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RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. Office of Nuclear Reactor Regulation, Director

SUBJECT: Forwards revised response to draft SER re Open Item 31 re NUREG-0737 items on in-core exit thermocouple & subcooling instrumentation sys. Response supersedes 831123 response. Response to other open items will be provided shortly.

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	NRR/DHFS/PSRB		1	1	NRR/DL/SSPB		1	0
	NRR/DSI/AEB	26	1	1	NRR/DSI/ASB		1	1
	NRR/DSI/CPB	10	1	1	NRR/DSI/CSB	09	1	1
	NRR/DSI/ICSB	16	1	1	NRR/DSI/METB	12	1	1
	NRR/DSI/PSB	19	1	1	NRR/DSI/RAB	22	1	1
	NRR/DSI/RSB	23	1	1	REG FILE	04	1	1
	RGN2		3	3	RM/DDAMI/MIB		1	0
EXTERNAL:	ACRS	41	6	6	BNL(AMDTS ONLY)		1	1
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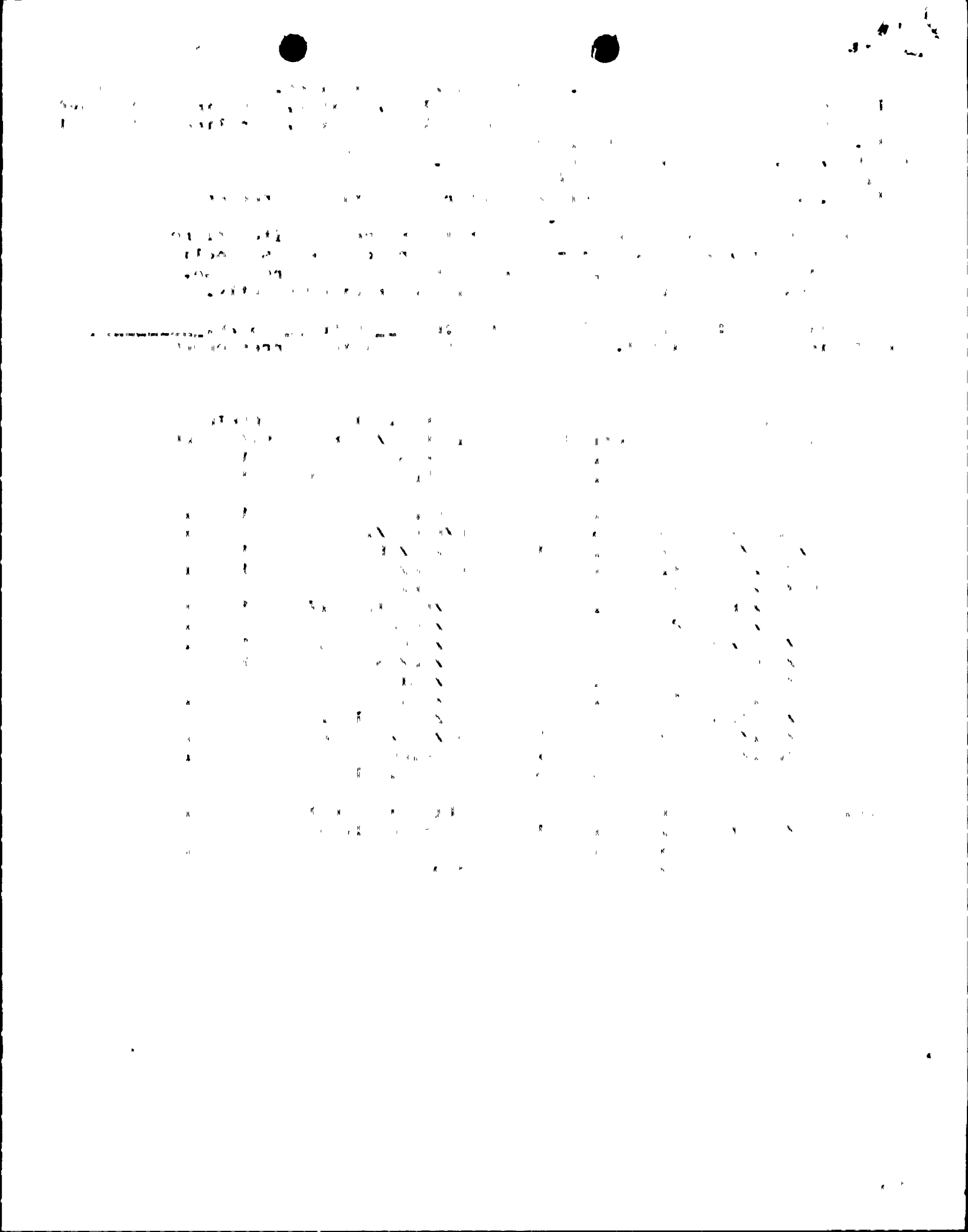

CP&L

Carolina Power & Light Company

SERIAL: LAP-83-552

DEC 06 1983

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT
UNIT NOS. 1 AND 2
DOCKET NOS. 50-400 AND 50-401
DRAFT SAFETY EVALUATION REPORT
CORE PERFORMANCE BRANCH

Dear Mr. Denton:

Carolina Power & Light Company hereby transmits one original and forty copies of the revised response to Shearon Harris Nuclear Power Plant Draft Safety Evaluation Report (DSER) Open Item 31. This response supercedes the response transmitted on a letter dated November 23, 1983 (LAP-83-541).

We will be providing responses to other open items in the DSER shortly.

Yours very truly,

M. A. McDuffie
Senior Vice President
Nuclear Generation

PS/ccc (8599PSA)

cc: Mr. B. C. Buckley (NRC)
Mr. G. F. Maxwell (NRC-SHNPP)
Mr. J. P. O'Reilly (NRC-RII)
Mr. Travis Payne (KUDZU)
Mr. Daniel F. Read (CHANGE/ELP)
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Dr. J. H. Carpenter (ASLB)
Mr. J. L. Kelley (ASLB)

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411 Fayetteville Street • P. O. Box 1551 • Raleigh, N. C. 27602

Shearon Harris Nuclear Power Plant
Draft SER Open Item 31
Supplemental Information

The applicant has been requested to provide an evaluation of the conformance of the incore exit thermocouple and the subcooling instrumentation system with NUREG-0737, Appendix B, "Design and Qualification Criteria for Accident Monitoring Instrumentation."

Response

The applicant's previous submittal on the documentation required for NUREG-0737 Item II.F.2 provides a description of the inadequate core cooling instrumentation to be used at Shearon Harris. In particular, the design utilizes a computer based processing system (ERFIS) for primary display of incore exit thermocouple and margin of subcooling data. Although ERFIS is non-Class 1E, it receives qualified pressure and temperature signals through an accessible isolator, and is powered from a high reliability power source which is battery backed. ERFIS computes margin of subcooling data which is displayed together with incore exit thermocouple temperature on the SPDS CRT located on the Main Control Board (MCB).

A qualified backup redundant display device is also located in the Control Room which will display qualified incore exit thermocouple temperatures. Qualified RCS pressure information can also be obtained from the indicators on the MCB. In accordance with the provisions of Regulatory Guide 1.97 Revision 3, this allows the operator to confirm displayed subcooling data, when used in conjunction with ASME Steam Tables.

An evaluation of the conformance of the above system with NUREG-0737 Appendix B is made as follows:

1) The instrumentation will be environmentally qualified in accordance with Regulatory Guide 1.89 (NUREG-0588) as defined in the applicants submittal of "Documentation required for Item II.F.2 of NUREG-0737," and Supplement 1 of NUREG-0737, (Regulatory Guide 1.97). For the backup systems, qualification applies to the complete instrument channel from sensor to display. For the primary ERFIS based system, qualification applies up to including the isolation devices. The isolators are accessible for maintenance during accident conditions. Seismic qualification of the above environmentally qualified systems also applies as defined in CP&L's submittal dated September 6, 1983 (LAP-83-405). A copy of that submittal has been included for your convenience as an attachment to this letter.

