TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401

5N 157B Lookout Place

AUG 31 1990

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

Gentlemen:

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

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2 - CONFORMANCE TO REGULATORY GUIDE (RG) 1.97, REVISION 2 (TAC NO. 63645)

This letter provides TVA's approach to satisfying the intent of RG 1.97, Revision 2, for WBN and identifies the exceptions and justifications for those exceptions as committed to in TVA's letter dated June 8, 1990. This approach is provided in Enclosure 1 and represents TVA's proposed design for compliance with RG 1.97. Also provided in Enclosure 1 (Section 3.0) is TVA's response to NRC's July 24, 1986 safety evaluation report concerning the subject RG.

TVA's June 8, 1990 letter also stated that TVA would provide a Final Safety Analysis Report (FSAR) change notice addressing compliance with each of the RG 1.97 requirements. The FSAR change notice is not being provided at this time because integration of other elements must be included in the appropriate FSAR sections in addition to the portions described in Enclosure 1. The FSAR changes for RG 1.97, Revision 2 compliance will be submitted in a future amendment, as was discussed with and agreed to by your staff.

Enclosure 2 provides a list of commitments identified in this letter. If there are any questions, please telephone M. C. Bryan at (615) 365-8819.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

E. G. Wallace, Manager
Nuclear Licensing and
Regulatory Affairs

Enclosures
cc: See page 2

A003
1 1

U.S. Nuclear Regulatory Commission

AUG 31 1990

cc (Enclosures):
Ms. S. C. Black, Deputy Director
Project Directorate II-4
U.S. Nuclear Regulatory Commission
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852

NRC Resident Inspector
Watts Bar Nuclear Plant
P.O. Box 700
Spring City, Tennessee 37381

Mr. P. S. Tam, Senior Project Manager
U. S. Nuclear Regulatory Commission
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852

Mr. B. A. Wilson, Project Chief
U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

ENCLOSURE 1

WATTS BAR NUCLEAR PLANT
REGULATORY GUIDE 1.97, REVISION 2
LICENSING POSITION

ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN)
LICENSING POSITION ON POSTACCIDENT MONITORING (PAM)
FOR REGULATORY GUIDE (RG) 1.97, REVISION 2

TABLE OF CONTENTS

1.0 SCOPE

This document is in response to Supplement 1 of NUREG-0737, "Requirements for Emergency Response Capability," that requires WBN to submit a document that addresses RG 1.97, Revision 2, concerning PAM instrumentation.

1.1 PURPOSE

This document establishes the method used by WBN to satisfy several requirements derived from General Design Criteria 13, 19, and 64 of Appendix A to 10 CFR 50 and Supplement 1 to NUREG-0737. In particular, it specifies WBN's approach to satisfy the intent of RG 1.97, Revision 2. Additionally this document serves to respond to the July 1986 safety evaluation report (SER) and is intended to supersede WBN's original submittal on compliance with RG 1.97, Revision 2.

1.2 DISCUSSION

The instrumentation outlined in this document is used by the plant operators to assess plant and environmental conditions during and following an accident. It includes instruments used for normal plant operation and instrumentation for specific accident monitoring functions. Sufficient instrumentation of the appropriate qualification level is available to: (1) allow the operator to implement the emergency instructions, and (2) maintain the plant in a safe condition for Final Safety Analysis Report (FSAR), Chapter 15, events within the design basis of the plant.

The instrumentation types and qualification categories listed in this document reflect those instruments used for PAM. Some circuits used in safety systems for other purposes have qualification requirements above those listed in this document. In these cases, the highest qualification level will apply; however, this document will only address the instrument's PAM function.

2.0 DEFINITIONS

2.1 VARIABLE DEFINITIONS

Five classifications of variable types have been identified in accordance with RG 1.97. These are as follows.

2.1.1 Type A Variable

Those variables that provide primary information to the control room operators to allow them to take specified, manually-controlled actions for which no automatic action is provided and that are required for safety systems to accomplish their safety functions for design basis events. Primary information is information that is essential for the direct accomplishment of specified safety functions.

2.1.2 Type B Variable

Those variables that provide information to indicate the accomplishment of critical safety functions.

2.1.3 Type C Variable

Those variables that provide information to indicate the potential for being breached or the actual breach of the barriers to fission product release. The barriers to fission product release are fuel cladding, reactor coolant pressure boundary, and primary reactor containment.

2.1.4 Type D Variable

Those variables that provide information to indicate the operation of individual safety systems and other systems important to safety.

2.1.5 Type E Variable

Those variables used in determining the magnitude of the release of radioactive materials and for continuously assessing such releases.

2.2 QUALIFICATION CATEGORIES 1, 2, 3

RG 1.97, Revision 2, classifies the qualification categories of the instruments into three separate classifications. In general, WBN follows these guidelines. A specific discussion of these requirements is contained in Table 1.

2.3 KEY VARIABLE

Those variables that most directly indicate the accomplishment of a safety function (Types B and C), the operation of a safety system (Type D), or of a radioactive material release (Type E). All Type A variables are key variables.

2.4 BACKUP VARIABLE

Those variables that provide only supplemental information for diagnosis, backup, and/or system status information.

2.5 CRITICAL SAFETY FUNCTION

Those safety functions that are essential to prevent a direct and immediate threat to the health and safety of the public. These accomplish and maintain: (1) reactivity control, (2) reactor core cooling and heat removal from the primary system, (3) reactor coolant system (RCS) integrity, (4) radioactivity control, and (5) containment integrity.

2.6 WBN POSITION REGARDING VARIABLE SELECTION

WBN's position with regard to the variable types above is as follows.

2.6.1 All Type A variables are key variables and are designated Category 1.

2.6.2 Type B and C variables are determined to be either a key or a backup variable depending on their particular usage. Those variables determined to be key shall be classified as Category 1 except for those classified as Category 2 in accordance with the specific guidance presented in RG 1.97, Table 2. Backup variables are considered Category 3.

2.6.3 The Type D and E variables determined to be key shall be classified as Category 2 except for those classified as Category 1 in accordance with the specific guidance presented in RG 1.97, Table 2. Backup variables are considered Category 3.

All variable types were determined through (1) the guidance given in RG 1.97, Table 2, (2) a review of the WBN Emergency Instructions, and (3) a safety analysis performed for the FSAR Chapter 15 design basis accidents. These three steps ensure that sufficient instrumentation is available to the operator to maintain the plant in a safe condition under accident scenarios.

3.0 RESPONSE TO THE JULY 1986 SAFETY EVALUATION REPORT

WBN has reviewed and taken into consideration the July 1986 SER on compliance with RG 1.97, Revision 2, and has provided responses to each item below. The item numbers refer to the item numbers found in the SER.

Item 3.3.1 Design Category Exceptions

Appendix A lists variables that are identified as Category 2 by RG 1.97. The applicant has furnished instrumentation for these variables that are identified as support instruments. The applicant does not consider these as PAM instrumentation. They provide information on system operating status, serve as diverse variables, and quantify radiation releases.

RG 1.97 is specific in defining a key variable as that single variable that most directly indicates the accomplishment of a safety function or the operation of a safety system or the quantification of a radioactive material release. For Types D and E variables, key variables are Category 2. The exception of all the variables listed in Appendix A from Category 2 recommendations is not acceptable. The applicant should, on a case-by-case basis, identify the specific exceptions from the Category 2 recommendations and provide adequate justification for each exception.

Response:

WBN has reconsidered its position regarding Category 2 variables. Analyses have been prepared which select Type D and E variables and have assigned qualification Category 2 to those determined to be key variables. Where TVA's variable selections and qualification category assignment are different from those listed in Appendix A of the RG, individual technical justifications have been provided in this submittal.

Item 3.3.2 Missing or Unidentifiable Information

The information on the variables listed in Appendix B is either missing or information in the applicant's submittal could not be tied directly to the RG 1.97 variable.

The applicant should provide the information required in Section 6.2 of NUREG-0737, Supplement 1, for the variables listed in Appendix B, identify any deviations from the recommendations of the RG, and justify any deviations.

Response:

WBN has revised Attachment 1 to include the information required in Section 6.2 of NUREG-0737, Supplement 1, for the variables listed in Appendix B of the SER or has provided technical justification for the deviation from the RG for each variable.

Item 3.3.3 RCS Soluble Boron Concentration

RG 1.97 recommends a range of 0 to 6000 ppm for this variable. The applicant has provided instrumentation with a range of 0 to 5000 ppm and did not justify this deviation.

The applicant takes exception to RG 1.97 with respect to postaccident sampling capability. This exception goes beyond the scope of this review and is being addressed by the NRC as part of their review of NUREG-0737, Item II.B.3.

Response:

WBN has provided postaccident sampling for RCS soluble boron concentration with a range of 50 to 6,000 ppm. For boron concentrations below 500 ppm, the tolerance for WBN's instrumentation would be limited to plus or minus 50 ppm. This tolerance band is considered by TVA to be acceptable for ensuring that postaccident shutdown margin is maintained. TVA's position is that the current range capability for boron analysis (50 to 6,000 ppm) is sufficient.

Item 3.3.4 RCS Hot-Leg and Cold-Leg Water Temperature

Response:

The reviewer found the deviation acceptable so no further response is required.

Item 3.3.5 Radioactive Concentration or Radiation Level in Circulating Primary Coolant

Response:

The reviewer found the instrumentation adequate so no further response is required.

Item 3.3.6 Condenser Air Removal System Exhaust

RG 1.97 recommends instrumentation for this variable with a range of 0 to 110 percent of design flow. The applicant has identified this as Type A variable. As such, it requires Category 1 qualification. The installed instrumentation does not meet the redundancy or power supply requirements for Category 1 instrumentation. The justification submitted by the applicant for the redundancy deviation is that redundancy is provided by the steam generator level and blowdown radiation instrumentation.

The justification is not adequate for this deviation. While these other variables are diverse methods of determining that a problem exists, they cannot be considered redundant instrumentation. The applicant should install redundant instrumentation for this variable.

