFR50.49	See Note 5	Complies	1 channel (see Note 13)	1.5×10^{-6} to 2.4×10^{-2} uCi/cc	TB	See Note 6	MCRP indicator- 1 channel TSC input	See Note 3	
Containment Atmosphere Temperature	SI	D	2	D	TE-30-210A through TE-30-210P	N/A (see Note 7)	N/A (See Note 7)	N/A (See Note 7)	16 elements	40-400° F	RB	See Note 9.3	TSC input	Installed*	
Containment Radiation	1	A,C,D, E	1 3	E C	RE-90-271 RE-90-272 RE-90-273 RE-90-274	Complies with 10CFR50.49	See Note 2	Complies	4 channels	1 R/hr to 10^{7} R/hr	AB	1E	MCRP indicators- 4 channels. TSC input	See Note 3	
Containment Sump Level Wide Range	1	A,C	1	B	LT-63-180 LT-63-181	Will comply with 10CFR50.49 (see Note 1)	See Note 2	Complies	2 channels	0-20 ft.	RB	1E	MCRP indicators- 2 channels. TSC input	See Note 3	

ATTACHMENT 1

Variable	Watts Bar NP Cat	Watts Bar NP Type(s)	Reg. Guide 1.97 Cat	Reg. Guide 1.97 Type(s)	Instrument Number	Environmental Qualification	Seismic Qualification	QA	Redundancy	Range	Sensor Loc.	Power Supply	Location of Display	Schedule	Comments
Narrow Range	SI	D	2	B	LT-77-125 LT-77-126 LT-77-410 LT-77-411	N/A (see Note 7)	N/A (see Note 7)	N/A (see Note 7)	2 channels	0-64 in.	RB	See Note 9.1	MCRP alarm	Installed*	
Safety Injection and Centrifugal Charging Pumps Running	1	A	See Note 17		HS-63-10A HS-63-15A HS-62-104A HS-62-108A	See Note 11	See Note 2	Complies	1 channel per pump	Running-not running	AB	1E	MCRP status lights	Installed*	
Containment Hydrogen Level	1	A,B,C	1	C	H2E-43-200 H2E-43-210	Will comply with 10CFR50.49 (See Note 1)	See Note 2	Complies	2 channels	0-10%	RB	1E	MCRP indicators-2 channels. TSC input	Installed*	
Refueling Water Storage Tank Level	1	A,D	2	D	LT-63-50 LT-63-51	See Note 11	See Note 2	Complies	2 channels	0-100%	Yard	1E	MCRP indicators-2 channels TSC input	Installed*	
Emergency Boration Flow	SI	D	2	D	FT-62-137	N/A (see Note 7)	N/A (see Note 7)	N/A (see Note 7)	1 channel	0-150 gpm	AB	See Note 9.1	MCRP indicator-1 channel	Installed*	
Core Exit Thermocouples	1	B,C	3 1	B C	TE-1E through TE-65E	Will comply with 10CFR50.49 (see Note 8)	Will comply with Reg Guide 1.100 (See Note 8)	Will comply (see Note 8)	8 PAM 1 8 PAM 2	200-2300° F	RB	See Note 8	MCRP indicators-2 channels. TSC input	See Note 8	