   The instrument range for which it is qualified meets the range required as noted in the applicant's September 9 submittal of Regulatory Guide 1.97 Revision 3.

2) No single failure within the above described instrumentation system will prevent the operator from being presented with information necessary to determine the safety status of the plant and to bring the plant to a safe and maintainable condition following an accident.

This can be accomplished since both RCS pressure and incore exit thermocouple instrumentation have redundant trains. Additional diverse pressure and RCS loop temperature information is available to supplement the other instrumentation should redundant displays disagree.

Redundant channels are electrically independent, energized from station Class 1E power sources, and are physically separated in accordance with Regulatory Guide 1.75 up to and including any isolation device. At least one channel can be displayed on a direct indicating or recording device.

3) The incore exit thermocouple and RCS wide range pressure instrumentation is energized from station Class 1E power sources.

4) Instrumentation channel availability will be provided as specified in SHNPP Technical Specifications.

5) The guidance of Regulatory Guides 1.28, 1.30, 1.38, 1.58, 1.64, 1.74, 1.88, 1.123, 1.144, and 1.146 have been utilized as described in FSAR Section 1.8.

6) Consistent with NUREG-0737, Item II.F.2, Attachment 1, "Design and Qualification Criteria for Pressurized Water Reactor Incore Thermocouples," the incore exit thermocouple temperature data is displayed on demand for the primary ERFIS based display. Either one of the qualified redundant backup displays (train A and train B) may be used for continuous indication also. The back up displays are also utilized to provide continuous reactor vessel water level data on the opposite train. (Either backup display can be used to display temperature as water level data.) Additionally, ERFIS continuously records temperature data which can be stored or printed out on demand.

In accordance with Regulatory Guide 1.97, Revision 3, the margin of subcooling is available for primary display on demand. As a backup, the wide range RCS pressure indicators provide the necessary information which, when used in conjunction with the incore exit thermocouple temperature data above, and ASME Steam Tables to determine the margin of subcooling.

Both the wide range RCS pressure indicators and the incore exit thermocouples span the necessary range to preclude the requirement of overlapping instrumentation.

7) ERFIS has the capability of monitoring 1500 inputs. The list of specific parameters to be recorded has not been finalized, but as a minimum will include the parameters specified in our response to R.G. 1.97, Revision 3. Transient or trending information is stored in redundant computer memory units and may be printed out on demand. The time discrimination between events averages one millisecond; the maximum discrimination is two milliseconds. The output of ERFIS can be displayed on control room CRTs or printers; a second CRT and printer is provided as a backup in the control room. Data for each input is stored for 12 hours. This data can be manually transferred to magnetic tape. The power sources for the computer consists of non-Class 1E AC power and a 30-minute battery power backup.

8) Post Accident Monitoring instrumentation is easily identifiable by the use of color coded bezels etc.

9) Isolation devices are utilized to ensure that Class 1E instrumentation channels are not degraded by non-Class 1E channels.

10) Means are available for checking channel operational availability during reactor operation.

11) Servicing, testing, and calibrating programs will be specified to ensure that the necessary level of qualification is maintained during plant operation.

12) Removal of channels from service will be controlled by administrative procedures.

13) Administrative control will determine access to calibration adjustment, and test points.

14) The monitoring instrumentation has included in its design consideration for minimizing situations that would be potentially confusing to the operator.

15) To the extent practical, the instrumentation has been designed to facilitate the recognition, location, replacement, repair, or adjustment or malfunctioning components or modules.

16) Monitoring instrumentation includes incore exit thermocouples which measure temperature immediately above the core, and RCS wide range pressure sensors which monitors RCS system pressure. The margin of subcooling is primarily calculated by the ERFIS. The backup method of calculating margin of subcooling is provided by utilizing the above 1E sensor information, 1E displays on the MCB, in conjunction with ASME Steam Tables.

17) The above instrumentation will be utilized during normal operation thus assuring operator familiarity.

18) Periodic testing of the instrument channels will be in accordance with the applicable provisions of Regulatory Guide 1.118 as noted in SHNPP FSAR Section 1.8.

(8599PSAccc)

ATTACHMENT
SHEARON HARRIS NUCLEAR POWER PLANT
COMPLIANCE WITH REGULATORY GUIDE 1.97

INTRODUCTION

In order to enable plant operators to assess plant and environ conditions over their anticipated (bounding) ranges during accident situations, various instrumentation and information systems have been incorporated into the SHNPP design. General Design Criterion (GDC) 13, GDC 19 and GDC 64 constitute the basis and framework for which this instrumentation has been provided. The objectives of GDC 13, GDC 19, and GDC 64 have been satisfied as delineated in FSAR Section 3.1.13, Section 3.1.19 and 3.1.64. Further information may also be found in FSAR Sections 5.2.5, 6.4, 7.3, 7.4, 7.5, 7.6 and 12.3.4.

DESIGN BASIS

The guidance of Regulatory Guide 1.97 (Revision 3) has been implemented along with that of NUREG 0737 Supplement 1 Section 6.2 in establishing the guidelines for variables to be monitored. The line-up table titled "Implementation of Regulatory Guide 1.97 Rev. 3" addresses SHNPP compliance to these guidelines. The selection of variables and the basis for their design is to provide information as follows:

Type A — Permit the control room operators to take specific pre-planned manually controlled actions for which no automatic control is provided and which may be required for safety systems to accomplish their functions during design basis events.

Type B — Determine if the reactor trip and engineered safety features are performing their appropriate functions (safety functions being accomplished).

Type C — Determine if there is potential for causing a breach or monitor a breach of the barriers to fission product releases.

Type D — Verify proper operation of safety systems and other systems important to safety.

Type E — Determine the magnitude of release of radioactive materials and to readily assess such releases to allow for appropriate action to be initiated as early as possible for protection of the public.

The five classifications of variables for SHNPP is consistent with the regulatory guide. Instrumentation may be applicable to one or more types of variables as well as being used for normal power operation. In addition, some instrumenta-

tion may be used for automatically initiating safety actions. As such, the classifications are not mutually exclusive.

The determination of type A variables was based on an assessment of the general operating procedures and the Preliminary Emergency Operating Procedures (EOPs). The EOPs are currently being developed. As such, the selection of Type A variables are subject to change consistent with applicable revisions to the EOPs. If it is determined that the selection of Type A variables should be modified, CP&L will revise the line-up table. The Type A variables include variables already identified as Type B, C, or D. It should be noted that the establishment of a variable as Type A does not necessarily infer that a specific action will be required. Besides specifically required manual actions, CP&L has given consideration to those variables which would alert the operators to the need to reactuate safety equipment even if the equipment was initially automatically actuated.

The Type B, C, D, and E variables noted in the line-up table represents adequate instrumentation required to monitor variables during accident conditions. Additional instrumentation may be utilized as warranted in order to confirm or deduce plant status. For the time period following an accident, the same would apply. Instrumentation which may be utilized when inspecting, repairing or cleaning up the plant, would actually be determined at that time and are clearly beyond the scope of this regulatory guide.

DESIGN CRITERIA

The design and qualification criteria for instrumentation are consistent with the three categories discussed in the regulatory guide. In general, Category 1 instrumentation meets the requirements for Class 1E systems. For Shearon Harris Nuclear Power Plant, instrumentation which is categorized as Category 2 per the regulatory guide, may actually meet the requirements of Category 1 or may meet the intent of the regulatory guide as justified. As noted in the line-up table, some instrumentation meets alternate environmental classification. These meet the intent of the regulatory guide since the associated systems are not required to operate after an accident. It should be noted that even if an instrument channel were not fully qualified it does not necessarily equate to not being able to monitor the particular variable. This is especially true of instrumentation located in a mild environment (e.g., RAB). CP&L has used good engineering judgment in procuring instrumentation for its service environment. In other instances, the intent of the regulatory guide is met through the use of diverse indication which would be qualified to high standards.