Response:

Through analysis of the use of this variable, TVA has reassigned this variable to Type E, Category 2. The information required by NUREG-0737, Section 6.2, can be found in the revised table of variables, Attachment 1.

Item 3.3.7 Residual Heat Removal (RHR) Heat Exchanger Outlet Temperature

Response:

The reviewer found the deviation acceptable so no further response is required.

Item 3.3.8 Accumulator Tank Level and Pressure

The applicant has supplied instrumentation for these variables with a range for level of the top 20 inches and for pressure of 0 to 110 percent design, rather than the recommended 10 to 90 percent volume (level) and 0 to 750 psig (pressure).

The applicant did not submit justification for these deviations. The applicant should either expand these ranges to comply with the guidance of RG 1.97 or submit justification that shows the existing ranges adequate to monitor accumulator operation during postaccident conditions.

Response:

The primary function of these instruments is to monitor the preaccident status of the accumulators to ensure the passive safety function of the system. By design they do not perform any postaccident safety function. Other seismically and environmentally qualified instruments such as RCS pressure can be monitored to determine if a cold-leg accumulator injection has occurred.

The design pressure of the cold-leg accumulator tanks is 700 psig. The precautions, limitations, and setpoints (PLS) limit the nitrogen cover gas to a maximum pressure of 632 psig. The high and low pressure alarm setpoints are 661 and 602 psig, respectively. Each tank is equipped with a pressure relief valve set at 700 psig. Therefore, WBN's position is that monitoring of the tanks to pressures higher than the relief setpoints is not needed. WBN considers the existing range of 0 to 700 psig to be acceptable.

The present accumulator tank level indication range of 7632 to 8264 gallons corresponds to 75 to 82 percent of volume.

Postaccident levels do not serve any safety function since the passive injection of the cold-leg accumulators into the RCS would be observed through other qualified instrumentation such as RCS pressure. Hence, level instrumentation that meets the requirements of a Type D3 variable is appropriate.

Item 3.3.9 Pressurizer Heater Status

RG 1.97 recommends monitoring the electric current of the pressurizer heaters. The applicant has supplied a status (heater on) light for each pressurizer heater group. The applicant has provided no justification for this deviation.

Section II.E.3.1 of NUREG-0737 requires a number of the pressurizer heaters to have the capability of being powered by the emergency power sources. Instrumentation is to be provided to prevent overloading a diesel generator. Also, technical specifications are to be changed accordingly. The Standard Technical Specifications, Section 4.4.3.2, require that the emergency pressurizer heater current be measured quarterly. These heaters, as required by NUREG-0737, should have the current instrumentation recommended by RG 1.97.

Response:

TVA has reconsidered the pressurizer heater status variable and has supplied heater current as a Type D, Category 2 variable.

Item 3.3.10 Quench Tank Temperature

The applicant has supplied instrumentation for this variable with a range of 50 to 300°F rather than the recommended 50 to 750°F. The applicant has provided no justification for this deviation.

The applicant should install instrumentation with a range sufficient to read the saturation temperature corresponding to the relief disk set pressure.

Response:

The purpose of this variable is to monitor operation. The pressurizer relief tank (PRT) rupture disk is designed to operate between 86-100 psig. Assuming that the rupture disk operates at 100 psig and the pressurizer is at 2500 psig at saturated conditions, the maximum temperature during discharge when all valves in the line are open could be approximately 350°F. High temperature due to discharges or leakage into the tank from the pressurizer or other sources would produce an early upward trend in PRT temperature above normal. Temperatures far below the RG 1.97 recommended temperature of 750°F or the 300°F WBN recommended temperature would be sufficient to alert the operator to an abnormal condition and the potential need to check related PAM variables. Therefore, the recommended range of 50 to 300°F is sufficient to permit the operator to monitor plant operation

Item 3.3.11 Steam Generator (SG) Level

The applicant indicates that the narrow range and wide range instruments both have a range of 0 to 100 percent. We are unable to determine from this information that the tube sheet to separator range recommended by the RG has been met.

The applicant should submit information indicating that the wide range instrumentation covers the recommended range.

Response:

WBN has provided wide range SG level which measures from the tube sheet to the separators and has designated it as Type D, Category 1 by the recommendation of RG 1.97. Additional information has been provided in the revised table of variables, Attachment 1.

Item 3.3.12 SG Pressure

The applicant has supplied instrumentation for this variable with a range of 0 to 1200 psig. The range recommended by RG 1.97 is from atmospheric to 20 percent above 1185 psig, the lowest safety valve setting, or 1422 psig. The applicant submitted no justification for this deviation.

The supplied range is lower than the highest safety valve setting (1224 psig). The licensee should provide the additional range recommended.

Response:

The design pressure for the main steam system at WBN is 1185 psig. The main steam safety valves are designed to maintain system pressure less than 110 percent of design pressure, which is 1303.5 psig. RG 1.97, Revision 2, recommends a range of 0 psig to 20 percent above the lowest safety valve set pressure, which corresponds to a range of 0 to 1422 psig. The highest main steam safety valve set pressure is 1224 psig, and the accumulation pressure for each of the highest pressure safety valves is 1284 psig. Therefore, since the accumulation pressure is below 1300 psig and the 110 percent design pressure of approximately 1300 psig, the WBN recommended range of 0-1300 psig is adequate to cover the design range. The RG 1.97, Revision 2 range is well above the design requirements for the system and the ASME Code requirements for relief valves. Thus, it is concluded that the WBN SG pressure range provides adequate feedback to the operator on SG pressure response to accidents or transients and should be acceptable.

Item 3.3.13 Condensate Storage Tank Water Level

RG 1.97 recommends Category 1 instrumentation for this variable if these tanks are the primary source of auxiliary feedwater. The applicant considers their Category 3 instrumentation to be support instrumentation that is not required during and following an accident.

If this tank is not the primary source of auxiliary feedwater, then the applicant should list the primary source of auxiliary feedwater. The applicant should verify that the primary source of auxiliary feedwater is monitored by Category 1 instrumentation.

Response:

WBN's safety grade auxiliary feedwater supply is the essential raw cooling water (ERCW) system. Therefore, the condensate storage tank is not considered the primary source of auxiliary feedwater. WBN's design is such that if low suction pressure occurs in any auxiliary feedwater pump supply line, safety-grade Class 1E powered pressure switches automatically align the pump to the safety-grade ERCW system which serves as the primary source of auxiliary feedwater. WBN has designated the auxiliary feedwater to ERCW interface valve status as Type D, Category 1, to monitor the availability of the safety grade auxiliary feedwater supply.

Item 3.3.14 Component Cooling Water (CCW) Temperature to Engineered Safety Features (ESF) System

RG 1.97 recommends instrumentation with a range of 32 to 200°F to monitor the operation of the CCW System. The applicant has supplied instrumentation for this variable with a range of 50 to 150°F. No justification for this deviation was submitted by the applicant.

The applicant should provide justification for this deviation.

Response:

WBN analysis has determined that the highest expected CCW water temperature (post-LOCA safety injection) is 120°F. The lowest expected CCW temperature is 60°F (based on a minimum ERCW temperature of 35°F).

An upward trend of the CCW System temperature above 120°F could be readily detected and would be expected to be slow-moving. Thus, there would be sufficient time well within the 150°F upper range to alert the operator to the condition and the need to check other PAM-related variables for potential manual actions. The preceding would also apply to the 50°F lower range should the temperature trend downward.

Item 3.3.15 Radioactive (Waste) Gas Holdup Tank Pressure

The applicant has supplied instrumentation for this variable that covers a range of 0 to 110 percent of the vessel design pressure. The RG recommends a range to 150 percent of design pressure. The applicant submitted no justification for this deviation.

The applicant should either change the range to that recommended by RG 1.97 or provide justification for this deviation.

Response:

The design pressure of the waste gas decay tanks is 150 psig. The waste gas decay tanks are equipped with pressure relief valves set at 150 psig. Therefore, WBN's position is that monitoring of the tanks to pressures higher than the relief setpoints is not necessary. WBN considers the existing range of 0 to 100 percent of design pressure to be acceptable.

Item 3.3.16 Airborne Radiohalogens and Particulates (Portable Sampling With Onsite Analysis Capability)

The applicant has provided instrumentation for this variable with a range of 1×10^{-11} to 2×10^{-5} mCi/cc. RG 1.97 recommends instrumentation with a range of 10^{-9} to 10^{-3} mCi/cc. No justification for this deviation was submitted by the applicant.

The applicant should either change their monitoring capability to cover the recommended range or provide justification for the range provided.

Response:

WBN has equipment capable of measuring the recommended range for this variable. Further information is given in the revised table of variables, Attachment 1.

Item 3.3.17 Plant and Environments Radiation (Portable Instrumentation)

The applicant's submittal does not indicate what range the instrumentation for this variable will cover. As the applicant has not made an explicit commitment to conform to RG 1.97, and has not supplied the range, we are unable to determine that the supplied instrumentation is adequate.

The applicant should submit range information for this instrumentation, identify any deviation, and justify that deviation.

Response:

WBN has included this information in the revised table of variables, Attachment 1. Portable instrumentation with a range of 2×10^{-5} to 10^{4} rad/hr is provided and will be used to measure this variable.

Item 3.3.18 Wind Speed

RG 1.97, Revision 2, recommends a range of 0 to 67 mph for this variable. The installed instruments at this station have an indicated range of 0 to 50 mph.

Response:

The reviewer found that the deviation was acceptable so no further response is required.

Item 3.3.19 Estimation of Atmospheric Stability

We are unable to determine from the applicant's submittal what range their vertical temperature difference instrumentation meets. RG 1.97 recommends a range of -9 to +18°F. The applicant should submit this range information and justify any deviation.

Response:

WBN submits a range of -9°F to +18°F for the vertical temperature difference variable. This information has been reflected in the revised table of variables, Attachment 1.