ATTACHMENT 1

Variable	Watts Bar NP Cat	Watts Bar NP Type(s)	Reg. Guide 1.97 Cat	Reg. Guide 1.97 Type(s)	Instrument Number	Environmental Qualification	Seismic Qualification	QA	Redundancy	Range	Sensor Loc.	Power Supply	Location of Display	Schedule	Comments
Reactor Vessel Level	1	B	1	B	LT-68-367 LT-68-368 LT-68-369 LT-68-370 LT-68-371 LT-68-372	Will comply with 10CFR50.49	See Note 2	Complies	2 channels	Top to bottom	AB	1E	MCRP indi-cators-2 channels. TSC input	See Note 3	See Note 8
Centri-fugal Charge Pump Flow	SI	D	See Note 17		FT-63-170 FT-62-93A	N/A (see Note 7)	N/A (see Note 7)	N/A (see Note 7)	1 channel each path	0-110% design flow	AB	See Note 9.1	MCRP indicators-1 channel each path	Installed*	
Safety Injec-tion Pump Flow	SI	D	2	D	FT-63-20 FT-63-151	N/A (see Note 7)	N/A (see Note 7)	N/A (see Note 7)	1 channel per pump	0-110% design flow	AB	See Note 9.1	MCRP indicators-1 channel per pump. TSC input	Installed*	
RHR Pump Flow	SI	D	2	D	FT-63-91A FT-63-91B FT-63-92A FT-63-92B FT-63-173A	N/A (see Note 7)	N/A (see Note 7)	N/A (see Note 7)	1 channel each path	0-110% design flow	AB	See Note 9.1	MCRP indicators-1 channel each path. TSC input	Installed*	
Radiation Monitor on Shield Bldg. Vent (Gaseous)	1	C,E	2	E	RE-90-401A RE-90-401B RE-90-401C	See Note 11	See Note 2	Complies	1 channel	4.0×10^{-7} to 10^{4} uCi/cc	RB	See Note 9.2	MCRP indi-cators 1 channel	See Note 3	See Nureg 0737, item II.F.1

ATTACHMENT 1

Variable	Watts Bar NP Cat	Watts Bar NP Type(s)	Reg. Guide 1.97 Cat	Reg. Guide 1.97 Type(s)	Instrument Number	Environmental Qualification	Seismic Qualification	QA	Redundancy	Range	Sensor Loc.	Power Supply	Location of Display	Schedule	Comments
Radiation Monitor on Essential Raw Cooling Water System	1	C	See Note 17		RE-90-133 RE-90-134 RE-90-140 RE-90-141	See Note 11	See Note 2	Complies	1 channel per discharge header.	$1.5x10^{-6}$ to $2.4X10^{-2}$ uCi/cc (I-131)	RB	See Note 9.2	MCRP indicators-1 channel per discharge header. TSC input	See Note 3	
Control Rod Bottom Lights	SI	D	See Note 17		Status Lights	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel	Full In-Not Full In	RB	See Note 9.5	MCRP Status Lights	Installed*	
Primary Coolant Activity	None	None	1	C	None	None	None	None	None	None	None	None	None	Do not plan to install	See Note 4
Radiation Monitor on main Steam Line	1	C,E	2	C,E	To be determined	Will comply	Will comply	Will comply	1 channel per steam line (see Note 15)	10^{-1} to 10^{3} uCi/cc	AB	See Note 9.2	MCRP indicator-1 channel per steam line	To be installed	See Note 15
Saturation Meter	1	A	2	B	See Note 8	Will comply with 10CFR50.49 (see Note 1)	See Note 2	Complies	2 channels	200° F subcooled to saturation	RB	1E	See Note 8	Installed*	See Note 8
	SI	D								200° subcooled to 35° F superheat					
Boron Injection Flow	SI	D	See Note 17		FT-63-170	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel	0-110% design flow	AB	See Note 9.1	MCRP indicator-1 channel	Installed*	

ATTACHMENT 1

Variable	Watts Bar NP Cat	Watts Bar NP Type(s)	Reg. Guide 1.97 Cat	Reg. Guide 1.97 Type(s)	Instrument Number	Environmental Qualification	Seismic Qualification	QA	Redundancy	Range	Sensor Loc.	Power Supply	Location of Display	Schedule	Comments
Reactor Coolant Pump Seal Injection Flow	SI	D	See Note 17		FIT-62-11 FIT-62-24 FIT-62-37 FIT-62-50	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel per pump	0-110% design flow	RB	See Note 9.1	MCRP 2 recorders- 2 pens each 1 channel per per pen. TSC input	Installed*	
Auxiliary Feedwater Flow	1	A,D	2,3	D	FT-3-147A FT-3-147B FT-3-155A FT-3-155B FT-3-163A FT-3-163B FT-3-170A FT-3-170B	Will comply with 10CFR50.49 (see Note 1)	See Note 2	Complies	2 channels per loop	0-110% design flow	AB	1E	MCRP indicators- 2 channels per pump TSC input 1 channel per pump	See Note 3	
Conden-sate Storage Tank Level	SI	D	1	D	LT-2-230 LT-2-233	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel per tank, 2 tanks	Full to empty	Yard	See Note 9.1	MCRP indicators- 1 channel per tank. TSC input	Installed*	
Compo-nent Cooling Water Heat Exchange Flow	SI	D	2	D	FT-70-159A FT-70-164A FT-70-165A FT-70-142	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel per flow path	0-110% design	AB	2 chan-nels 1E 2 chan-nels See Note 9.1	MCRP indicators- 1 channel per flow path	Installed*	
Compo-nent Cooling Water Supply & Return Temperature	SI	D	2	D	TE-70-70 TE-70-72 TE-70-161 TE-70-162	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel per flow path	50-150°F	AB	3 chan-nels - See Note 9.1 1 chan-nel See Note 9.3	MCRP indicators- 1 channel per flow path	Installed*	