Certain instrumentation is in the process of being procured or upgraded. Where information is currently unavailable (such as sensor tag numbers or ranges), the line-up table will be modified later. It is anticipated that instrumentation will be implemented prior to commercial operation. If it becomes apparent that such a schedule can not be met, then the NRC will be notified as to the revised implementation date.

The footnotes which are provided for the line-up table delineate the design criteria utilized as well as define the meaning of information shown. Additional information regarding the footnotes and use of instrumentation may be found in the applicable FSAR section.

The Environmental Qualification Program is currently under way and will address the qualified variables noted in the line-up table. Additional information is presented in FSAR Section 3.11. Seismic Qualification is further discussed in FSAR Section 3.10.

Redundancy is noted where applicable. The sensor tag numbers also serve to note how many points are being monitored. The RCS hot and cold leg temperature information provided meets the intent of single failure in that additional information is provided to allow the operator to deduce the actual temperature of the RCS. The steam generator wide range level transmitters meet single failure criteria on a system basis. The steam generator wide range level transmitters are also supplemented by the qualified and redundant narrow range level transmitters.

A description of the power supplies for instrumentation is provided in FSAR Section 8.3.1 and further discussed in FSAR Chapter 7. The back up batteries are also discussed.

CP&L has implemented a qualification program in order to assure the availability and proper functioning of instrumentation. Further information regarding the SHNPP QA Program may be found in FSAR Section 17.2

SHEARON HARRIS NUCLEAR POWER PLANT

REGULATORY GUIDE 1.97

FOOTNOTES

Notes:

(1) Variable Types (i.e. B, C, D, E) are those noted in RG 1.97 (Rev. 3). Variables are listed in the same order as they appear in Table 3 of RG 1.97 (Rev. 3). Identifiers are grouped by function (e.g. reactivity control, core cooling, maintaining reactor coolant system integrity).

(2) Category (1, 2 or 3) noted is as defined in RG 1.97 (Rev. 3).

(3) Yes - indicates that SHNPP is in compliance with the Category and range requirements of RG 1.97.

Intent - indicates that SHNPP meets the intent of RG 1.97 as discussed in the remarks column.

(4) Environmental Qualification (temperature pressure, radiation, chemicals) -

BOP Instrumentation:

E - Safety related instrumentation (up to and including electrical isolation device, if applicable) is qualified in accordance with RG 1.89 (Rev. 0) and methodology of NUREG-0588 as noted in the SHNPP Environmental Qualification Report (FSAR Section 3.11). IEEE 323-74 has been utilized except where IEEE 323-71 may be noted. Cables (safety related) are qualified in accordance with IEEE 383-74. Safety related instrumentation located outside containment and not subject to DBA temperatures or pressures are qualified for radiation exposure.

L - Non-Safety related instrumentation qualified for service environment for which instrument is located.

NSSS Instrumentation:

A - Group A denotes instrumentation (sensor) which is qualified for harsh environment and high radiation. Instrumentation (sensor) meets the intent of RG 1.89 (Rev. 0) and is qualified in accordance with either IEEE 323-74 as documented in WCAP-8587 (Rev. 2) or IEEE 323-71 as documented in WCAP-7410-L, WCAP-7709-L and the Westinghouse Supplemental Environmental Qualification Testing Program. Associated instrument cables (BOP) are qualified in accordance with IEEE 323-74 and IEEE 383-74.

B - Group B qualification methodology is described in WCAP-8587 (Rev. 2) WCAP-7410-L, WCAP-7709-L and the Westinghouse Supplemental Environmental Qualification Testing Program. Associated instrument cables (BOP) are qualified in accordance with IEEE 323-74 and IEEE 383-74.

C - Group C denotes non-safety related instrumentation which is designed for its service environment (High Quality Commercial Grade).

Additional information regarding environmental qualification may be found in FSAR Section 3.11.

(5) Seismic Qualification

BOP Instrumentation:

I - Instrumentation (up to and including electrical isolation device, if applicable) is qualified in accordance with IEEE 344-75 and Regulatory Guide 1.100 (Rev 1).

V - Equipment is designed to withstand normal mechanical vibration experienced in its location.

NSSS Instrumentation:

A or B - NSSS (Westinghouse) instrumentation is seismically qualified in accordance with IEEE 344-75, IEEE 344-71 and Regulatory Guide 1.100 as delineated in WCAP-8587 "Methodology for Qualifying Westinghouse PWR-SD supplied NSSS Safety Related Electrical Equipment," and WCAP-8587 Supplement 1. Where multifrequency biaxial inputs are employed for testing, the methodology described in WCAP-8695, "General Method of Developing Multifrequency Biaxial Test Inputs for Bistables," is employed.

R - Recorders (which are indicated by the tag number) are qualified to operate after a seismic event. Seismic qualification methodology is delineated in WCAP-8587 (see item B, above).

C - Commerical grade instrument is designed for normal vibration of location.

Additional information regarding the above subject may be found in FSAR Section 1.8 (RG 1.100) and FSAR Section 3.10.

(6) Quality Assurance

Q - 1E instrumentation (up to and including any isolation device) is subject to the quality assurance program in accordance with 10CFR50 Appendix B. The guidance of the Regulatory Guides 1.28, 1.30, 1.38, 1.58, 1.64, 1.74, 1.88, 1.123, 1.144 and 1.146 are utilized as described in FSAR Section 1.8 (as applicable) and FSAR Section 17.2.

(7) Redundancy

S - Instrumentation meets single failure criteria. Redundant or diverse channels are electrically independent and physically separated (up to and including any isolation device) from each other and from equipment not classified important to safety in accordance with Regulatory Guide 1.75 (Rev 1).

NA - Single failure criteria is not applicable.

(8) Power

1E - Powered off the 1E bus

Non 1E - High reliability power source which may not necessarily be Stand-by Power.

Note: Where a variable is recorded (indicated by the display column), the recorders are powered from the non-1E UPS distribution panel.

UPS - Uninterruptible Power Supply

(9) Sensor Location

Cont - Containment

RAB - Reactor Auxiliary Building

WPB - Waste Processing Building

TB - Turbine Building

MET - Meteorology Facilities

(10) Display Location

MCB - Main Control Board

CR - Control Room

ERFIS - Emergency Response Facilities Information System

ACP - Auxiliary Control Panel

TSC - Technical Support Center

WPB - Waste Processing Building

RCDR - Variable is recorded on the Recorder Panel (Control Room)

AEP - Auxiliary Equipment Panel

NIS - Nuclear Instrumentation System

RMS - Radiation Monitoring System

SHEARON HARRIS NUCLEAR POWER PLANT
IMPLEMENTATION OF REGULATORY GUIDE 1.97 REVISION 3

Table(1) Identifier	Variable Description	(2) CAT	(3) SHNPP Complies	Sensor Tag Number	Required Range	Existing Range	(4) EQ	(5) Seismic	(6) QA	(7) Redundant	(8) Power	(9) Sensor Location	(10) Display Location	Remarks
.1	RCS Hot Leg Water Temperature	1	Intent	TE-413 I TE-423 I TE-433 I	Plant specific	0-700°F	A	A	Q	-	1E	Cont	MCB RCDR ERFIS ACP	Refer to B.2.1.
.2	RCS Cold Leg Water Temperature	1	Intent	TE-410 II TE-420 II TE-430 II	Plant specific	0-700°F	A	A	Q	-	1E	Cont	MCB RCDR ERFIS ACP	Refer to B.2.2.
.3	RCS Pressure	1	Yes	PT-440 I PT-441 II	Plant specific	0-3000 psig	A	A	Q	S	1E	RAB	MCB RCDR ERFIS ACP	PT-440 and PT-441 are provided as part of the RVLIS. Diverse information regarding RCS pressure is available from PT-444 and PT-403 which are used for LTOP.
.4	Core Exit Temperature	1	Yes	T1 to T25 T26 to T51	Plant specific	0-2300°F	A	A	Q	S	1E	Cont	MCB ERFIS	
.5	Neutron Flux	1		NI-31B and 32B	Plant Specific	1 to 10^6 CPS (Source)	C	C	-	-	-	Cont	MCB (NIS) ERFIS	Refer to B.1.1
				NI-35B and 36B		10^{-11} to 10^{-3} amps (Intermediate)	C	C	-	-	-	Cont	MCB (NIS) ERFIS	
				NI-41B, 42B, 43B, and 44B		0 to 120% (Average Power)	A	A	Q	S	1E	Cont	MCB (NIS) ERFIS	
.1	Containment Water Level - Wide Range	1	Yes	LT-7162A LT-7162B	Plant specific	0 to 18.5 feet	E	I	Q	S	1E	Cont	MCB ERFIS	Refer to B.3.2
	Narrow Range(ECCS Sump)	1	Yes	LT-7160A LT-7160B	Plant specific	0 - 100%	E	I	Q	S	1E	Cont	MCB ERFIS	
.2	Containment Hydrogen Concentration	1	Yes	ISP-7438 SA ISP-7438 SB	Plant specific	0 to 10% (by volume)	E	I	Q	S	1E	RAB	CR (envelope) ERFIS RCDR	
.3	Containment Pressure	1	Yes	PT-950 I PT-951 II PT-952 III PT-953 IV	Plant specific	0 to 55 psig	B	B	Q	S	1E	RAB	MCB ERFIS	

