

ENCLOSURE

RESPONSE TO NUREG-0737
SUPPLEMENT 1, SECTION 6.0

REVIEW OF REGULATORY GUIDE 1.97 -
APPLICATION TO EMERGENCY RESPONSE FACILITIES,
CALVERT CLIFFS NUCLEAR POWER PLANT

BALTIMORE GAS AND ELECTRIC COMPANY

DECEMBER 1, 1984

1.0 INTRODUCTION AND SUMMARY

As stated in Section 1.1 of the Updated Final Safety Analysis Report (FSAR) the Calvert Cliffs Nuclear Power Plant was designed in accordance with the seventy (70) design criteria published by the Atomic Energy Commission on July 11, 1967. Inasmuch as these original criteria were revised and regrouped into the sixty-four (64) General Design Criteria (GDC) that were subsequently issued as Appendix A to 10 CFR 50, the Calvert Cliffs design continues to satisfy these criteria. Specifically, instrumentation currently provided at Calvert Cliffs to assess plant and environs conditions during and following a design basis accident (DBA) satisfies GDC 13, "Instrumentation and Control," GDC 19, "Control Room," and GDC 64, "Monitoring Radioactivity Releases," as described in Section 7 of the Updated FSAR.

Supplement 1 to NUREG-0737 requires each licensee to review the post-accident monitoring (PAM) instrumentation available at their facility and to compare this instrumentation with the recommendations of Regulatory Guide 1.97⁽¹⁾. This report presents the results of BG&E's review of the provisions for post-accident monitoring at the Calvert Cliffs Nuclear Power Plant. This review considered the specific information needs of the plant operators in responding to accidents as established in the existing emergency operating procedures (EOPs) and the generic Combustion Engineering Emergency Procedure Guidelines (CEN-152) from which we are developing new function-oriented EOPs.

Attachment "A" provides the results of our review of each of the post-accident monitoring variables identified in Regulatory Guide 1.97. Where instrumentation available at Calvert Cliffs deviates from the recommendations of Regulatory Guide 1.97, Attachment "A" provides either a justification for the deviation or a commitment to assess the need for physical plant upgrades. The results of our review are summarized in Table 1.

Those modifications which BG&E has determined to be warranted will be accomplished under our facility change request (FCR) process in a manner consistent with existing procedures. These procedures reflect the need for establishing priorities consistent with the safety significance of the modification and for performing additional design evaluations to better define the required scope of effort. A preliminary schedule for implementing the proposed upgrades is shown on Table 2.

2. SELECTION OF VARIABLE TYPE AND CATEGORY

2.1 General

The recommendations of Regulatory Guide 1.97, Revision 3, were used in our preliminary review of PAM instrumentation to identify the required monitoring function (variable type) and classification (variable category). These initial designations were then evaluated against the specific function and safety significance of the PAM instrumentation at Calvert Cliffs as defined in the Updated FSAR and the plant emergency operating procedures. This evaluation was performed in parallel with our selection of variables to be displayed on the safety parameter display system (SPDS).

(1) Regulatory Guide 1.97, Revision 3, Instrumentation for Light-Water Reactor Plants to Assess Plant and Environs Conditions During and Following an Accident.

As a result of the above evaluation, the type and category of certain PAM variables were revised as summarized below. The rationale for these changes is provided in Attachment "A".

<u>Change</u>	<u>No. of Variables</u>
Category 1 revised to Category 3	1
Category 2 revised to Category 3	10
New variables added to Category 3	2

2.2 Type A Variables

Type A variables were initially selected from a review of the current Calvert Cliffs EOPs to identify those variables which would provide primary information to the plant operators to support pre-determined manually controlled actions for which no automatic control is provided and which are required for safety systems to accomplish their safety function. The list of Type A variables generated during this review was then compared with the operator actions specified in the new function-oriented EOPs currently under development to verify that the list was complete and accurate. The Type A variables are shown below.