ATTACHMENT 1

Variable	Watts Bar NP Cat	Watts Bar NP Type(s)	Reg. Guide 1.97 Cat	Reg. Guide 1.97 Type(s)	Instrument Number	Environmental Qualification	Seismic Qualification	QA	Redundancy	Range	Sensor Loc.	Power Supply	Location of Display	Schedule	Comments
Essential Raw Cooling Water Header Flow	SI	D	See Note 17		FT-67-61 FT-67-62	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel per header	0-110% design	Yard	See Note 9.1	MCRP indicators- 1 channel per header	Installed*	
RHR Heat Exchanger Inlet-Outlet Temperature	SI	D	2	D	TE-74-14 TE-74-29 TE-74-25 TE-74-39	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	2 channels per HT EX, 2 HT EX's	50-400° F	AB	HT EX Outlet are 1E. For HT EX Inlet See Note 9.1	MCRP for HT EX Outlets, both indicators and recorders- 1 channel per HT EX TSC input for HT EX inlets- 1 channel per HT EX	Installed*	
Containment Spray Flow	SI	D	2	D	FT-72-13 FT-72-34	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel per loop	0-110% design	AB	1E	MCRP indicators- 1 channel per loop. TSC input	See Note 3	
Containment Spray Heat Exchanger Outlet Temperature	SI	D	See Note 17		TE-72-6 TE-72-31	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel per HT EX, 2 HT EX's	50-300° F	AB	See Note 9.1	MCRP for HT EX outlets, recorders- 1 channel per HT EX	Installed*	
Accumulator tank Level	SI	D	2	D	LT-63-60 LT-63-81 LT-63-82 LT-63-89 LT-63-99 LT-63-109 LT-63-119 LT-63-129	N/A (see Note 7)	N/A (see Note 6)	N/A(see Note 7)	4 tanks 2 channels each	Top 20in of tank	RB	See Note 9.1	MCRP indicators- 2 channels per tank	Installed*	

ATTACHMENT 1

Variable	Watts Bar NP Cat	Watts Bar NP Type(s)	Reg. Guide 1.97 Cat	Reg. Guide 1.97 Type(s)	Instrument Number	Environmental Qualification	Seismic Qualification	QA	Redundancy	Range	Sensor Loc.	Power Supply	Location of Display	Schedule	Comments
Accumulator tank pressure	SI	D	2	D	PT-63-128 PT-63-126 PT-63-106 PT-63-108 PT-63-88 PT-63-86 PT-63-62 PT-63-61	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	4 tanks 2 channels each	0-110% design	RB	See Note 9.1	MCRP indicators- 2 channels per tank	Installed*	
Essential Raw Cooling Water Supply Temperature	SI	D	See Note 17		TE-67-455 TE-67-456	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel per header	40-120° F	AB	See Note 9.3	MCR process computer alarm printer	Installed*	
Upper Head Injection Accumulator Tank Pressure	SI	D	2	D	PT-87-2 PT-87-3	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	2 channels	0-110% design	AB	See Note 9.1	MCRP indicators- 2 channels	Installed*	
Reactor Coolant Pump Status	SI	D	3	D	EI-68-8A EI-68-31A EI-68-50A EI-68-73A	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel per pump	0-110% current	AB	See Note 9.6	MCRP indicators- 1 channel per pump	Installed*	
Upper Head Injection Surge Tank Level	SI	D	See Note 17		LT-87-1 LT-87-4	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	2 channels	0-100%	AB	See Note 9.1	MCRP indicators- 2 channels	Installed*	
Pressurizer Heaters	SI	D	2	D	HS-68-341F HS-68-341H HS-68-341D HS-68-341A (Status Lights)	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel per heater- 4 heaters	On-Off	AB 1E(2 heaters)	See Note 9.1 (2 heaters)	MCRP status lights- 1 channel per heater	Installed*	