ENCLOSURE 1
TABLE 1

SUMMARY OF QUALIFICATION CRITERIA

CRITERIA	CATEGORY 1	CATEGORY 2	CATEGORY 3
Redundancy	Yes	N/A	N/A
EQ	Per 10 CFR 50.49 as described in WBN FSAR, Chapter 3	Equipment in harsh environment same as Category 1; N/A for the equipment in mild environment	N/A
Seismic	Must function after seismic event as described in Chapter 3 of WBN FSAR	N/A	N/A
QA	Yes - as given in Chapter 17 of WBN FSAR for safety-related devices	Yes-for all items requiring EQ above; no-for the remainder	N/A
Power Supply	Class 1E as described in WBN FSAR, Chapter 8	Non-Class 1E instrument power	Non-Class 1E
Physical Separation	Yes-per design basis of the plant	N/A	N/A
Electrical Separation	Yes; non-Class 1E circuit interfaces are through qualified isolation devices	N/A	N/A
Indication	Hardwired indicator	Indicator, computer, or indicating light	Indicator, computer, indicating light, or alarm
Special Labeling on MCR Board	Yes	Yes	No
Testing and Maintenance	Yes	Yes	Yes
Isolation Device Accessibility	Yes	N/A	N/A
Recording	At least 1 channel per analog variable shall be recorded on recorders qualified to Category 2 requirements.	Radiation monitors and meteorology shall be recorded; not required for others	Recorder or computer for meteorological; not required for others

POSTACCIDENT MONITORING (PAM) INSTRUMENTATION VARIABLES LIST LEGEND

The following table of variables provides a listing of specific design requirements for the PAM instruments. The table represents the minimum required to conform to Regulatory Guide (RG) 1.97, Revision 2. Additional qualification may be provided as a result of other plant, system, or design requirements. The topics described are:

- Variable Name
- Type and Category
- Redundant Channels
- Range, Range Units
- Display Location
- Sensor Location
- Environmental Qualification (EQ)
- Seismic Qualification (SQ)
- Quality Assurance (QA)
- Power Supply

Type and Category - The variable's type(s) and associated category are identified. Entries in this column are derived from the type selection analyses and RG 1.97. Both the regulatory requirement and the WBN assignment are given.

Redundancy - The number of instrument channels required to monitor the variable. For Category 1 variables, the number of channels is determined from the PAM single failure analysis. Diverse indication used to supplement or replace redundant information is also identified in Note 1.

Range - The required range and engineering units of the instrumentation are developed in the type selection analyses or the required range and accuracy analysis. The regulatory requirement and WBN's actual range is provided in this table. The radiation monitor variable's range may reflect the interpreted range and not the equipment's scale.

Display Location - The locations of the instrument displays are designated as follows:

MCR - Main control room indication
TSC - Variable is stored on computer and displayed on demand
LOC - Local indicator on or near the equipment

Sensor Location - The locations of the instrument sensors are designated as follows:

AB - Auxiliary Building
RB - Reactor Building
YD - Yard
TB - Turbine Building
PSAF - Postaccident Sampling Facility

Qualification Environmental and Seismic - EQ and SQ requirements are derived from the assignment of the variable category. The qualification requirements for each category are taken from RG 1.97, Revision 2. The environmental operating times for Category 1 and Category 2 are specified in each component's NUREG-0588 category and operating times analysis. A "yes" in these columns indicates that the equipment for the given variable requires and has been evaluated by WBN's EQ and SQ programs. A "no" in these columns indicates that qualification is not required.

Quality Assurance (QA) - A "yes" entry indicates that the instrumentation has been included in the WBN QA program. The determination of "yes" or "no" is made from the variable's assigned category and, in the case of Category 2, whether the instrumentation is powered from Class 1E sources has been included in WBN's 10 CFR 50.49 program.

Power Supply - The minimum required source of electrical power for postaccident monitoring is identified as follows:

1E - Class 1E power
Non-1E - Non-Class 1E*
Battery - Batteries installed in portable instrumentation

The requirement for electrical power source is derived from the variable's category.

* Instrumentation shall be powered from 1E sources if its system function requires it.

Enclosure 1
Attachment 1
Regulatory Guide 1.97
Postaccident Monitoring Table Of Variables

Var Num	Variable Name	RG 1.97 Type/Category	Watts Bar Type/Category	Redundant Channels	RG 1.97 Range From	RG 1.97 Range To	Watts Bar Range From	Watts Bar Range to	Range Units	Display Location	Sensor Location	EQ	SE	QA	Power Supply	Notes
1	Auxiliary Feedwater Flow	D2	A1 D2	P1 P2 2 Channels Per Loop	0	110% Design	Note 2	Note 2		MCR	AB	YES	YES	YES	1E	(See Note 1)
2	Containment Lower Comp Atm Temperature	D2	A1 D2	P1 P2 2 Channels	40 Deg F	400 Deg F	0	350	Deg F	MCR	RB	YES	YES	YES	1E	Deviation #8
3	Containment Pressure (Narrow Range)	B1 C1	A1 B1 C1 D2	4 Channels	10 Psia	Design Pressure	-2	15	PSIG	MCR	RB	YES	YES	YES	1E	Deviation #24
4	Containment Radiation	C3 E1	A1 C3 E1	P1 P2 2 Upper 2 Lower	1	10E7	1	10E8	R/hr	MCR	RB	YES	YES	YES	1E	
5	Containment Sump Level (Wide Range)	B1 C1	A1 B1 C1 D2	P1 P2	Bottom Of Contmnt	600k Gal. Equivalent	0	20	Ft	MCR	RB	YES	YES	YES	1E	
6	Core Exit Temperature	B3 C1	A1 B1 C1 D2	P1 P2 8 PAM 1 8 PAM 2	200	2300	200	2300	Deg F	MCR	RB	YES	YES	YES	1E	Minimum Of 16 Operable Thermo Couples. 4 From Each Quadrant (See Note 1)
7	Main Steam Line Radiation	C2 E2	A1 C1 E2	1 Channel Per Steam Gen	10E-1	10E3	10E-4	10E4	uCi/cc	MCR	RB	YES	YES	YES	1E	(See Note 1)
8	Nuclear Inst. (Source Range)		A1 B1 D2	P1 P2	NA	NA	1	10E6	CPS	MCR	RB	YES	YES	YES	1E	
9	RCS Pressurizer Level	D1	A1 D1	P1 P2 P3	Bottom	Top	0	100	%	MCR	RB	YES	YES	YES	1E	(See Note 9)
10	RCS Pressure Wide Range	B1 C1	A1 B1 C1 D2	P1 P2 P3	0	3000	0	3000	PSIG	MCR	AB	YES	YES	YES	1E	(See Note 9)
11	RCS Temperature T Cold	B1	A1 B1 C1 D2	4 Channels 1 Per Loop	50	750	50	700	Deg F	MCR	RB	YES	YES	YES	1E	(See Note 1) Deviation #1
12	RCS Temperature T Hot	B1	A1 D2	4 Channels 1 Per Loop	50	750	50	700	Deg F	MCR	RB	YES	YES	YES	1E	(See Note 1) Deviation #1
13	Refueling Water Storage Tank Level	D2	A1 D2	P1 P2	Top	Bottom	100	0	%	MCR	YD	YES	YES	YES	1E	

Enclosure 1
Attachment 1
Regulatory Guide 1.97
Postaccident Monitoring Table Of Variables

Var Num	Variable Name	RG 1.97 Type/Category	Watts Bar Type/Category	Redundant Channels	RG 1.97 Range From	RG 1.97 Range To	Watts Bar Range From	Watts Bar Range to	Range Units	Display Location	Sensor Location	EQ	SE	QA	Power Supply	Notes
14	Steam Generator Level (Narrow Range)		A1 B1	P1 P2 P3 3 Channels Per SG	NA	NA	0	100	%	MCR	RB	YES	YES	YES	1E	(See Note 1 & 9)
15	Steam Generator Pressure	D2	A1 B1 D2	P1 P2 2 Channels Per SG	Atmos. pressure	20% Of Safety	0	1300	PSIG	MCR	AB	YES	YES	YES	1E	Deviation #3
16	Subcooling Margin Monitor	B2	A1 B2 C1 D2	P1 P2	200 *	35 *	200 *	35 *	Deg F	MCR	RB	YES	YES	YES	1E	*200 Deg Subcooling To 35 Deg Superheat
17	Auxiliary Building Passive Sump Level		B1 C1	P1 P2	NA	NA	0	60	Inches	MCR	AB	YES	YES	YES	1E	
18	Containment Isolation Valve Position Indication	B1	B1 D2	1 Per Valve	Closed	Not Closed	Closed	Not Closed		MCR	RB/AB	YES	YES	YES	1E	Deviation #20
19	Containment Hydrogen Concentration	C1	B1 C1 D2	P1 P2	0	30	0	10	%	MCR	RB	YES	YES	YES	1E	Deviation #2
20	Control Rod Position	B3	B3 D3	1 Channel Per Bank	Full In	Not Full In	0	235	Steps	MCR	RB	NO	NO	NO	NON-1E	
21	Nuclear Inst (Intermediate Range)	B1	B1 D2	P1 P2	10E-6%	100% Pwr	10E-8%	200%	Power	MCR	RB	YES	YES	YES	1E	
22	REACTOR VESSEL LEVEL	B1	B1 C1 D2	P1 P2 Plasma Display	Bottom Of Core	Top Of Vessel						YES	YES	YES	1E	(See Note 5)
22a	Static Mode (Pumps Not Running)						0	100	%	MCR	RB					0% Represents Reactor Vessel Empty
22b	Dynamic Mode (Pumps Running)						0	100	%	MCR	RB					100% Represents Reactor Vessel Full
23	Containment Pressure (Wide Range)	B1 C1	C1	P1 P2	0	4x Design Pressure	-5	60	PSIG	MCR	RB	YES	YES	YES	1E	
24	Shield Building Vent (Noble Gas Activity)	C2 E2	C2 E2	1 Channel	10E-6	10E4	10E-6	10E4	uCi/cc	MCR	AB	YES	NO	YES	NON-1E	
25	ABGTS High Pressure Alarm		D2	1 Channel Per Fan	NA	NA	NA	-0.2	In. H2O	MCR	AB	YES	NO	YES	NON-1E	