Variable(1) Type/ Identifier	Variable Description	(2) CAT	(3) SSNPP Complies	Sensor Tag Number	Required Range	Existing Range	(4) EQ	(5) Seismic	(6) QA	(7) Redun-dant	(8) Power	(9) Sensor Location	(10) Display Location	Remarks
A.3.1	RWST Level	1	Yes	LT-990 I LT-991 II LT-992 III LT-993 IV LR-990	Plant specific	0-100%	B	B	Q	S	1E	RAB	MCB RCDR ERFIS	
A.3.2	Pressurizer Level	1	Yes	LT-459 I LT-460 II LT-461 III	Plant specific	0-100%	A	A	Q	S	1E	Cont	MCB RCDR ERFIS ACP	
A.4.1	Steam Generator Level (narrow range)	1	Yes	LT-473,4,5,6 I LT-483,4,5,6 II LT-493,4,5,6 III	Plant specific	0-100%	A	A	Q	S	1E	Cont	MCB RCDR ERFIS	
A.4.2	Steam Line Pressure	1	Yes	PT-474,5,6 I PT-484,5,6 II PT-494,5,6 III	Plant specific	0-1300 psig	B	B	Q	S	1E	RAB	MCB RCDR ERFIS ACP	
A.5.1	Auxiliary Feedwater Flow	1	Yes	FT-2050 A FT-2050 B FT-2050 C	Plant specific	0-266 K-lb/hr on each AFW Line	E	I	Q	S	1E	RAB	MCB ERFIS ACP	Redundancy is provided on a system basis. Diversity is provided by the steam generator levels (Item A.4.1).
A.5.2	CST Level	1	Yes	LT-9010 A LT-9010 B	Plant specific	0-100%	E	I	Q	S	1E	RAB	MCB ERFIS ACP	
A.6.1	Containment Spray Additive Tank Level	1	Yes	LT-7150 SA LT-7166 SB	Plant specific	0-100%	E	I	Q	S	1E	RAB	MCB ERFIS	

Table(1) Identifier	Variable Description	(2) CAT	(3) SHNPP Complies	Sensor Tag Number	Required Range	Existing Range	(4) EQ	(5) Seismic	(6) QA	(7) Redundant	(8) Power	(9) Sensor Location	(10) Display Location	Remarks
1	Neutron Flux	1		NI-31B and 32B	10^{-6} to 100% full power	1 to 10^6 CPS (Source)	C	C	-	-	-	Cont	MCB (NIS) ERFIS	Diverse information is provided by the following:
				NI-35B and 36B		10^{-11} to 10^{-3} Amps (Intermed)	C	C	-	-	-	Cont	MCB (NIS) ERFIS	I) Control Rod Position Indication II) Boron Concentration via PASS
				NI-41B, 42B, 43B 44B		0-120% (Average Power)	A	A	Q	S	1E	Cont	MCB (NIS) ERFIS	III) Core Exit Thermocouple Monitoring (This variable is still under investigation
2	Control Rod Position	3	Yes	RPI	Full in or not full in	0 to 230 Steps	C	C	-	NA	Non-1E	Cont	ALP-1 ERFIS	Rod Position-fully inserted and/or Fully Withdrawn indicated on ERFIS
3	RCS Soluble Boron Concentration	1	Intent	-	0-6000 ppm	0 to 5000 ppm	C	C	-	NA	Non-1E	RAB	MCB ERFIS	Diverse information may be obtained from the PASS (Refer to E.6.1.3) via grab sample (Lab analysis). Present boron meter is adequate for anticipated range.
4	RCS Cold Leg Water Temperature	3	Yes	TE-410-II TE-420-II TE-430-II	50^F to 400^F	$0 - 700^F$	A	A	Q	NA	1E	Cont	MCB RCDR ERFIS ACP	This variable is addressed by Item B.2.2.
1	RCS Hot Leg Water Temperature	1	Intent	TE-413 I TE-423 I TE-433 I	50^F to 700^F	$0 - 700^F$	A	A	Q	-	1E	Cont	MCB RCDR ERFIS ACP	TE-433 is not displayed continuously. Instead, it is available on demand from the ERFIS computer. Diverse information is provided by the core exit thermocouples. See Item C.1.1.
2	RCS Cold Leg Water Temperature	1	Intent	TE-410 II TE-420 II TE-430 II	50^F to 700^F	$0 - 700^F$	A	A	Q	-	1E	Cont	MCB RCDR ERFIS ACP	TE-430 is not displayed continuously. Inst it is available on demand from the ERFIS computer. Diverse information is obtained by the steam line pressure.
3	RCS Pressure	1	Yes	PT-440 I PT-441 II	0-3000 PSIG	0-3000 psig	A	A	Q	S	1E	RAB	MCB ERFIS ACP	PT-440 and PT-441 are provided as part of the RVLIS. Diverse information regarding RCS pressure is provided by PT-402 and PT-403 which are used for LTOP.
5	Core Exit Temperature	3	Yes	T1 to T25 T26 to T51	200°F to 2300°F	200°F to 2300°F	A	A	Q	S	1E	Cont	CR ERFIS	Meets Category 1 requirements per [redacted] C.1.

Variable(1) Type/ Identifier	Variable Description	(2) CAT	(3) SHNPP Complies	Sensor Tag Number	Required Range	Existing Range	(4) EQ	(5) Seismic	(6) QA	(7) Redun-dant	(8) Power	(9) Sensor Location	(10) Display Location	Remarks
B.2.5.	Coolant Inventory	1	Yes	LT-1312 LT-1322	Bottom of Hot Leg to top of Vessel	Bottom to top of Vessel	A	A	Q	S	1E	RAB	CR ERFIS	Coolant Inventory is by the Reactor Vessel Level Instrumentation System (RVLIS).
B.2.6	Degree of Subcooling	2	Yes	See Remarks	200°F Subcooling to 35°F Superheat	200°F subcooling to 35°F Superheat	A	A	Q	S	1E	See Remark	ERFIS	Degree of subcooling will be computed by t ERFIS computer utilizing the core exit temperature (Item B.2.4) and RCS pressure (Item B.2.3). Degree of subcooling can al be determined by utilizing the safety grad RCS Pressure and Temperature in conjunctio with Steam Tables.
B.3.1	RCS Pressure	1	Yes	PT-440 PT-441	0 to 3000 PSIG	0-3000 PSIG	A	A	Q	-	1E	RAB	MCB RCDR ERFIS ACP	Refer to B.2.3.
B.3.2	Containment Sump Water Level	2	Yes	LE-7160A and B	Narrow Range (Sump)	0-100% (ECCS Sump)	E	I	Q	S	1E	Cont	MCB	0-100% for Narrow Range Corresponds to 0-60 inches
		2	Yes	LE-7161A and B	Narrow Range (Sump)	0-4 feet (Cavity Sump)	E	I	Q	S	1E	Cont	ERFIS	
		1	Yes	LE-7162A and B	Wide range (Plant specific)	0-18.5 feet (Wide Range)	E	I	Q	S	1E	Cont	MCB ERFIS	
B.3.3	Containment Pressure	1	Yes	PT-950 I PT-951 II PT-952 III PT-953 IV	0 to Design Pressure	0-55 PSIG	B	B	Q	S	1E	RAB	MCB RCDR ERFIS	Design Pressure is 45 psig
B.4.1	Containment Isolation Valve Position (excluding check valves)	1	Yes	See remarks.	-Closed- not Closed	Not Closed Not Open	E	I	Q	S	1E	Valve Limit Switch	MCB ALP ERFIS	Valve Tag Numbers are shown on FSAR Table 6.2.4-1.
B.4.2	Containment Pressure	1	Yes	PT-7160A PT-7160B	-5 PSIG to Design Pressure	-5 to 135 PSIG	E	I	Q	S	1E	Cont	MCB ERFIS	The wide range transmitters are noted in o to monitor pressures below zero psig. Div information is noted by Item B.3.3 which covers positive pressures beyond design. Additional information can be o[illegible] fro Containment Vacuum Relief Instru[illegible]tion the range -5 to +5 inches of water - PDT-7681MSA, PDT-7682BSB.
B.1.1	Core Exit Temperature	1	Yes	T1 to T25 T26 to T51	200°F to 2300°F	200°F to 2300°F	A	A	Q	S	1E	Cont	CR ERFIS	