ATTACHMENT 1

Variable	Watts Bar NP Cat	Watts Bar NP Type(s)	Reg. Guide 1.97 Cat	Reg. Guide 1.97 Type(s)	Instrument Number	Environmental Qualification	Seismic Qualification	QA	Redundancy	Range	Sensor Loc.	Power Supply	Location of Display	Schedule	Comments
Makeup and Letdown Flow	SI	D	2	D	FT-62-93A FT-62-82	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel per flow path	0-110% design	AB	See Note 9.1	MCRP indicators- 1 channel per path. TSC input	Installed*	
Air Return Fans Running	SI	D	2	D	HS-30-38A HS-30-39A (Status Lights)	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel per fan	Running Not running	RB	1E	MCRP status lights- 1 channel per fan	Installed*	
H_2 Recombining Energized	SI	D	See Note 17		Htr-83-1 Htr-83-2	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	2 channels	On-Off	RB	1E	MCRP status lights	Installed*	
H_2 Igniters Energized	SI	D	See Note 17		HTR-268-1 through HTR-268-68	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	68 elements 2 channels 34 elements each	On-Off	RB	See Note 9.1	MCRP status lights (one per train)	Installed*	
Essential Air Header Pressure	SI	D	See Note 17		PT-32-104 PT-32-105	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel per header	0-110% design	AB	See Note 9.1	MCRP low pressure alarm- 1 channel per header	Installed*	
Auxiliary Bldg. to Annulus Differential Pressure	SI	D	See Note 17		PT-30-126 PT-30-127	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	2 channels	0-110% design	AB	See Note 9.1	MCRP indicators- 2 channels	Installed*	
Volume Control Tank Level	SI	D	2	D	LT-62-129A LT-62-130A	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	2 channels	Full to empty	AB	See Note 9.1	MCRP indicators- 2 channels	Installed*	

ATTACHMENT 1

Variable	Watts Bar NP Cat	Watts Bar NP Type(s)	Reg. Guide 1.97 Cat	Reg. Guide 1.97 Type(s)	Instrument Number	Environmental Qualification	Seismic Qualification	QA	Redundancy	Range	Sensor Loc.	Power Supply	Location of Display	Schedule	Comments
Pressure Relief Tank															
Level	SI	D	3	D	LT-68-300	N/A	N/A	N/A(see	1 channel	0-100%	RB	See	MCRP	Installed*	
Pressure	SI	D	3	D	PT-68-301	(see Note 7)	(see	Note 7)	each.	0-100 psig		Note	indicators-		
Tempera-	SI	D	3	C	TE-68-309		Note 7			50-300°F		9.1	1 channel		
ture													each.		
													TSC-input		
Control Room Habitability															
Radiation	SI	D	See Note 17		RE-90-125	N/A	N/A	N/A(see	2 channels	10^{-1} to	CB	1E	MCRP	Installed*	
(area)					RE-90-126	(see Note 7)	(see	Note 7)		10^{4} mR/hr			indicators-		
							Note 7)						2 channels		
													recorders-		
													2 channels.		
													TSC input		
(particulate)					RE-90-105				1 channel	$1.5x10^{-10}$		See	MCRP		
										to $1.5x10^{-5}$		Note	indicator		
										uCi/cc		9.2	and recorder.		
													TSC input		
Diesel	SI	D	2	D	LS-18-77A	N/A	N/A	N/A(see	1 channel	Empty	DB	1E	MCRP	Installed*	
Generator					LS-18-77B	(see Note 7)	(see	Note 7)	per diesel	to Full			(Hi-Low		
Fuel Oil Day					LS-18-63A		Note 7)						Alarm)		
Tank Level					LS-18-63B								1 channel		
													per diesel		
Diesel	SI	D	2	D	PS-82-164	N/A	N/A	N/A(see	1 channel	0-110%	DB	1E	MCRP	Installed*	
Starting					PS-82-165	(see Note 7)	(see	Note 7)	per diesel	Design			(Alarm)		
Air Pressure					PS-82-174		Note 7)						1 channel		
					PS-82-175								per diesel		
Tritiated	SI	D	See Note		LT-77-31	N/A	N/A	N/A(see	1 channel	Empty	AB	non-	LCP	Installed*	
Drain			17			(see Note 7)	(see	Note 7)		to Full		1E			
Collector Tank							Note 7)								
Level															