Enclosure 1
Attachment 1
Regulatory Guide 1.97
Postaccident Monitoring Table Of Variables

Var Num	Variable Name	RG 1.97 Type/Category	Watts Bar Type/Category	Redundant Channels	RG 1.97 Range From	RG 1.97 Range To	Watts Bar Range From	Watts Bar Range to	Range Units	Display Location	Sensor Location	EQ	SE	QA	Power Supply	Notes
26	ACAS Pressure	D2	D2	1 Channel Per Train	Plant	Specific	0	150	PSIG	MCR	AB	YES	YES	YES	1E	
27	AFW Valve Status		D1	1 Channel Per Valve	NA	NA	Open	Closed	NA	MCR	AB	YES	YES	YES	1E	
28	Accumulator Flow Isolation Valve Status	D2	D3	1 Channel Per Valve	Open	Closed	Open	Closed	NA	MCR	AB	NO	NO	NO	NON-1E	Deviation #16
29	Accumulator Tank Level	D2	D3	1 Channel Per Tank	10%	90%	7632	8264	GAL	MCR	RB	NO	NO	NO	NON-1E	Deviation #15
30	Accumulator Tank Pressure	D2	D3	1 Channel Per Tank	0 psig	750 psig	0	700	PSIG	MCR	RB	NO	NO	NO	NON-1E	Deviation #6
31	Annulus Pressure		D2	1 Channel	NA	NA	-10	0	In. H2O	MCR	RB	YES	NO	YES	NON-1E	
32	Aux. Feed Pump Turbine Steam Supply Isolation Valve Status		D3	1 Channel Per Valve	NA	NA	Open	Closed	NA	MCR	AB	NO	NO	NO	NON-1E	
33	Battery Current (125V dc Vital)	D2	D2	1 Channel Per Battery	Plant	Specific	-200	+600	AMPS	MCR	AB	YES	NO	YES	N/A	
34	Bus Voltage (125V dc Vital)	D2	D2	1 Channel Per Battery	Plant	Specific	75	150	VOLTS	MCR	AB	YES	NO	YES	N/A	
35	Bus Voltage (480V Shutdown)	D2	D2	1 Channel Per Train	Plant	Specific	0	600	VOLTS	MCR	AB	YES	NO	YES	N/A	
36	Bus Voltage (6.9kv Shutdown)	D2	D2	1 Channel Per Train	Plant	Specific	0	9000	VOLTS	MCR	AB	YES	NO	YES	N/A	
37	CCS Surge Tank Level Abnormal		D3	1 Channel Per Train	NA	NA	0	100	%	MCR	AB	NO	NO	NO	NON-1E	
38	Centrifugal Charging Pump Total Flow	D2	D2	1 Channel	0	110% Design	0	1500	GPM	MCR	AB	YES	NO	YES	NON-1E	
39	Charging Header Flow	D2	D3	1 Channel	0	110% Design	0	200	GPM	MCR	AB	NO	NO	NO	NON-1E	Deviation #17

Enclosure 1
Attachment 1
Regulatory Guide 1.97
Postaccident Monitoring Table Of Variables

Var Num	Variable Name	RG 1.97 Type/Category	Watts Bar Type/Category	Redundant Channels	RG 1.97 Range From	RG 1.97 Range To	Watts Bar Range From	Watts Bar Range to	Range Units	Display Location	Sensor Location	EQ	SE	QA	Power Supply	Notes
40	Component Cooling Water To ESF Flow	D2	D2	1 Channel Per HX	0	110% Design	0	6000	GPM	MCR	AB	YES	NO	YES	NON-1E	
41	Component Cooling Water Supply Temperature	D2	D2	1 Channel Per Train	32 Deg F	200 Deg F	50	150	Deg F	MCR	AB	YES	NO	YES	NON-1E	Deviation #7
42	Condensate Storage Tank Water Level	D1	D3	1 Channel Per Tank	Plant	Specific	0	400,000	GAL	MCR	AB	NO	NO	NO	NON-1E	Not Primary Sour of Aux. Feed Water. See Varible 27
43	Containment Air Return Fan Status	D2	D2	1 Channel Per Fan	Plant	Specific	On	Off	NA	MCR	RB	YES	NO	YES	NON-1E	(Breaker Status)
44	Containment Cooling Valve Status		D3	1 Channel Per Valve	NA	NA	Open	Closed	NA	MCR	AB	NO	NO	NO	NON-1E	
45	Containment Spray Flow	D2	D2	1 Channel Per Train	0	110% Design	0	5000	GPM	MCR	AB	YES	NO	YES	NON-1E	
46	Containment Spray HX Outlet Temperature		D2	1 Channel Per HX	NA	NA	0	200	Deg F	MCR	AB	YES	NO	YES	NON-1E	
47	Containment Sump Water Level (Narrow Range)	B2 C2	D3	1 Channel	Botton Of Sump	Top Of Sump	2	66	Inches	TSC	RB	YES	NO	YES	NON-1E	Deviation #12
48	Containment Sump Water Temperature	D2	D2	1 Channel	50 Deg F	250 Deg F	50	400	Deg F	MCR	AB	YES	NO	YES	NON-1E	Used RHR Inlet Temperature Loo Which is quilif
49	Diesel Generator Power	D2	D2	1 Channel Per DG	Plant	Specific	0	7.2	MWATTS	MCR	AB	YES	NO	YES	N/A	
50	Diesel Generator Volts	D2	D2	1 Channel Per DG	Plant	Specific	0	9000	VOLTS	MCR	AB	YES	NO	YES	N/A	
51	ECCS Valve Status		D2	1 Channel Per Valve	NA	NA	Open	Closed	NA	MCR	AB	YES	NO	YES	NON-1E	
52	ERCW Header Flow		D2	1 Channel Per Header	NA	NA	0	20,000	GPM	MCR	*	YES	NO	YES	NON-1E	* See Note 8
53	ERCW Supply Temperature		D2	1 Channel Per Header	NA	NA	0	200	Deg F	TSC	AB	YES	NO	YES	NON-1E	

Enclosure 1
Attachment 1
Regulatory Guide 1.97
Postaccident Monitoring Table Of Variables

Var Num	Variable Name	RG 1.97 Type/Category	Watts Bar Type/Category	Redundant Channels	RG 1.97 Range From	RG 1.97 Range To	Watts Bar Range From	Watts Bar Range to	Range Units	Display Location	Sensor Location	EQ	SE	QA	Power Supply	Notes
54	Emergency Gas Treatment Damper Position	D2	D2	1 Channel Per Damper	Open	Closed	Open	Closed	NA	MCR	AB	YES	NO	YES	NON-1E	
55	Emergency Ventilation Damper Status	D2	D2	1 Channel Per Damper	Open	Closed	Open	Closed	NA	MCR	AB	YES	NO	YES	NON-1E	
56	Hydrogen Recombiner Status		D3	1 Channel Per Recombiner	NA	NA	On	Off	NA	MCR	RB	NO	NO	NO	NON-1E	
57	Igniter Group Status		D3	1 Channel Per Group	NA	NA	On	Off	NA	MCR	RB	NO	NO	NO	NON-1E	
58	Inverter Current (120V ac Vital)	D2	D2	1 Channel Per Inverter	Plant	Specific	0	200	AMPS	AB	AB	YES	NO	YES	N/A	Local Indication
59	Inverter Voltage (120V ac Vital)	D2	D2	1 Channel	Plant	Specific	0	150	VOLTS	AB	AB	YES	NO	YES	N/A	Local Indication
60	Letdown Flow	D2	D3	1 Channel	0	110% Design	0	200	GPM	MCR	AB	NO	NO	NO	NON-1E	Deviation #18
61	MCR Pressure		D3	1 Channel	NA	NA	0	0.50	In. H2O	MCR	CB	NO	NO	NO	NON-1E	
62	MCR Radiation Level		D2	1 Channel	NA	NA	*	*		MCR	MCR	YES	NO	NO	NON-1E	* See Note 6 for range
63	Main Feedwater Flow	D3	D3	1 Channel Per Loop	0	110% Design	0	4,500,000	lb/hr	MCR	AB	NO	NO	NO	NON-1E	
64	Normal Emergency Boration Flow	D2	D2	1 Channel	0	110% Design	0	150	GPM	MCR	AB	NO	NO	YES	NON-1E	Deviation #4
65	THIS LINE INTENTIONALLY LEFT BLANK															
66	Pressurizer Heater Status (Electric Current)	D2	D2	1 Channel Per Group	Plant	Specific	0	50.5	AMPS	TSC	AB	YES	NO	YES	NON-1E	(See Note 3)
67	Pressurizer Pressure Relief Valve Pos. (PORV, Block & Code)	D2	D2	1 Channel Per Valve	Closed	Not Closed	Closed	Not Closed		MCR	RB	YES	NO	YES	NON-1E	

Enclosure 1
Attachment 1
Regulatory Guide 1.97
Postaccident Monitoring Table Of Variables