Variable(1) Type/ Identifier	Variable Description	(2) CAT	(3) SIMFP Complies	Sensor Tag Number	Required Range	Existing Range	(4) EQ	(5) Seismic	(6) QA	(7) Redundant	(8) Power	(9) Sensor Location	(10) Display location	Remarks
C.1.2	Radioactivity Concentration or Radiation level in circulating primary coolant	1	Intent	See remarks.	1/2 Tech Spec limit to 100 times tech spec limit	See remarks.	C	C	-	See Remarks	-	See Remarks	CR	During operation, the Gross Failed Fuel Detector will be utilized. This Detector monitors delayed neutron precursors. The Detector is isolated upon receipt of a "I" Signal. If the Detector is not available, grab samples may be taken via the PASS for Analysis. See Item C.1.3 below.
C.1.3	Analysis of Primary Coolant (Gamma spectrum)	3	Yes	See remarks.	10 μCi/ml to 10 Ci/ml (or TID-14844 source term in coolant volume)	See remarks.	L	V	-	NA	-	RAB	-	The PASS may be used to obtain grab samples of the primary coolant for lab analysis.
C.2.1	RCS Pressure	1	Yes	PT-440 PT-441	0 - 3000 PSIG	0 - 3000 PSIG	A	A	Q	S	1E	RAB	MCB ERFIS ACP RCDR	See Item B.2.3.
C.2.2	Containment Pressure	1	Yes	PT-7160A PT-7160B	-5 PSIG to Design Pressure	-5 to 135 PSIG	E	1	Q	S	1E	Cont	MCB ERFIS	Refer to B.4.2
C.2.3	Containment Sump Water Level	2	Yes	LE-7160A and B	Narrow Range Top to bottom (Sump)	0 - 100% (ECCS Sump)	E	1	Q	S	1E	Cont	MCB ERFIS	Refer to B.3.2
			Yes	LE-7161A and B	Narrow Range Top to bottom (Sump)	0 - 4 feet (Cavity Sump)	E	1	Q	S	1E	Cont	ERFIS	
		1	Yes	LE-7162A and B	Wide Range (Plant specific)	0 - 18.5 feet (Wide range)	E	1	Q	S	1E	Cont	ERFIS MCB	
C.2.4	Containment Area Radiation	3	Yes	RE/H-3561-ASA RE/H-3561-BSB RE/H-3561-CSA RE/H-3561-DSB	1 to 10^6 R/Hr	.01 to 10^6 R/hr	E	1	Q	S	1E	Cont	ERFIS	These monitors are also used to initiate containment isolation.
C.2.5	Effluent Radioactivity Noble gas effluent from Condenser Air removal exhaust	3	Intent	RE/H-21V-3534 RE/H-21V-3534	10^{-6} μCi/cc to 10^{-2} μCi/cc	10^{-6} μCi/cc to 8×10^{-3} μCi/cc	L	V	-	NA	1E	RAB	CR ERFIS	Refer to E.3.1.4
C.3.1	RCS Pressure	1	Yes	PT-440 PT-441	0 to 3000 PSIG	0 - 3000 PSIG	A	A	Q	S	1E	RAB	MCB RCDR ERFIS ACP	See B.2.3

Variable(1) Type/ Identifier	Variable Description	(2) CAT	(3) SRP Complies	Sensor Tag Number	Required Range	Existing Range	(4) EQ	(5) Seismic	(6) QA	(7) Redun-dant	(8) Power	(9) Sensor Location	(10) Display Location	Remarks
C.3.2	Containment Hydrogen Concentration	1	Yes	ISP-7438 SA ISP-7438 Sb	0 to 10% (Capable of operating from -5PSIG to max. design pressure)	0 to 10% (by volume)	E	I	Q	S	1E	RAB	CR (envelope) ERFIS RLDR	The hydrogen analyzer is capable of monitor from -5 PSIG to design pressure. Refer to FSAR Section 6.2.5.
C.3.3	Containment Pressure	1	Yes	PT-7160A PT-7160B	-5 PSIG to 3 times design pressure for concrete	-5 to 135 PSIG	E	I	Q	S	1E	Cont	MCB ERFIS	
C.3.4	Containment Effluent Radioactivity - Noble Gases from identified release points	2	Yes	RMH-1AV-3509SA	10^{-6} µCi/cc to 10^{-2} µCi/cc	8×10^{8} µCi/cc to 8×10^{8} µCi/cc	E	I	Q	S	1E	RAB	CR ERFIS RMS	This variable is addressed by monitors noted at Item E.3.1.5. Regulatory Guide 1.97 (Rev 3) Table 3 footnote 10 allows the combination of streams prior to release.
C.3.5	Effluent Radioactivity Noble Gases (Penetration, Hatches)	2	Yes	RMH-1AV-3509SA	10^{-6} µCi/cc to 10^{3} µCi/cc	8×10^{-6} µCi/cc to 8×10^{8} µCi/cc	E	I	Q	S	1E	RAB	CR ERFIS	Also refer to Item E.3.1.5.
D.1.1	RHR System Flow	2	Yes	Later	0 to 110% Design Flow	Later	E	I	Q	NR	Non-1E UPS	RAB	MCB ERFIS ACP	Back-up information is provided by pump motor current and valve status. The range will meet or exceed 0-110% of design flow.
D.1.2	RHR Heat Exchanger Outlet temperature	2	Yes	Later	40°F to 350°F	Later	E	I	Q	NR	Non-1E UPS	RAB	MCB RLDR ERFIS	Back-up indication is provided by CCW temperature exiting the Residual Heat Removal Heat Exchangers. The range will meet or exceed 40°F to 350°F.
D.2.1a	Accumulator: Tank Level	2	Intent	LT-920,922,924 LT-926,928,930	10% to 90% volume	0 - 100%	C	C	-	S	Non-1E UPS	Cont	MCB ERFIS	Tank Level and Pressure are monitored by Technical Specifications during normal operation. Safety Grade Isolation Valve indication is provided. Since the System is passive, power to valve is locked out at the Circuit Breaker. Therefore no immediate Operator action is anticipated. Tank status can be inferred from the RCS Pressure.
1b	Tank Pressure	2	Intent	PT-921,923,925 PT-927,929,931	0 - 750 PSIG	0 - 800 PSIG	C	C	-	S	Non-1E UPS	Cont	MCB ERFIS	
D.2.2	Accumulator Isolation Valve Position	2	Yes	8808A 8808B 8808C	Closed or Open	Not Closed Not Open	E	I	Q	S	1E	Cont	MCB ERFIS	Position switch is provided for valve.