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Variable	Watts Bar NP Cat	Watts Bar NP Type(s)	Reg. Guide 1.97 Cat	Reg. Guide 1.97 Type(s)	Instrument Number	Environmental Qualification	Seismic Qualification	QA	Redundancy	Range	Sensor Loc.	Power Supply	Location of Display	Schedule	Comments
Waste Gas Decay Tank Pressure	SI	D	3	D	PT-77-100 PT-77-101 PT-77-102 PT-77-113 PT-77-114 PT-77-115 PT-77-145 PT-77-146 PT-77-147	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel per tank	0-110% design	AB	non-1E	LCP	Installed*	
Class 1E Power															
6900V ac Voltage Current	SI	D	3	D	EI-57-39 EI-57-38A EI-57-38B EI-57-40A EI-57-40B EI-57-66 EI-57-65A EI-57-65B EI-57-67A EI-57-67B	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	2 shutdown bds. 1 voltage indication each-- 4 current supply indicators each	0-100% design	AB	1E	MCRP indicators-(voltage) 1 channel per SD BD (current) 4 channels per SD BD	Installed*	
480V ac Voltage	SI	D	2	D	EI-57-29A1 EI-57-29A2 EI-57-29B1 EI-57-29B2 EI-57-30A1 EI-57-30A2 EI-57-30B1 EI-57-30B2 EI-57-83A1 EI-57-83A2 EI-57-83B1 EI-57-83B2 EI-57-84A1 EI-57-84A2 EI-57-84B1 EI-57-84B2	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	4 shutdown bds, 4 voltage indicators each	0-110% design	AB	1E	MCRP indicators-(voltage) 4 channels each	Installed*	

ATTACHMENT 1

Variable	Watts Bar NP Cat	Watts Bar NP Type(s)	Reg. Guide 1.97 Cat	Reg. Guide 1.97 Type(s)	Instrument Number	Environmental Qualification	Seismic Qualification	QA	Redundancy	Range	Sensor Loc.	Power Supply	Location of Display	Schedule	Comments
125V dc Voltage Current	SI	D	2	D	EI-57-92 EI-57-93 EI-57-94 EI-57-95 EI-57-96	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	4 battery bds, 1 current indicator each-1 common voltage indicator	0-110% design	AB	1E	MCRP indicators-(current) 1 channel each (voltage) 1 common channel	Installed*	
Diesel Wattmeter	SI	D	2	D	EI-82-10A EI-82-40A EI-82-70A EI-82-100A	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel per diesel	0-110% design	DB	See Note 9.6	MCRP indicators-1 channel per diesel	Installed*	
RCS Boron Concen-tration	SI	D	3	B	XAN-43-94	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel	0-5000ppm	AB	See Note 9.4	MCRP recorder-1 channel	Installed*	
Shield Building Vent Flow	SI	E	2	E	FE-30-242	See Note 11	See Note 2	Complies	1 channel per unit	0-110% design	RB	See Note 9.2	MCRP indicator-1 channel per unit	See Note 3	
Shield Building Vent Monitor (Particulate)	SI	E	2	E	RE-90-400A	See Note 11	See Note 2	Complies	1 channel per unit	4.7×10^{-11} to 10^{2} uCi/cc	RB	See Note 9.2	MCRP recorder-1 channel per unit	See Note 3	
Shield Building Vent Monitor (Iodine)	SI	E	2	E	RE-90-400B	See Note 11	See Note 2	Complies	1 channel per unit	1.0×10^{-9} to 10^{2} uCi/cc	RB	See Note 9.2	MCRP recorder-1 channel per unit	See Note 3	