Var Num	Variable Name	RG 1.97 Type/Category	Watts Bar Type/Category	Redundant Channels	RG 1.97 Range From	RG 1.97 Range To	Watts Bar Range From	Watts Bar Range to	Range Units	Display Location	Sensor Location	EQ	SE	QA	Power Supply	Notes
68	Pressurizer Relief Tank Level	D3	D3	1 Channel	Top	Bottom	0	100	%	MCR	RB	NO	NO	NO	NON-1E	
69	Pressurizer Relief Tank Pressure	D3	D3	1 Channel	0	Design Pressure	0	100	PSIG	MCR	RB	NO	NO	NO	NON-1E	
70	Pressurizer Relief Tank Temperature	D3	D3	1 Channel	50 Deg F	750 Deg F	50	300	Deg F	MCR	RB	NO	NO	NO	NON-1E	Deviation #11
71	RCP Seal Injection Flow		D3	1 Ch Per RCP	NA	NA	0	15	GPM	MCR	AB	NO	NO	NO	NON-1E	
72	RCS Head Vent Valve Status		D2	1 Channel Per Valve	NA	NA	Closed	Not Closed	NA	MCR	RB	YES	NO	YES	NON-1E	
73	RHR Heat Exchanger Outlet Temperature	D2	D2	1 Channel Per HX	32 Deg F	350 Deg F	50	400	Deg F	MCR	AB	YES	NO	YES	NON-1E	Deviation #9
74	RHR Pump Flow (RHR System Flow)	D2	D2	1 Channel Per Pump	0	110% Design	0	5500	GPM	MCR	AB	YES	NO	YES	NON-1E	
75	RHR Valve Status		D3	1 Channel Per Valve	NA	NA	Open	Closed	NA	MCR	AB	NO	NO	NO	NON-1E	
76	Reactor Coolant Pump Status (Motor Current)	D3	D3	1 Channel Per Pump	Plant	Specific	0	1000	AMPS	MCR	AB	NO	NO	NO	NON-1E	
77	Safety Injection Pump Flow	D2	D2	1 Channel Per Pump	0	110% Design	0	800	GPM	MCR	AB	YES	NO	YES	NON-1E	
78	Safety Injection System Valve Status		D3	1 Channel Per Valve	NA	NA	Open	Closed	NA	MCR	AB	NO	NO	NO	NON-1E	
79	Spent Fuel Pool Level Alarm		D2	1 Channel	NA	NA	748,11-1/2	749,2-1/2	ft,in	MCR	AB	YES	NO	YES	NON-1E	Range Reflects Low and High Alarm Setpoints
80	Spent Fuel Pool Temperature Alarm		D2	1 Channel	NA	NA		127	Deg F	MCR	AB	YES	NO	YES	NON-1E	Upper Range Is Alarm Set point
81	Steam Generator Blowdown Isolation Valve Status		D2	1 Channel Per Valve	NA	NA	Closed	Not Closed	NA	MCR	RB	YES	NO	YES	NON-1E	

Enclosure 1
Attachment 1
Regulatory Guide 1.97
Postaccident Monitoring Table Of Variables

Var Num	Variable Name	RG 1.97 Type/Category	Watts Bar Type/Category	Redundant Channels	RG 1.97 Range From	RG 1.97 Range To	Watts Bar Range From	Watts Bar Range to	Range Units	Display Location	Sensor Location	EQ	SE	QA	Power Supply	Notes
82	Steam Generator Level (Wide Range)	D1	D1	4 Channels 1 Per SG	Tube Sheet	Separators	0	100	%	MCR	RB	YES	YES	YES	1E	Deviation #10
83	Steam Generator Power Operated Relief And Safety Valves Status	D2	D2	1 Channel Per Valve	Closed	Not Closed	Closed	Not Closed	NA	TSC	AB	YES	NO	YES	NON-1E	
84	Tritiated Drain Collector Tank Level	D3	D3	1 Channel Per Train	Top	Bottom	0	100	%	MCR	AB	NO	NO	NO	NON-1E	Local Indication Deviation #25
85	Volume Control Tank Level	D2	D3	1 Channel	Top	Bottom	0	100	%	MCR	AB	NO	NO	NO	NON-1E	Deviation #19
86	Waste Gas Decay Tank Pressure	D3	D3	1 Channel Per Tank	0	150% Design	0	150	PSIG	MCR	AB	NO	NO	NO	NON-1E	Local Indication Deviation #23
87	Radiation Exposure Meters	E3		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Deviation #22
88	Airborne Radiohalogens And Particulates	E3	E3	Portable	10E-9	10E-3	5.8x10E-10	10E-3	uCi/cc	ANALYSIS	SAMPLE	NO	NO	NO	NA	Airborne I-131 and particulates
89	Plant And Environs Radiation	E3	E3	Portable	10E-3	10E4	2x10E-5	10E4	RAD/hr	PORTABLE	PORTABLE	NO	NO	NO	NA	
90	Plant and Environs Radioactivity (portable instr.)	E3	E3	PORTABLE	NA	NA	NA	NA	NA	ANALYSIS	SAMPLE	NO	NO	NO	NA	Multi Channel Ga Ray Spectrometer
91	Auxiliary Building Vent (Noble Gas)	E2	E2	1 Channel	10E-6	10E3	10E-6	10E-2	uCi/cc	MCR	AB	YES	NO	YES	NON-1E	Deviation #13
92	Auxiliary Building Vent (Flow Rate)	E2	E2	1 Channel	0	110% Design	0	300,000	CFM	MCR	AB	YES	NO	YES	NON-1E	
93	Auxiliary Building Vent (Part. and Halogens)	E3	E3	1 Channel	10E-3	10E2	10E-9	10E-4	uCi/cc	ANALYSIS	SAMPLE	NO	NO	NO	NON-1E	Sampling With Onsite Analysis Capability Deviation #14
94	Condenser Air Ejector Flow Rate	E2	E2	1 Channel	0	110% Design	0	2640	CFM	TSC	TB	YES	NO	YES	NON-1E	Total Flow From 3 Air Ejectors

Enclosure 1
Attachment 1
Regulatory Guide 1.97
Postaccident Monitoring Table Of Variables

Var Num	Variable Name	RG 1.97 Type/Category		Watts Bar Type/Category		Redundant Channels	RG 1.97 Range From	RG 1.97 Range To	Watts Bar Range From	Watts Bar Range to	Range Units	Display Location	Sensor Location	EQ	SE	QA	Power Supply	Notes
95	Condenser Vacuum Pump Exhaust Vent (Noble Gas)	C3	E2	C3	E2	1 Channel	10E-6	10E5	10E-6	10E5	uCi/cc	MCR	TB	YES	NO	YES	NON-1E	
96	ERCW Radiation Monitors				E2	1 Channel Per Discharge Point	NA	NA	4.2X10E-6	2.4X10E-2	uCi/cc	MCR	AB	YES	NO	YES	NON-1E	
97	POST ACCIDENT SAMPLE SYSTEM		E3		E3	1 System						GRAB	PASF	NO	NO	NO	NON-1E	
97a	Reactor Coolant Chloride Concentration		E3		E3		0	20	1	20	ppm	NA	SAMPLE					Deviation #29
97b	Reactor Coolant Dissolved Hydrogen		E3		E3		0	2000	10	2000	cc/kg (STP)	NA	SAMPLE					Deviation #21
97c	Reactor Coolant Disolved Oxygen		E3		E3		0	20	0	20	ppm	NA	SAMPLE					
97d	Reactor Coolant Total Dissolved Gas		E3		E3		0	2000	10	2000	cc/kg (STP)	NA	SAMPLE					
97e	Reactor Coolant Boron	B3	E3		E3		0	6000	50	6000	ppm	NA	SAMPLE					Deviation #26
97f	Reactor Coolant PH		E3		E3		1	13	1	13	pH	NA	SAMPLE					
97g	Reactor Coolant Sample Activity	C1	E3	C3	E3		10uCi/ml	10Ci/ml	10uCi/ml	10Ci/ml	Ci/ml	NA	SAMPLE					Deviation #5
97h	Reactor Coolant Gamma Spectrum		E3		E3		NA	NA	NA	NA	NA	ANALYSIS	SAMPLE	NA	NA	NA	NA	Isotopic Analysis
98	CONTAINMENT AIR																	
98a	Containment Air H2		E3		E3		0%	30%	0%	10%	By Vol	ANALYSIS	SAMPLE	NA	NA	NA	NA	Also Measured by Hydrogen Analyzer

Enclosure 1
Attachment 1
Regulatory Guide 1.97
Postaccident Monitoring Table Of Variables

Var Num	Variable Name	RG 1.97 Type/Category	Watts Bar Type/Category	Redundant Channels	RG 1.97 Range From	RG 1.97 Range To	Watts Bar Range From	Watts Bar Range to	Range Units	Display Location	Sensor Location	EQ	SE	QA	Power Supply	Notes
98b	Oxygen Content	E3		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Deviation #27
98c	Gamma Spectrum Sample	E3	E3	NA	NA	NA	NA	NA	NA	ANALYSIS	SAMPLE	NA	NA	NA	NA	Isotopic Analysis
99	Shield Building Vent Flow	E2	E2	1 Channel Per Unit	0	110% Design	0	30,800	CFM	MCR	AB	YES	NO	YES	NON-1E	
100	Shield Building Vent Monitor (Particulate And Iodine)	E3	E3	1 Channel Per Unit	10E-3	10E2	10E-3	10E2	uCi/cc	NA	SAMPLE	NO	NO	NO	NON-1E	Sampling With Onsite Analysis Capability
101	Steam Generator Discharge Vent (Flow Rate and Noble Gas)	E2	E2	1 Channel Per Release Point	10E-1	10E3	NOTE 4	NOTE 4		MCR	AB	YES	NO	YES	NON-1E	
102	METEOROLOGY															
102a	Vertical Temperature Difference	E3	E3	1 Channel	-9	+18	-9	+18	Deg F	TSC	YD	NO	NO	NO	NON-1E	
102b	Wind Direction	E3	E3	1 Channel	0	360	0	360	Deg	TSC	YD	NO	NO	NO	NON-1E	
102c	Wind Speed	E3	E3	1 Channel	0	67	0	50	MPH	TSC	YD	NO	NO	NO	NON-1E	Deviation #28

REGULATORY GUIDE 1.97
POSTACCIDENT MONITORING
TABLE OF VARIABLES

Notes:

1. The following parameters are identified as diverse.

Parameter	Diverse Parameter
T (Hot)	Core Exit Temperature
Core Exit Temperature	T (Hot)
T (Cold)	SG Pressure
Main Steamline Radiation	SG NR Level
Auxiliary Feedwater Flow (AFW)	SG NR Level

2. The required range for the AFW flow instrumentation must cover from zero flow up to the maximum flow of the AFW System assuming all AFW pumps operating which is 1880 gpm for Type A use. Design flow for each loop is 470 gpm. The specified range for Type D use is 0-110 percent of design flow; therefore, 0-517 gpm is the range requirement for these loops.