Pressurizer Level	(A-1)
Pressurizer Pressure	(A-2)
Steam Generator Pressure	(A-3)
Steam Generator Level	(A-4)
Reactor Coolant System Hot Leg Temperature	(A-5)
Reactor Coolant System Cold Leg Temperature	(A-6)
Subcooled Margin	(A-7)
Condensate Tank No. 12 Level	(A-8)
Containment H ₂ Concentration	(A-9)
Containment Pressure	(A-10)

All Type A variables were classified as Category 1 in accordance with the guidelines of R.G. 1.97 and were evaluated accordingly.

3. **DESIGN AND QUALIFICATION CRITERIA**

3.1 General

The twelve design and qualification criteria presented in R.G. 1.97 were used as the basis for comparison. However, it should be recognized that certain of the current recommended design standards and criteria are not appropriate for Calvert Cliffs. Nevertheless, BG&E believes that the intent of the recommended design and qualification criteria are met.

3.2 Equipment Qualification

3.2.1 Category 1 and 2

BG&E's equipment qualification program includes procedures and guidelines that establish methods for the assessment, evaluation, review, and implementation activities associated with environmental and seismic qualification of Class 1E equipment at Calvert Cliffs. These procedures reflect the requirements of 10 CFR 50.49.

All Category 1 and 2 instrument loops will be reviewed in accordance with our existing commitments.

3.2.2 Category 3

Specific environmental qualification requirements were not included in our review of Category 3 variables. However, during the specification process for non-safety related electrical equipment BG&E considers the environmental conditions under which the equipment must operate in order to provide reasonable assurance that the equipment will function under all anticipated conditions.

3.3 Redundancy and Separation

3.3.1 Category 1

BG&E's separation criteria for the installation of safety-related electrical equipment is described in Section 8.5 of the Updated FSAR. This section presents BG&E design practices for the following:

- o Channel identification
- o Cable routing throughout the plant
- o Cable routing in panels
- o Separation of raceways
- o Separation in penetration rooms

These criteria assure that the minimum availability required during any DBA is met.

All Category 1 instrument loops were considered safety-related and were evaluated in accordance with the applicable requirements.

3.3.2 Category 2 and 3

Where Category 2 and 3 variables have been classified as safety-related for reasons other than R.G. 1.97, they have been installed in accordance with separation requirements less stringent than for Category 1 while still providing for high signal reliability. BG&E's practices for installation of non-safety related equipment are also described in Section 8.5 of the FSAR.

3.4 Power Sources

3.4.1 Category 1

BG&E's criteria for the design of the plant electrical power sources are described in Sections 8.1, 8.2, 8.3 and 8.4 of the Updated FSAR. Class 1E electrical systems have been designed in accordance with "IEEE Criteria for Class 1E Electric Systems for Nuclear Power Generating Stations," IEEE No. 308-1974.

All Category 1 loops are required to have power sources from buses satisfying the above criteria.

3.4.2 Category 2 and 3

Power sources for Category 2 and 3 instruments were reviewed for adequacy in light of their intended post-accident function. All Category 2 instruments were required to be supplied from a highly reliable power source. There were no specific requirements for Category 3 instrumentation.

3.5 Channel Availability

3.5.1 Category 1

For Type A variables the instrumentation channel will be available prior to an accident except as provided in paragraph 4.11, "Exception" as defined in IEEE Std. 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations" or as specified in the technical specifications. For other Category 1 variables, the provisions will be similar to Category 2 variables.

3.5.2 Category 2

The out-of-service interval is based on the technical specification requirements for the PAM function served by the instrumentation channel, where applicable.

3.5.3 Category 3

No specific provisions.

3.6 Quality Assurance

3.6.1 Category 1 and 2

BG&E's Quality Assurance Policy is defined in Section 1B of the Calvert Cliffs Nuclear Power Plant Updated FSAR. The program is responsive to the established requirements of the NRC and has been applied to the applicable activity for all safety-related equipment at Calvert Cliffs Nuclear Power Plant. In addition, a series of QA Procedures has been developed to implement the actions identified in the QA Policy.

All Category 1 equipment was considered safety-related and was evaluated in accordance with those requirements, where appropriate. Category 2 equipment will also be considered safety-related, where appropriate.