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Variable	Watts Bar NP Cat	Watts Bar NP Type(s)	Reg. Guide 1.97 Cat	Reg. Guide 1.97 Type(s)	Instrument Number	Environmental Qualification	Seismic Qualification	QA	Redundancy	Range	Sensor Loc.	Power Supply	Location of Display	Schedule	Comments
Condenser Vacuum Pump Exhaust Flow Rate	SI	E	2	E	FT-2-257 FT-2-256	See Note 11	See Note 2	Complies	2 channels	0-100% design	TB	See Note 6 and 9.1	MCR Process Computer Alarm Printer	See Note 3	
Post-Accident Sampling	SI	E	3	E	See Note 16	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)		See Note 16	PASF			Installed*	
Airborne Radio-halogens and Particulates (portable sampling with onsite analysis)	SI	E	3	E		N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)		1.0x10-11 to 2x10-5 uCi/cc					
Plant and Environs Radiation (portable instrumentation)	SI	E	3	E		N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)							
Meterology															
Wind Speed	SI	E	3	E		N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	1 channel each	0-50 mph			MCRP recorder-1 channel		
Wind Direction	SI	E	3	E						0-359°					
Vertical Temp. Difference	SI	E	3	E						-10° to 10°					
Containment Sump to Residual Heat Removal Pump Valve Position	1	A	See Note 17		FCV-63-72/73	Complies with 10CFR50.49	See Note 2	Complies	One valve per pump	Open-Close	AB	1E	MCRP status lights. TSC input	Installed*	

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Variable	Watts Bar NP Cat	Watts Bar NP Type(s)	Reg. Guide 1.97 Cat	Reg. Guide 1.97 Type(s)	Instrument Number	Environmental Qualification	Seismic Qualification	QA	Redundancy	Range	Sensor Loc.	Power Supply	Location of Display	Schedule	Comments
Safety Injection System Accumulator Tank Flow Isolation Valve Position	SI	D	2	D	FCV-63-67 FCV-63-80 FCV-63-98 FCV-63-118	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	Check Valve in series	Open-Close	RB	1E 1E See Note 9.1	MCRP status lights	Installed*	
Reactor Coolant System Pressurizer Pressure Relief Valve Position															
PORVs	SI	D	2	D	PCV-68-334 PCV-68-340A	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	2 valves in parallel	Open-close	RB	1E	MCRP indicators-acoustic temperature, and status lights. TSC input	Installed*	
Code (Safety) Valves.	SI	D	2	D	68-563 68-564 68-565	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	3 valves in parallel	Open-close	RB	1E	MCRP indicators-acoustic and temperature	Installed*	
Containment Ventilation System Valve Position	SI	D	2	D	FCV-30-2 FCV-30-5 FCV-30-61 FCV-30-62	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	2 valves in series or parallel trains	Open-Close	AB	1E	MCRP status lights	Installed*	
Steam Generator Safety Relief Valves Position	SI	D	2	D	1-512 through 1-531	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	5 valves per steam generator	Open-Close	AB	See Note 9.3	TSC input	Installed*	See Note 14

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Variable	Watts Bar NP Cat	Watts Bar NP Type(s)	Reg. Guide 1.97 Cat	Reg. Guide 1.97 Type(s)	Instrument Number	Environmental Qualification	Seismic Qualification	QA	Redundancy	Range	Sensor Loc.	Power Supply	Location of Display	Schedule	Comments
Pressure Control Valve Position	SI	D	See Note 17		PCV-1-5 PCV-1-12 PCV-1-23 PCV-1-30	N/A (see Note 7)	N/A (see Note 7)	N/A (see Note 7)	1 valve per steam generator	Open-Close	AB	See Note 9.3	MCRP status lights. TSC input	Installed*	See Note 14
Containment Ventilation System Valves Position	SI	D	2	D	FCO-30-21 FCO-30-22 FCO-30-86 FCO-30-87 FCO-30-106 FCO-30-107 FCO-30-108 FCO-30-109 FCO-30-137 FCO-30-138 FCO-30-140 FCO-30-141 FCO-30-146A FCO-30-147B FCO-30-157A FCO-30-157B FCO-30-279 FCO-30-280 FCO-30-160 FCO-30-161 FCO-30-166 FCO-30-167 FCO-30-271 FCO-30-272 FCO-30-275 FCO-30-276	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	2 valves in series or parallel trains	Open-Close	AB	1E	MCRP status lights	Installed*	
Emergency Gas Treatment System	SI	D	2	D	FCV-65-4 FCV-65-5 FCV-65-7 FCV-65-8 FCV-65-9 FCV-65-10 FCV-65-24 FCV-65-26 FCV-65-27 FCV-65-29	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	Check valve or control valve in series with each	Open-Close	AB	1E	MCRP status lights	Installed*	