3. Pressurizer heater status required only for safety-related heater banks (backup heater 1A-A and 1B-B).

4. Recorder shall be provided for duration of release from all discharge points.

Noble Gas Activity	10^{-1} to $10^{3}\mu Ci/cc$
Steam Flow Rate	0 to 4,945,200 lb/hr PORV and Safety Valves
	0 to 63,375 lb/hr To AFW Pump Turbine

5. The vessel level on plasma display is compensated actual vessel level derived from microprocessor algorithm using the upper range, lower range, dynamic range differential pressure, wide range temperature, and wide range pressure.

6.

	Range From	Range To	
Main Control Room Radiation Level (62)	$2x10^{-11}\mu Ci/cc$	$7x10^{-6}\mu Ci/cc$	Particulate
	$1x10^{-1}mR/hr$	$1x10^{4}mR/hr$	Area

7. The range for particulate and halogen activity measurements in the Auxiliary Building vent shall be given by the specific analysis procedures that are used.

8. Transmitters are located in the ERCW pipe tunnel underneath the yard between the Auxiliary Building and the refueling water storage tank.

9. The requirements for Category 1 variables which require a third independent channel to resolve ambiguity resulting when redundant displays disagree are being implemented at WBN as follows:

   The loop instrumentation for each channel is assigned to a redundant protection set (I, II, III, and IV) and electrical independence is maintained from sensor to display. Physical separation is maintained from the sensor to the isolator in the auxiliary instrument room. From the isolator to the indicator in the main control room, third channel (PAM 3) cables may be routed with either PAM 1 or PAM 2 cables (but not both) depending on its associated protection set.

JUSTIFICATION FOR DEVIATIONS

DEVIATION 1

VARIABLES (11 AND 12)

Reactor Coolant System (RCS) Cold- and Hot-Leg Water Temperatures

DEVIATION FROM REGULATORY GUIDE (RG) 1.97 GUIDANCE

The range recommended in RG 1.97, Revision 2, is 50 to 750°F; the recommendation for Watts Bar Nuclear Plant (WBN) is 50 to 700°F.

JUSTIFICATION

The Reactor Coolant System Description N3-68-4001 states that the design temperature of the RCS is 650°F. The RG 1.97, Revision 2 recommended range is 50-750°F. However, NRC has revised its position on this range and RG 1.97, Revision 3, now recommends a range of 50-700°F. The recommended range of 50-700°F will provide a 50°F margin over the design limit for both temperatures, which should provide the operator with adequate information for all transients. NRC concurs with WBN that an upper limit of 700°F is acceptable. (Reference: NRC letter from Youngblood to White dated July 24, 1986.)

DEVIATION FROM RG 1.97 GUIDANCE

RG 1.97, Revision 2, recommends that the RCS hot-leg water temperature (Variable 12) parameter be a B1 variable. WBN recommends that this be an A1 and D2 variable.

JUSTIFICATION

Type B variables provide information to indicate whether plant safety functions are being accomplished. WBN's position is that RCS pressure (Type A1, B1, C1, and D2), core exit temperature (Type A1, B1, C1, and D2), reactor vessel level (Type B1, C1, and D2), and subcooling margin (A1, B2, C1, and D2) are sufficient to monitor for adequate core cooling and the approach to superheat conditions in order to determine the margin by which the core cooling safety function is being accomplished. Therefore, it is WBN's position the RCS hot-leg water temperature be required only as a Type A1 and D2 variable.

DEVIATION 2

VARIABLE (19)

Containment Hydrogen Concentration

DEVIATION FROM RG 1.97 GUIDANCE

The range recommended in RG 1.97, Revision 2, is 0 to 30 percent, whereas WBN has provided instrumentation for this variable with a range of 0 to 10 percent.

JUSTIFICATION

WBN has performed an analysis that shows the worst-case hydrogen concentration will be less than 4 percent post-loss-of-coolant (LOCA) with one of the hydrogen recombiners operating. Also, the hydrogen igniter system handles degraded core hydrogen releases as specified in 10 CFR 50.44 and will also keep the hydrogen concentration below 10 percent for these events. Therefore, the instrumentation will always be on scale. The hydrogen recombiner status is indicated by a PAM D3 variable.

DEVIATION 3

VARIABLE (15)

Steam Generator (SG) Pressure

DEVIATION FROM RG 1.97 GUIDANCE

The range recommended in RG 1.97, Revision 2, is 0 psig to 20 percent above the lowest safety valve setting (corresponding to 1422 psig at WBN); the recommended range for WBN is 0-1300 psig.

JUSTIFICATION

The design pressure for the main steam system at WBN is 1185 psig. The main steam safety valves are designed to maintain system pressure less than 110 percent of design pressure, which is 1303.5 psig. RG 1.97, Revision 2, recommends a range of 0 psig to 20 percent above the lowest safety valve set pressure, which corresponds to a range of 0 to 1422 psig. The highest main steam safety valve set pressure is 1224 psig and the accumulation pressure for each of the highest pressure safety valves is 1284 psig. Therefore, since the accumulation pressure is below 1300 psig and the 110 percent design pressure of approximately 1300 psig, the WBN recommended range of 0-1300 psig is adequate to cover the design range. The RG 1.97, Revision 2 range is well above the design requirements for the system and the ASME Code requirements for relief valves. Thus it is concluded that the WBN SG pressure range provides adequate feedback to the operator on SG pressure response to accidents or transients, and should be acceptable.

DEVIATION 4

VARIABLE (64)

Normal/Emergency Boration Flow (Boric Acid Charging Flow)

DEVIATION FROM RG 1.97 GUIDANCE

WBN recommends that this variable not be environmentally qualified (as required for RG 1.97, Revision 2, Category 2 variables) since other variables perform the required emergency boration monitoring function.

JUSTIFICATION

The flow path monitored by this variable is a normally isolated path that requires operator action to utilize. This path is used for manual boration of the RCS. This path is not required for mitigation of any event. Postaccident reactivity control is accomplished by the Emergency Core Cooling System (ECCS) injecting borated water from the refueling water storage tank (RWST) into the RCS. Manual boration is not utilized. The ECCS flow is monitored by the centrifugal charging pump total flow (high pressure injection flow), the safety injection (SI) pump flow (low pressure injection flow), and the residual heat removal (RHR) pump flow (RHR System flow). These three variables are in the environmental qualification program and meet the 110 percent design flow measurement requirement.

DEVIATION 5

VARIABLE (97g)

Radiation Level in Circulating Primary Coolant (Reactor Coolant Sample Activity)

DEVIATION FROM RG 1.97 GUIDANCE

This variable has been identified in RG 1.97, Revision 2, as Type C, Category 1, whereas WBN has identified this variable as Type C, Category 3.

JUSTIFICATION

For the fuel cladding integrity safety function, RG 1.97 recommends core exit temperature and RCS activity as key variables and gamma spectrum analysis of the reactor coolant as a Category 3 variable. Core-exit temperature provides primary indication of a significant breach or potential breach of fuel cladding because of elevated fuel temperatures and is frequently used throughout the emergency instructions (EIs), functional restoration guidelines (FRGs), and Final Safety Analysis Report (FSAR). Therefore, this variable was included as the Category 1 or key indication. Radiation level in circulating primary coolant was considered; however, it indicates conditions following fuel damage and provides less timely information. Thus, this variable is considered to be less useful to the operators and was included as a backup variable. TVA meets the intent of the RG 1.97 recommended range by monitoring this variable using the gross activity analysis of primary coolant samples taken in the postaccident sampling facility.

DEVIATION 6

VARIABLE (30)

Safety Injection (Cold-Leg) Accumulator Tank Pressure

DEVIATION FROM RG 1.97 GUIDANCE

RG 1.97, Revision 2, recommends that the pressure instruments meet the D2 criteria with a range of 0 to 750 psig. WBN recommends retaining this variable as D3, with a range of 0 to 700 psig.

JUSTIFICATION

The primary function of these instruments is to monitor the preaccident status of the accumulators to ensure the passive safety function of the system. By design they do not perform any safety function postaccident. Other seismically and environmentally qualified instruments such as RCS pressure can be monitored to determine if a cold-leg accumulator injection has occurred.

The design pressure of the cold-leg accumulator tanks is 700 psig. The precautions, limitations, and setpoints (PLS) limit the nitrogen cover gas to a maximum pressure of 632 psig. The high and low pressure alarm setpoints are 661 and 602 psig, respectively. Each tank is equipped with a pressure relief valve set at 700 psig. Therefore, WBN's position is that monitoring of the tanks to pressures higher than the relief setpoints is not needed. WBN considers the existing range of 0 to 700 psig to be acceptable.

DEVIATION 7

VARIABLE (41)

Component Cooling Water (CCW) Temperature to Engineered Safety Features (ESF) Equipment

DEVIATION FROM RG 1.97 GUIDANCE

The range recommended in RG 1.97, Revision 2, is 32 to 200°F; the recommendation for WBN is 50 to 150°F.

JUSTIFICATION

WBN analysis has determined that the highest expected CCW temperature (post-LOCA safety injection) is 120°F. The lowest expected CCW temperature is 60°F (based on a minimum ERCW temperature of 35°F).

An upward trend of the CCW temperature above 120°F could be readily detected and would be expected to be slow-moving. Thus, there would be sufficient time well within the 150°F upper range to alert the operator to the condition and the need to check other PAM-related variables for potential manual actions. The preceding would also apply to the 50°F lower range should the temperature trend downward.