Variable(1) Type/ Identifier	Variable Description	(2) CAT	(3) SHNPP Complies	Sensor Tag Number	Required Range	Existing Range	(4) EQ	(5) Seismic	(6) QA	(7) Redun-dant	(8) Power	(9) Sensor Location	(10) Display Location	Remarks
D.2.3	Boric Acid Charging Flow	2	Yes	Later	0 to 110% Design Flow	Later	E	I	Q	NR	Non-IE UPS	RAB	MCB ERFIS	During the injection phase (after receipt o an "S" signal), Item D.2.4 Flow Transmitter may be used to monitor Boron Injection Flow The Range will meet or exceed 0 to 110% of Design Flow. Backup indication is provided by Boric Acid
D.2.4	Flow in HPI System	2	Yes	Later	0-110% Design Flow	Later	E	I	Q	NR	Non-IE UPS	RAB	MCB ERFIS	HPI is by charging pump. The range will meet and/or exceed 0 to 110% of Design Flow
D.2.5	Flow in LPI System	2	Yes	Later	0 to 110% Design Flow	Later	E	I	Q	NR	Non-IE UPS	RAB	MCB ERFIS	LPI is by RHR system. Refer to Item D.1.1.
D.2.6	Refueling Water Storage Tank Level	2	Yes	LT/LI-990 I LT/LI-991 II LT/LI-992 III LT/LI/993 IV	Top Bottom	0 - 100%	B	B	Q	S	IE	RAB	MCB RSDR ERFIS	
D.3.1	Reactor Coolant Pump Status	3	Yes	EI-0160 EI-0161 EI-0162	0 - 800 Amps	0-800 Amps	L	V	-	Na	Non-IE	SWGR AUX BUS	MCB ERFIS	-
D.3.2	Primary System a) Safety & b) Relief, Valve Positions, or Flow through, or Pressure in Relief Valve Lines	2	Yes	(a) 8010A 8010B 8010C (b) PCV-445A PCV-445B PCV-444B	Closed Not Closed Closed Not Closed	Not Closed Not Open Not Closed Not Open	E A	I A	Q Q	S S	IE Non-IE	Cont	ERFIS MCB	Position switch is provided for valve show Backup indication is provided by temperatu monitors downstream of the valves.
D.3.3	Pressurizer Level	1	Yes	LT-459 I LT-460 II LT-461 III	Top to Bottom	0-100%	A	A	Q	S	IE	Cont	MCB ERFIS ACP	
D.3.4	Pressurizer Heater Status	2	Intent	EI-0444	Electric Current	0-600 Amp	L	V	-	NA	Non-IE UPS	PWR DIST PNL CT	MCB	Instrumentation is located in a mild envir Backup indication is provided by pressuriz circuit breaker status in control room.
D.3.5	Quench Tank Level	3	Yes	LT-470	Top to Bottom Pressurizer Tank	0-100%	C	C	-	NA	Non-IE UPS	Cont	MCB ERFIS ACP	

Variable(1) Type/ Identifier	Variable Description	(2) CAT	(3) SIWRP Complies	Sensor Tag Number	Required Range	Existing Range	(4) EQ	(5) Seismic	(6) QA	(7) Redundant	(8) Power	(9) Sensor Location	(10) Display Location	Remarks
D.3.6	Quench Tank Temperature	3	Intent	TE-471	50°F to 750°F	50-250°F	C	C	-	NA	Non-1E UPS	Cont	MCB ALP ERFIS	Since PRT Design Pressure is 100 psig. (Refer to Item D.3.7) the Rupture Disc is at approximately 86-100 psig, T_{sat} = 327.8°F at 100 psig
D.3.7	Quench Tank Pressure	3	Yes	PT-472	0 to Design Pressure	0-100 PSIG	C	C	-	NA	Non-1E UPS	Cont	MCB ALP ERFIS	Rupture Disc set to blow prior to 100 psig.
D.4.1	Steam Generator Level	1	Intent	LT-477 I LT-487 II LT-497 III	From Tube Sheet to Separators	0-100% (Wide range)	A	A	Q	-	1E	Cont	MCB ERFIS ALP	These wide-range transmitters may be supplemented by the redundant narrow range transmitters on each steam generator. See Item A.4.1. In addition, diversity is provided by use of steam line pressure and auxiliary feedwater
D.4.2	Steam Generator Pressure	2	Yes	PT-474,5,6 I PT-484,5,6 II PT-494,5,6 III	From atmos. Pressure to 2% above Lowest valve Setting	0-1300 PSIG (Steamline Pressure)	B	B	Q	S	1E	RAB	MCB ALP RCDR ERFIS	Steam line pressure is measured instead of steam generator pressure.
D.4.3	a) Safety/b) Relief Valve Positions or Main Steam Flow	2	Yes	a) 2MS-R1 thru R15 b) PCV-308A PCV-308B PCV-308C	Closed - Not Closed a) & b)	Not Closed & Not Open a) & b)	E	I	Q	NA	1E	RAB	MCB ALP ERFIS	Position switch is provided for valve shown
D.4.4	Main Feedwater Flow	3	Yes	FT-476,7 FT-486,7 FT-496,7	0-110% Design Flow	0-5 million lb/hr For each MFW line	B	B	Q	S	1E	RAB	MCB ERFIS	This range covers 0-120% on each main feedwater flow line.
D.5.1	Auxiliary or Emergency Feedwater Flow	2	Yes	FT-2050A FT-2050B FT-2050C	0 to 100% Design Flow	0-266,000 lb/hr on each AFW line	E	I	Q	NA	1E	RAB	MCB ALP ERFIS	This range covers 0-130% on each auxiliary feedwater flow line.
D.5.2	Condensate Storage Tank Water Level	1	Yes	LT-9010A LT-9010B	Plant Specific	0-100%	E	I	Q	S	1E	RAB	MCB ALP ERFIS	Condensate tank level will be recorded by ERFIS (Computer) for trig information.
D.6.1	Containment Spray Flow	2	Yes	LT-7122A LT-7122B	0-110% Design Flow	Later	E	I	Q	NA	1E	RAB	ERFIS	Transmitters will be purchased to meet the reg guide requirements.

Variable(1) Type/ Identifier	Variable Description	(2) CAT	(3) SSHFF Complies	Sensor Tag Number	Required Range	Existing Range	(4) EQ	(5) Seismic	(6) QA	(7) Redundant	(8) Power	(9) Sensor Location	(10) Display Location	Remarks
.6.2	Heat Removal by Containment Fan Heat Removal System	2	Yes	AH-1 AH-2 AH-3 AH-4	Plant Specific	On/Off Running Status	E	I	Q	S	1E	RAB	ERFIS	Diversity for monitoring operation is provided by use of the containment temperature indicators. See Item D.6.3.
.6.3	Containment Atmosphere Temperature	2	Yes	TE-7562 A,B,C TE-7561 A,B,C	40°F to 400°F	0-400°F	E	I	Q	S	1E	Cont	MCB ERFIS	
.6.4	Containment Sump Water Temperature	2	Yes	TI-7133A TI-7133B	50°F to 250°F	50°F - 250°F	E	I	Q	S	1E	Cont	MCB ERFIS	
.7.1	Makeup Flow-in	2	Intent	FT-114	0-100% Design Flow	0-160 GPM	C	C	-	-	Non-1E	RAB	RCDR ERFIS	This system variable is not required for safe plant shutdown. The system is isolated on plant protection signals. Range covers 0 to 125%.
.7.2	Letdown Flow-out	2	Intent	FT-150	0 to 110% Design Flow	0-200 GPM	C	C	-	-	Non-1E UPS	RAB	MCB ERFIS	This system variable is not required for safe plant shutdown. The system is isolated on plant protection signals. Maximum Let down flow is 120 gpm.
.7.3	Volume Control Tank Level	2	Intent	LT-115	Top to Bottom	0-100%	C	C	-	-	Non-1E UPS	RAB	MCB ERFIS ACP	This system variable is not required for safe plant shutdown. The System is isolated on plant protection signals.
.8.1	Component Cooling Water Temperature to ESF System	2	Yes	TE-674 TE-675	40°F to 200°F	0-200°F	B	B	Q	-	1E	RAB	MCB RCDR ERFIS	TE-674 and TE-675 indicate temperature out of the CCW Heat Exchangers. The Temperature of CCW into the Heat Exchangers is indicated by TE-671 and TE-672.
.8.2	Component Cooling Water Flow to ESF System	2	Intent	FI-652 FI-653	0 - 110% Design Flow	0-15000 GPM	C	C	-	-	Non-1E	RAB	MCB RCDR ERFIS	FT-688 and FT-689 indicate CCW flow to the RHR Heat Exchangers. Indication may be also inferred from FT-649 and FT-650.
.9.1	High Level Radioactive Liquid Tank Level	3	Yes	LT-6001 (Waste Holdup Tank) LT-6101 (FL Drain Tank)	Top to Bottom	0-100% 0-100%	L L	V V	-	-	Non-1E Non-1E	WPB WPB	WPB-CB ERFIS RMS WPB-CB ERFIS RMS	