ATTACHMENT 1

Variable	Watts Bar NP Cat	Watts Bar NP Type(s)	Reg. Guide 1.97 Cat	Reg. Guide 1.97 Type(s)	Instrument Number	Environmental Qualification	Seismic Qualification	QA	Redundancy	Range	Sensor Loc.	Power Supply	Location of Display	Schedule	Comments
Emergency Gas Treatment System	SI	D	2	D	FCV-65-30 FCV-65-43 FCV-65-45 FCV-65-46 FCV-65-50 FCV-65-51 FCV-65-52 FCV-65-53 FCV-65-81 FCV-65-83 FCV-65-86 FCV-65-87	N/A (see Note 7)	N/A (see Note 7)	N/A(see Note 7)	Check valve or control valve in series with each	Open-Close	AB RB	1E	MCRP status lights	Installed*	
Containment Isolation System Valve Position	1	B	1	B	See Note 10	Will comply with 10CFR50.49 (see Note 1)	See Note 2	Complies	See Note 10	Open-close	AB, RB	1E	MCRP status lights	Installed*	

ATTACHMENT 1

1. Will be upgraded to comply with environmental qualification by 3/85. Some necessary equipment upgrades (e.g., Nuclear Instrumentation System - source range and intermediate range channels) may extend past this 3/85 date; due to the design, procurement, and installation schedules.

2. Fully conforms to IEEE Standard 344-1971 (ANSI N41.7). Partially complies to Reg. Guide 1.100 (see Watts Bar Nuclear Plant FSAR Section 3.10).

3. Unit 1 currently installed or will be installed before fuel load.

4. The Type 'E' Post-Accident Sampling System will provide the required information.

5. To the extent possible, since this element does have seismic qualification but is located in a nonseismic structure (Turbine Building).

6. 1E power supply to the extent possible, since Turbine Building is a nonseismic structure.

7. See Section 3.2.2.

8. See NUREG-0737 Item II.F.2. (reference 8.3).

9. Power Supply Classifications

   1. 1E Battery Backed Supply up to and including the isolation device-isolation required since this instrument is non-divisional.

   2. 1E Diesel Generator Backed Supply up to and including the isolation device-isolation required since this instrument is non-divisional.

   3. Non-1E battery backed.

   4. Non-1E diesel generator backed.

   5. Non-1E motor generator.

   6. No power required.

10. See Watts Bar Nuclear Plant FSAR figure 6.2.4-21 (TVA drawing No. 47W611-88-1) for a listing of the containment isolation valves which receive a containment isolation signal. This signal initiates closing of the automatic isolation valves in those lines which must be isolated immediately following a design basis event.

11. Per TVA's NUREG-0588 review, these sensors are located in a mild environment and are not subject to 10CFR50.49.

12. Redundancy provided by Steam Generator level and blowdown radiation.

13. Redundancy provided by Steam Generator level and condenser radiation.

14. The required flow indication for the Radiation Monitor on Main Steam Line will provide adequate status indication of Steam Generator Safety Relief and Pressure Control Valve positions.

15. Can be used as a Type 'A' alternative to the Condenser Vacuum Pump Exhaust Radiation Monitor.

16. See NUREG-0737 Item II.B.3 (reference 8.12).

17. Variable could not be explicitly categorized with respect to the RG 1.97 (revision 2) category/type definitions.

ABBREVIATIONS

AB - Auxiliary Building
RB - Reactor Building
CB - Control Building
TB - Turbine Building
DB - Diesel Building
PASF - Post-Accident Sampling Facility
MCRP - Main Control Room Panel
TSC - Technical Support Center
LCP - Local Control Panel
SI - Support Instrument

*This instrument loop will be or is currently installed as noted, but may require some degree of upgrade to fully comply with the requirements for PAM as outlined in this document.