DEVIATION 8

VARIABLE (2)

Containment Atmosphere Temperature (Containment Lower Compartment Atmosphere Temperature)

DEVIATION FROM RG 1.97 GUIDANCE

The range for this variable is recommended to be 40 to 400°F in accordance with RG 1.97, Revision 2. WBN recommends the range to be 0 to 350°F.

JUSTIFICATION

WBN is an ice condenser plant and, therefore, has a lower containment temperature postaccident than dry containments. The maximum temperature expected post-LOCA at WBN is 250°F as compared to 275 to 290°F for dry containments. The maximum temperature expected at WBN after a steam line break is 327°F as compared to 380 to 450°F for dry containments. The minimum expected containment atmospheric temperature will be 60°F. This minimum temperature is due to the minimum allowable RWST water temperature which could be sprayed into containment by inadvertent operation of the containment spray. Therefore, it is WBN's position that a range of 0 to 350°F is adequate.

DEVIATION 9

VARIABLE (73)

Residual Heat Removal (RHR) Heat Exchanger Outlet Temperature

DEVIATION FROM RG 1.97 GUIDANCE

The range recommended in RG 1.97, Revision 2, is 32 to 350°F; the recommendation for WBN is 50 to 400°F.

JUSTIFICATION

NRC letter from Youngblood to White dated July 24, 1986, states that RG 1.97, Revision 3, increased the minimum required range of this variable to 40°F and that WBN's range of 50 to 400°F was acceptable due to the minor deviation.

DEVIATION 10

VARIABLE (82)

SG Level Wide Range

DEVIATION FROM RG 1.97 GUIDANCE

RG 1.97, Revision 2, recommends this variable as a Type D, Category 1 variable, which requires redundancy in the instrumentation. WBN recommends this variable be Category 1, Type D, but utilizing only one wide range transmitter per SG.

JUSTIFICATION

SG wide range level indication is utilized as a diverse variable to auxiliary feedwater (AFW) flow for gross indication of flow to the SGs. The WBN AFW monitors are Types A1 and D2. WBN's position is that since SG wide range level is only used as a backup to redundant AFW flow monitors, it does not require redundancy.

DEVIATION 11

VARIABLE (70)

Quench Tank (Pressurizer Relief Tank [PRT]) Temperature

DEVIATION FROM RG 1.97 GUIDANCE

The range for this variable is recommended to be 50 to 750°F in accordance with RG 1.97, Revision 2. WBN recommends the range to be 50 to 300°F.

JUSTIFICATION

The purpose of this variable is to monitor operation. The PRT rupture disk is designed to operate between 86-100 psig. Assuming that the rupture disk operates at 100 psig and the pressurizer is at 2500 psig at saturated conditions, the maximum temperature during discharge when all valves in the line are open could be approximately 350°F. High temperature due to discharges or leakage into the tank from the pressurizer or other sources would produce an early upward trend in PRT temperature above normal. Temperatures far below the RG 1.97 recommended temperature of 750°F or the 300°F WBN recommended temperature would be sufficient to alert the operator to an abnormal condition and the potential need to check related PAM variables. Therefore, the recommended range of 50 to 300°F is sufficient to permit the operator to monitor plant operation.

DEVIATION 12

VARIABLE (47)

Containment Sump Water Level (Narrow Range)

DEVIATION FROM RG 1.97 GUIDANCE

RG 1.97, Revision 2, recommends this variable as Types B and C, Category 2. WBN recommends this variable as Type D, Category 3.

JUSTIFICATION

The operator does not monitor this variable to perform any required safety function. In addition, Chapter 15 of the FSAR takes no credit for monitoring this variable for any design bases event. This variable is used primarily to monitor RCS leakage. This variable, along with the lower containment atmosphere particulate radioactivity monitoring system, and the lower containment atmosphere gaseous radioactivity monitoring systems are used to detect RCS leakage. These small leakages do not cause plant perturbations or transients that would cause a reactor trip or SI signal to be generated. Therefore, the operator does not enter the emergency procedures to detect or mitigate these leakages and corrective actions based on the emergency procedures and the use of PAM equipment are inappropriate. However, for the purpose of monitoring gross leakage, this variable will be designated as a Type D3 variable.

The containment sump water level (wide range) is a Type A1, B1, C1, and D2 variable and is used at WBN to monitor the containment water level for the mitigation of accidents.

DEVIATION 13

VARIABLE (91)

Auxiliary Building Exhaust Vent Radiation Level - Noble Gas Release

DEVIATION FROM RG 1.97 GUIDANCE

The range recommended in RG 1.97, Revision 2, is 10^{-6} to 10^{3} microcuries/cubic centimeter (cc); the recommendation for WBN is 10^{-6} to 10^{-2} microcuries/cc.

JUSTIFICATION

The Auxiliary Building vent monitor is provided to continuously monitor the airborne radioactivity released through the Auxiliary Building exhaust vent. The receipt of a high radiation level reading on the Auxiliary Building vent monitor shall cause all ventilation paths exhausting into the Auxiliary Building vent duct to automatically close and the Auxiliary Building gas treatment system to be activated. Because the isolation function occurs before accident-range activity is reached, a normal-range monitor only is employed to monitor activity in the Auxiliary Building exhaust vent. Therefore, the recommended range of 10^{-6} to 10^{-2} microcuries/cc is adequate for detecting and measuring noble gas concentrations.

DEVIATION 14

VARIABLE (93)

Auxiliary Building Exhaust Vent Radiation Level - Particulates and Halogens

DEVIATION FROM RG 1.97 GUIDANCE

The range recommended in RG 1.97, Revision 2, is 10^{-3} to 10^{2} microcuries/cc; the recommendation for WBN is 10^{-9} to 10^{-4} microcuries/cc.

JUSTIFICATION

The Auxiliary Building vent monitor is provided to continuously monitor the radioiodine and particulate radioactivity released through the Auxiliary Building exhaust vent. The receipt of a high radiation level reading on the Auxiliary Building vent monitor will cause all ventilation paths exhausting into the Auxiliary Building vent duct to automatically close and the Auxiliary Building gas treatment system to be activated. Because the isolation function occurs before accident-range activity is reached, a normal-range monitor only is employed to monitor activity in the Auxiliary Building exhaust vent. Therefore, the recommended range of 10^{-9} to 10^{-4} microcuries/cc is adequate for detecting and measuring normal operation particulate and radioiodine concentrations. Laboratory analysis of collected samples allows measurement over a wide range.

DEVIATION 15

VARIABLE (29)

Safety Injection (Cold-Leg) Accumulator Tank Level

DEVIATION FROM RG 1.97 GUIDANCE

The range recommended in RG 1.97, Revision 2, is 10 to 90 percent volume using a D2 variable. WBN recommends a range of 75 to 82 percent volume, using a D3 variable.

JUSTIFICATION

The present accumulator tank level indication range of 7632 to 8264 gallons corresponds to 75 to 82 percent of volume.

Postaccident level does not serve any safety function since the passive injection of the cold-leg accumulators (CLA) into the RCS would be observed through other qualified instrumentation such as RCS pressure. Hence, level instrumentation which meets the requirements of a D3 variable is appropriate.

DEVIATION 16

VARIABLE (28)

Cold-Leg Accumulator Isolation Valve Position Indication

DEVIATION FROM RG 1.97 GUIDANCE

RG 1.97, Revision 2, recommends that the position indication of the CLA isolation valve be qualified to D2 requirements. WBN recommends designating this variable as D3.

JUSTIFICATION

The CLA isolation valves do not need to change from their normally open position in the event of an accident which requires CLA injection. These valves will already have been opened during startup soon after the RCS pressure sufficiently exceeds the CLA normal operating pressure. Then the associated motive power will be removed.

There is no accident event in which instantaneous emptying of all four CLAs could cause inadequate core cooling or cold overpressurization of the RCS. The steamline break is the only Condition IV event other than a LOCA that causes a rapid depressurization of the RCS. However, even for that accident the RCS depressurizes rapidly down to 900 psi where the pressure stabilizes or rises. Further depressurizations are at a much more controlled rate, giving the operator time to react.

For a Condition III event, such as a 4- or 6-inch break (small break LOCA), the depressurization of the RCS may cause emptying of the CLA. Even under such cases, emptying the CLAs will not cause inadequate core cooling or cold overpressurization of the RCS.

Furthermore, closing the CLA isolation valves is not a safety function for accident mitigation that necessitates environmentally qualified valve position indication. Hence, there is no need to environmentally qualify these valves.

WBN recommends designating the position indication of the CLA isolation valve as a D3 variable.

DEVIATION 17

VARIABLE (39)

Chemical and Volume Control System (CVCS) Makeup Flow-In (Charging Header Flow)

DEVIATION FROM RG 1.97 GUIDANCE

The RG 1.97, Revision 2, recommends that the design flow should be monitored using a D2 variable. WBN recommends designating this variable as D3.

JUSTIFICATION

This variable is used to monitor normal operation. The charging flow is isolated on a SI signal. While certain events may produce a harsh environment for the flow instruments, makeup flow is not required to mitigate these events. Thus, the installed instrumentation qualified to D3 requirements is appropriate for the intended monitoring function at WBN.

DEVIATION 18

VARIABLE (60)

CVCS Letdown Flow-Out (Let Down Flow)

DEVIATION FROM RG 1.97 GUIDANCE

RG 1.97, Revision 2, recommends 0 to 110 percent design flow monitoring using D2 variables to monitor flow. TVA recommends this variable as D3.

JUSTIFICATION

This variable is used to monitor normal operation. The letdown flow isolation valves close on a SI signal, low pressurizer level, or Phase A isolation signal. While certain events may produce a harsh environment for the flow instruments, letdown flow is not required to mitigate these events. Thus, the installed instrumentation qualified to D3 requirements is appropriate for the intended monitoring function at WBN.