Variable(1) Type/ Identifier	Variable Description	(2) CAT	(3) SRMPP Complies	Sensor Tag Number	Required Range	Existing Range	(4) EQ	(5) Seismic	(6) QA	(7) Redun-dant	(8) Power	(9) Sensor Location	(10) Display Location	Remarks
D.9.2	Radioactive Gas Holdup Tank Pressure	3	Yes	PT-1036 to PT-1039 PT-1052 to PT-1055	0 - 150% Design Pressure	0-150 PSIG 0-150 PSIG	C C	C C	- -		Non-1E Non-1E	WPB WPB	WIR-CB ERFIS RMS WPB-CB ERFIS RMS	
D.10.1	Emergency Ventilation Damper Position	2	Yes	Various	Open-Closed Status	Not Open Not Closed	E	I	Q	S	1E	Valve Limit Switch	MCB	
D.11.XX	Status of Standby Power & Other Energy Sources Important to Safety (electric hydraulic, pneumatic)	2	Yes			-								See Variables Listed Below
D.11.1	6.9 kV EMER BUS Volt	2	Yes	E1-6956A1 and B1	Plant specific	0-9000V	E	I	Q	S	1E	Swgr Pnl	MCB ERFIS	
D.11.2	Diesel Generator Volt	2	Yes	E1-6955A and B	Plant specific	0-9000	E	I	Q	S	1E	DG Pnl	MCB ERFIS	
D.11.3	Diesel Generator Field Volt	2	Yes	E1-6954A and B	Plant specific	0-150V	E	I	Q	S	1E	DG Cont Pnl	MCB	
D.11.4	D.G. Field current	2	Yes	E1-6950A and B	Plant specific	0-500 amp	E	I	Q	S	1E	DG Cont Pnl	MCB	
D.11.5	D.G. Reactive Power	2	Yes	E1-6952A and B	Plant specific	± 10 MVAR	E	I	Q	S	1E	DG Cont Pnl	MCB	
D.11.6	D.G Power	2	Yes	E1-6957A and B	Plant specific	0-8 MW	E	I	Q	S	1E	DG Cont Pnl	MCB	
D.11.7	D.G. Current	2	Yes	E1-6951A and B	Plant specific	0-800 Amp	E	I	Q	S	1E	DG Cont Pnl	MCB	
D.11.8	Batt Current	2	Yes	E1-6963A and B	Plant specific	± 600 Amp	E	I	Q	S	1E	Battery Pnl	MCB ACP	

Variable(1) Identifier	Variable Description	(2) CAT	(3) SRNPP Complide	Sensor Tag Number	Required Range	Existing Range	(4) EQ	(5) Seismic	(6) QA	(7) Redun-dant	(8) Power	(9) Sensor Location	(10) Display Location	Remarks
.11.9	Batt Volts	2	Yes	E1-6961A and B	Plant specific	0-150V	E	1	Q	S	1E	Battery Panel	MCB ACP	
.11.10	MSIV Hydraulic Accumulator Pressure	2	Yes	2MS-V1SAB-1 2MS-V2SAB-1 2MS-V3SAB-1	Plant specific	80-150 psig	E	1	Q	S	1E	NA	NA	
.11.11	FWIV Hydraulic Accumulator Pressure	2	Yes	2FW-V26SAB-1 2FW-V2GSAB-1 2FW-V28SAB-1	Plant specific	Later	E	1	Q	S	1E	NA	NA	
.1.1	Containment Area Radiation High Range	1	Yes Yes	RE1H-3589 SA RE1H-3590 SB RE1H-3563 ASA RE1H-3563 BSB	1 R/HR to 10^7 R/HR	Later Later	E	1	Q	S	1E	CB	CR ERFIS RMS	Additional monitors will be purchased for use inside containment. Rem[illegible] monito[illegible] are for POST LOCA monitoring. E[illegible] ranges are Table 12.3.4-1. noted in FSAR [illegible] 12.3.4-1
.2.1	Radiation Exposure Rate (inside bldgs or Areas where access is required to service equip. important to safety	2	Yes	RE1H-1RR-3597 RE1H-1RR-3598 RE1H-1RR-3599B RE1H-1RR-2599C RE1H-1RR-3600 RE1H-1RR-3601 RE1H-1RR-3602 RE1H-1RR-3603 RE1H-2RR-3604	10^{-1} R/HR to 10^4 R/HR RE1H-1RR-3606A RE1H-1RR-3606B	See Remark	L	V	-	NA	Non-1E	RAB	ERFIS PMS	Energy ranges are noted in FSAR Table 12.3.4-1
E.3.1.1	Containment or Purge Effluent	2	-	-	10^{-6} μCi/cc to 10^5 μCi/cc 0 to 110% Vent Design flow	-	-	-	-	-	-	-	-	Not Applicable since effluent discharges through common plant vent.
E.3.1.2	Reactor Shield Bldg Annulus	2	-	-	10^{-6} μCi/cc to 10^4 μCi/cc 0 to 110% Vent Design flow	-	-	-	-	-	-	-	-	Not Applicable.
E.3.1.3	Auxiliary Bldg (including any bldg) Containing primary System gases, e.g. waste gas decay tank)	2	-	-	10^{-10} μCi/cc to 10^3 μCi/cc 0 to 110% Vent Design flow			-	-	-	-	-	-	Not Applicable since effluent di[illegible] through common plant vent.

Variable(1) Type/ Identifier	Variable Description	(2) CAT	(3) SRNPP Complies	Sensor Tag Number	Required Range	Existing Range	(4) EQ	(5) Seismic	(6) QA	(7) Redundant	(8) Power	(9) Sensor Location	(10) Display Location	Remarks
E.3.1.4	Condenser Air Removal System Exhaust	2	Yes	RE-ITV-3534	10^{-6} μCi/cc to 10^{3} μCi/cc 0 to 110% Vent Design flow	Later	L	V	-	NA	Non-1E	Tub	CR ERFIS	Monitor will be purchased to meet requirements.
E.3.1.5	Common Plant Vent or Multipurpose Vent Discharging any (If above releases is included)	2	Yes	RPH-1AV-3509SA	10^{-6} μCi/cc to 10^{-4} μCi/cc 0 - 110% Vent Design flow	Later	E	I	Q	S	1E	RAB	CR ERFIS	
E.3.1.6	Vent from steam Generator Safety Relief valves or Atm. Dump Valves	2	Yes	RE-3591 RE-3592 RE-3593	10^{-1} μCi/cc to 10^{3} μCi/cc (Duration of releases in sec. & mass of steam per unit time	Later	E	I	Q	S	1E	RAB	CR ERFIS	
E.3.1.7	All other identified release points	2	Yes	RIH - 1WV-3546 REH 1WV-3547	10^{-6} μCi/cc to 10^{2} μCi/cc 0 to 110% vent design flow	Later	E	I	Q	-	1E		CR ERFIS	Monitor will be purchased to meet requirements.
E.3.2	Particulates and Halogens	3	Yes	RIH-1TV-3509 SA REH-2TV-3509 SA RIH-1WV-3546 RIH-1WV-3547	10^{-3} μCi/cc to 10^{2} μCi/cc 0 to 110% Vent Design flow	Later	L	V	-	-	Non-1E			Monitor will be purchased to meet requirements.
E.4.1	Airborne Radio-Halogens and Particulates (portable sampling with onsite analysis capability	3	Yes	-	10^{-9} μCi/cc top 10^{-3} μCi.cc		L	V	-	-	Non-1E		CR ERFIS	Other identified release points consist of t Waste Processing Building Stack.
E.4.2	Plant & environs Radiation (Portable instrumentation)	3	Yes	-	10^{-3} R/Hr to 10^{4} R/HR, Photons 10^{-3} R/HR to 10^{4} R/HR, beta rads & low-energy photons		L	V	-	-	Non-1E			CP&L will purchase monitors to m requirements.