DEVIATION 19

VARIABLE (85)

Volume Control Tank (VCT) Level

DEVIATION FROM RG 1.97 GUIDANCE

The RG 1.97, Revision 2, recommends that the VCT level be monitored from top to bottom with a D2 variable. TVA recommends using a D3 variable and a range slightly less than top to bottom.

JUSTIFICATION

The VCT is isolated on a SI signal. While certain events may produce a harsh environment for the level instruments, the VCT itself is not required to mitigate the events. Hence the D3 type and category variable is appropriate for its performance requirements.

The present VCT indication reads from 0 to 100 percent over a range of 70 inches which is entirely within the approximately 80-inch cylindrical portion of the tank. Extending the range to include the top and bottom hemispherical portions of the tank would result in nonlinear readings at the extreme ends of the scale. Including the hemispheres and the remaining 10 inches of the vertical cylinder would not add significantly to monitoring capability.

DEVIATION 20

VARIABLE (18)

Containment Isolation Valve (CIV) Position

DEVIATION FROM RG 1.97 GUIDANCE

RG 1.97, Revision 2, recommends that the CIV position indication should meet the requirements of a B1 variable (which encompasses position indication for the duration of the event). WBN's RCS letdown CIVs flow control valves (FCV)-62-72, 73, 74, and 76 will be submerged postaccident inside containment. These valves' limit switches are not qualified for operation during postsubmergence.

JUSTIFICATION

These valves close on a SI signal, Phase A signal, or a low pressurizer level signal. The valves and associated position indication limit switches are qualified to perform their intended safety functions prior to being submerged. The limit switch for the valve position indication is located on the valve and hence subject to submergence. The limit switch is not qualifiable for submergence. The limit switch performs its intended safety function well before submergence. Valve positions are indicated both in the main control room and the Technical Support Center.

Once the limit switches are flooded, it must be assumed that the control circuit fuses will be blown and position indication will be lost. This indication circuit, however, is isolated from the other CIV indication circuits.

The solenoids for these valves are included in WBN's environmental qualification (EQ) program and will vent to automatically close the FCVs as required under accident conditions. An analysis in WBN's EQ binder demonstrates that once closed, a submergence failure of the solenoid will not cause the FCV to change position. Hence the valves are considered closed and no further indication is required.

DEVIATION 21

VARIABLE (97b)

Reactor Coolant Dissolved Hydrogen

DEVIATION FROM RG 1.97 GUIDANCE

The RG 1.97, Revision 2 (refer to Table 2, Type E variables), recommends that primary coolant grab sample capability exists for hydrogen analysis.

JUSTIFICATION

The WBN postaccident sampling facility (PASF) will have two independent methods for measuring dissolved hydrogen in the RCS. It will have the capability to measure dissolved hydrogen in the range from 10-2000 cc/kg with an inline ion chromatograph. In addition, it will have a total dissolved gas analyzer to measure the total dissolved gas in the pressurized coolant in the range from 100-2000 cc/kg. Dissolved oxygen will be separately measured with a dissolved oxygen analyzer. These latter two measurements provide another determination of the dissolved hydrogen. The two available methods provide sufficient backup monitoring capability for dissolved hydrogen and will eliminate the need for handling highly radioactive, undiluted, pressurized reactor coolant grab samples. Diluted, unpressurized reactor coolant grab samples may be obtained as necessary at the PASF for other analyses.

DEVIATION 22

VARIABLE (87)

Radiation Exposure Meters

DEVIATION FROM RG 1.97 GUIDANCE

RG 1.97, Revision 2, recommends that Type E radiation exposure meters with continuous indication be available at fixed locations. No category is specified. WBN recommends not classifying these meters as a RG 1.97 variable.

JUSTIFICATION

RG 1.97, Revision 2, was issued with an outstanding question regarding the practicality of deploying radiation monitors at fixed locations. A study (NUREG/CR-2644) concluded that it is unlikely that a few fixed-station area monitors could provide sufficiently reliable information to be of use in detecting releases from unmonitored containment release points.

NRC agreed with this conclusion and in Revision 3 of RG 1.97 deleted the environs radiation monitors from the pressure water reactor (PWR) table of variables.

TVA thereby requests a deviation from RG 1.97, Revision 2 specification of this Type E variable.

DEVIATION 23

VARIABLE (86)

Waste (Radioactive) Gas Holdup Tank Pressure (Waste Gas Decay Tank Pressure)

DEVIATION FROM RG 1.97 GUIDANCE

RG 1.97, Revision 2, recommends that waste (radioactive) gas holdup tank pressure be monitored from 0 to 150 percent of design pressure. WBN recommends that the pressure be monitored from 0 to 100 percent of design pressure (150 psig).

JUSTIFICATION

The design pressure of the waste gas decay tanks is 150 psig. The waste gas decay tanks are equipped with pressure relief valves set at 150 psig. Therefore, WBN's position is that monitoring of the tanks to pressures higher than the relief setpoints is not necessary. WBN considers the existing range of 0 to 100 percent of design to be acceptable.

DEVIATION 24

VARIABLE (3)

Containment Pressure (Narrow Range)

DEVIATION FROM RG 1.97 GUIDANCE

RG 1.97, Revision 2, recommends Type B and Type C variable which covers a range of -5 psig to the design pressure. WBN recommends a lower range of -2 psig using a Type A1, B1, C1, and D2 variable (with no deviation to the upper range).

JUSTIFICATION

The WBN containment vessel design net external pressure is 2 psig. Inadvertent containment spray initiation will cause rapid depressurization inside containment. However, for this event the pressure will not drop below the minimum design pressure. Another event that can cause a depressurization inside containment is continuous inadvertent air return fan operation. However, this will occur slowly enough to allow the operators sufficient time to observe trending of containment depressurization and afford ample opportunity to terminate the air fan operation and manually open the lower compartment pressure relief line.

In addition, the containment pressure wide range instrumentation (-5 to 60 psig) overlaps the -2 psig lower range instrumentation. The -2 psig value is the lower design limit and is consistent with the use of upper range design limit of 15 psig. Hence, a lower range value of -2 psig is appropriate for WBN.

DEVIATION 25

VARIABLE (84)

High Level Radioactive Liquid Tank Level (Tritiated Drain Collector Tank)

DEVIATION FROM RG 1.97 GUIDANCE

RG 1.97, Revision 2, recommends a range for this variable from top to bottom. WBN recommends a range from 11 to 133 inches from the bottom of the tank.

JUSTIFICATION

The capacity of the tank is approximately 24,700 gallons. The quantity of water that is excluded from the range of the indication is approximately 1000 gallons at the bottom and an equal amount at the top. Thus, the present range is capable of monitoring approximately 22,700 gallons which is about 92 percent of the total capacity of the tank. TVA thereby considers the proposed range for the existing level taps (11 to 133 inches from the bottom of the tank) to be sufficient for indicating postaccident storage volume for this tank.

DEVIATION 26

VARIABLE (97e)

Reactor Coolant Boron

DEVIATION FROM RG 1.97 GUIDANCE

RG 1.97, Revision 2, recommends that the analysis range for boron content in the primary coolant and sump be between 0 to 6,000 parts per million (ppm) and be monitored with a Type B3 and E3 variable. WBN recommends that the range be between 50 to 6,000 ppm and be monitored with a Type E3 variable.

JUSTIFICATION

For boron concentrations below 500 ppm, the tolerance for WBN's instrumentation would be limited to plus or minus 50 ppm. This tolerance band is considered by WBN to be acceptable for ensuring that postaccident shutdown margin is maintained. WBN's position is that the current range capability for boron analysis (50 to 6,000 ppm) is sufficient.

RCS boron concentration used in conjunction with control rod position indication and RCS cold-leg temperature only provides indirect indication. These are backup variables for monitoring reactivity control. Nuetron flux is a direct variable that allows the operator to determine if reactivity is under control (i.e., the reactor has tripped and the core is in a subcritical condition). Neutron flux is a Type B1 and D2 variable at WBN. Therefore, the boron concentration is not required for direct reactivity control determination. It is available as a Type E3 variable for backup verification of reactivity control.

DEVIATION 27

VARIABLE (98b)

Containment Air Oxygen Content

DEVIATION FROM RG 1.97 GUIDANCE

RG 1.97, Revision 2 recommends a measurement range of 0-30 percent volume for containment air oxygen content. WBN recommends that the measurement of this variable should not be required.

JUSTIFICATION

The measurement of containment air oxygen content is not required by NUREG-0737. Following a design basis LOCA at WBN, the combustible gas control system will operate as described in System Description N3-83-4001 R1 to maintain the hydrogen concentration in containment below the lower flammability limit of 4 percent volume. Therefore, the oxygen concentration in containment is not important for combustion control. A measurement of the containment oxygen concentration is not needed for any other reason after an accident.

DEVIATION 28

VARIABLE (102c)

Meteorology (Wind Speed)

DEVIATION FROM RG 1.97 GUIDANCE

RG 1.97, Revision 2, recommends that the wind speed measurement range be 0 to 67 mph. WBN recommends that the range be 0 to 50 mph.

JUSTIFICATION

RG 1.97, Revision 3, recommends that the wind speed measurement range be 0 to 50 mph. Also, NRC letter from Youngblood to White dated July 24, 1986, states that since WBN meets the range recommended in RG 1.97, Revision 3, the 0 to 50 mph range is acceptable.

DEVIATION 29

VARIABLE (97a)

Reactor Coolant Chloride Concentration

DEVIATION FROM RG 1.97 GUIDANCE

RG 1.97, Revision 2, recommends a range of 0 to 20 ppm for reactor coolant chloride concentration. WBN recommends a range of 1 to 20 ppm.

JUSTIFICATION

The WBN recommended range of 1 to 20 ppm accurately represents TVA's commitment to the NRC.

ENCLOSURE 2

Watts Bar Nuclear Plant
Regulatory Guide 1.97, Revision 2 Compliance
List of Commitments

FSAR changes for RG 1.97, Revision 2 compliance will be sumbitted in a future amendment.