Variable(1) Identifier	Variable Description	(2) CAT	(3) SSNPP Complies	Sensor Tag Number	Required Range	Existing Range	(4) EQ	(5) Seismic	(6) QA	(7) Redun-dant	(8) Power	(9) Sensor Location	(10) Display Location	Remarks
..4.3	Plant Environs Radioactivity (Portable Instrumentation)	3	Yes	-	Multichannel Gamma-ray Spectrometer	Later	L	V	-	-	Non-1E	-	-	CP&L will Purchase Monitors to meet this Requirement.
.5.1	Wind Direction	3	Yes	-	0 to 360° (±5° accuracy with a deflection of 10° starting speed 0.40 MPS (1 MPH). Damping ratio greater than or equal to 0.4, delay distance less than or equal to 2 meters	6-540° (± 5.4° or 1%) with a deflec- of 15°. Starting Speed of 0.75 MPH and damping Ratio of 0.5-0.6. Delay Distance is 1.222 meters.	L	V	-	-	Non-1E	1.1 Miles NE of Plant	ERFIS	
2.5.2	Wind Speed	3	Yes	-	0 to 22 MPS (50 MPH). ± 0.2 MPS (0.5 MPH) accuracy for speeds less than 2 MPS (5 MPH), 10% for speeds in excess of 2 MPS (5 MPH), with a starting threshold of less than 0.40 MPS (1 MPH) and a distance constant not to exceed 2 meters.	0-100 MPH (linear) with accuracy of ± 0.4 MPH or 1% whichever is greater. Starting threshold of 0.75 MPH and a constant distance of 1.222 meters.	L	V	-	-	Non-1E	1.1 Miles NE of Plant	ERFIS	
3.5.3	Estimation of Atmospheric Stability	3	Yes	-	Based on a vert. temp, diff from primary meteorological system -5°C to 10°C (-9°F to 18°F) & ± 0.15 accuracy per 50- meter intervals (± 0.3°F accuracy per 164 foot intervals) or analogous range for alternative stability estimates.	-10°F to 15°F with an accuracy of ± 0.186°F per 48 meters.	L	V	-	-	Non-1E	1.1 Miles NE of Plant	ERFIS	

Variable(1) Type/ Identifier	Variable Description	(2) CAT	(3) SIHPP Complies	Sensor Tag Number	Required Range	Existing Range	(4) EQ	(5) Seismic	(6) QA	(7) Redun-dant	(8) Power	(9) Sensor Location	(10) Display Location	Remarks
E.6.1.1	Gross Activity (Primary Coolant)	3	Yes	Later	10 μCi/ml to 10 Ci/ml	See Remarks.	L	V	-	NA	Non-1E	RAB	Hot Lab	The postaccident sampling system (PASS will be utilized in order to obtain grab samples of primary coolant. The PASS will also be able to provide diluted samples. Refer to FSAR Section 9.3.2 for information regarding the PASS.
E.6.1.2	Gamma Spectrum (Primary Coolant)	3	Yes	Later	(Isotopic Analysis)	See Remarks.	L	V	-	NA	Non-1E	RAB	Hot Lab	See Item E.6.1.1.
E.6.1.3	Boron Content (Primary Coolant)	3	Yes	Later	0 - 6000 PPM Lab	See Remarks.	L	V	-	NA	Non-1E	RAB	Hot Lab	See Item E.6.1.1.
E.6.1.4	Chloride Content (Primary Coolant)	3	Yes	Later	0 - 20 PPM	See Remarks	L	V	-	NA	Non-1E	RAB	Hot Lab	See Item E.6.1.1.
E.6.1.5	Dissolved Hydrogen or total gas (Primary Coolant)	3	Yes	Later	0 - 2000 cc (STP)/Kg	0 - 2000 cc	L	V	-	NA	Non-1E	RAB	RAB	See Item E.6.1.1.
E.6.1.6	Dissolved Oxygen (Primary Coolant)	3	Yes	Later	0 to 20 PPM	0 - 20 PPM	L	V	-	NA	Non-1E	RAB	RAB	See Item E.6.1.1.
E.6.1.7	pH (Primary Coolant)	3	Yes	Later	1 to 13	1 - 13	L	V	-	NA	Non-1E	RAB	RAB	See Item E.6.1.1.
E.6.2.1	Gross Activity (Sump)	3	Yes	Later	1μCi/ml to 10 Ci/ml	See Remarks	L	V	-	NA	Non-1E	RAB	Hot Lab	The Post Accident Sampling System (PASS) will be utilized to obtain a grab sample of containment sump fluid. The PASS is also capable of providing diluted grab samples. Refer to FSAR Section 9.3.2 for information regarding the PASS.
E.6.2.2	Gamma Spectrum (Sump)	3	Yes	Later	(Isotopic Analysis)	See Remarks	L	V	-	NA	Non-1E	RAB	Hot Lab	See Item E.6.2.1.

Variable(1) Type/ Identifier	Variable Description	(2) CAT	(3) SHNPP Complies	Sensor Tag Number	Required Range	Existing Range	(4) EQ	(5) Seismic	(6) QA	(7) Redun-dant	(8) Power	(9) Sensor Location	(10) Display Location	Remarks
E.6.2.3	Boron Content Content (Sump)	3	Yes	Later	0 to 6000 PPM	See Remarks	L	V	-	NA	Non-1E	RAB	Hot Lab	See Item E.6.2.1.
E.6.2.4	Chloride Content (Sump)	3	Yes	Later	0 to 20 PPM	See Remarks.	L	V	-	NA	Non-1E	RAB	Hot Lab	See Item E.6.2.1.
E.6.2.5	Dissolved Hydrogen or Total Gas (Sump)	3	Yes	Later	0 to 2000cc (STP)Kg	See Remarks.	L	V	-	NA	Non-1E	RAB	RAB	See Item E.6.2.1.
E.6.2.6	Dissolved Oxygen (Sump)	3	Yes	Later	0 to 20 PPM	See Remarks.	L	V	-	NA	Non-1E	RAB	RAB	See Item E.6.2.1.
E.6.2.7	pH (Sump)	3	Yes	Later	1 to 13	1 - 13	L	V	-	NA	Non-1E	RAB	RAB	See Item E.6.2.1.
E.6.3.1	Hydrogen Content	3	Yes	ISP 7438SA ISP 7438SB	0 to 10%	See Remarks.	L	V	-	NA	Non-1E	RAB	Next to CR	A sample dilution skid is connected to the Hydrogen Analyzer in order to obtain a grab sample of containment air. The grab sample may then be used for lab analysis. Refer to FSAR Section 6.2.5 for additional information regarding air sampling.
E.6.3.2	Oxygen Content	3	Yes	Later	0 to 30%	See Remarks.	L	V	-	NA	Non-1E	RAB	Hot Lab	See Item E.6.3.1.
E.6.3.3	Gamma Spectrum	3	Yes	Later	(Isotopic analysis)	See Remarks.	L	V	-	NA	Non-1E	RAB	Hot Lab	See Item E.6.3.1.