3.6.2 Category 3

No QA requirements apply to Category 3 instruments. However, normal BG&E practices assure that high-quality equipment is procured and that this equipment is installed and maintained in a manner consistent with its importance to plant operation.

3.7 Display and Recording

BG&E's standard design practices are based upon providing continuous real-time displays on the main control panel (MCP) in a manner consistent with plant operating requirements. In addition, seismically qualified recorders are

provided where essential to provide trending or transient information to the operator. In general, however, recorders on the MCP are not seismically qualified. This is considered consistent with the requirements of R.G. 1.97.

In addition to the MCP displays, PAM information is provided to engineering and off-site personnel via computer terminals located in the Technical Support Center (TSC) and Emergency Operations Facility (EOP). This provides additional assurances that trending information is available. Attachment "B" compares the variables available at these terminals with PAM instrumentation provided in the main control room. The variables that are available to the SPDS via the plant computer are also shown on Attachment "B".

3.8 Range

BG&E's standard design practices are based upon the same requirements as those stated in R.G. 1.97. The appropriateness of the instrument ranges provided reflects this requirement.

3.9 Equipment Identification

No specific provisions exist at present to identify EQ instrumentation. Appropriate identification will be added and coordinated with our detailed control room design review (DCRDR).

3.10 Interfaces

BG&E's standard design practices provide for isolation devices when required to ensure proper operation and separation of all instrumentation loops. When instrument loops contain both qualified and non-qualified equipment, the isolation device is considered part of the qualified portion.

3.11 Servicing, Testing, and Calibration

Instrumentation is included in BG&E's planned maintenance program. Testing is performed on instrument strings on a regular basis. The test points for the instrument strings are under administrative control (technical specification, maintenance procedure, or administrative procedure) to prevent unauthorized testing.

3.12 Human Factors

BG&E's DCRDR program includes a human factors review of control room instrumentation. Any proposed plant upgrades will be discussed in the DCRDR submittal scheduled for January 1, 1985.

3.13 Direct Measurement

To the extent practicable, monitoring instrumentation inputs are from sensors that directly measure the desired variables.

TABLE 1
Regulatory Guide 1.97, Rev. 3
Position Summary

<u>ITEM</u>	<u>VARIABLE</u>	<u>CATEGORY</u>	<u>POSITION</u>
1	Pressurizer Level	1	Upgrade Misc. Wiring & Penetrations
2	Pressurizer Pressure	1	Upgrade Penetrations
3	Pressurizer Temperature	3	No changes necessary
4	Pressurizer Spray Temp	3	No changes necessary
5	Pressurizer Heater Status	2	No changes necessary
6	SRV Position/Flow	2	No changes necessary
7	Steam Generator Level	1	Upgrade Penetrations
8	Steam Generator Pressure	1	Upgrade Indicator Power Sources
9	Steam Generator Steam Flow	3	No changes necessary
10	SIT Level	3	No changes necessary
11	SIT Level	3	No changes necessary
12	SIT Isolation Valve Pos	3	No changes necessary
13	Quench Tank Level	3	No changes necessary
14	Quench Tank Pressure	3	Change range of indicator
15	Quench Tank Temperature	3	Change range of indicator
16	VCT Level	3	No changes necessary
17	CVCS Make-up Water	3	No changes necessary
18	CVCS Make-up Boric Acid	3	No changes necessary
19	CVCS Letdown	3	No changes necessary
20	RWT Level	2	No changes necessary
21	Condensate Storage Tank Lvl	1	Upgrade of cabling being considered
22	Cntmt Sump Level - NR	3	No changes necessary
23	Cntmt Sump Level - WR	1	No changes necessary
24	Cntmt Sump Water Temp	N/A	Not applicable to CCNPP
25	HI Radiation Liq. Tank Lvl	3	No changes necessary
26	Radiation Gas Tank Press	3	No changes necessary
27	KCS Temperature (HOT)		Upgrade existing inst. add new WR channel
28	RCS Temperature (COLD)	1	Upgrade existing inst.
29	Subcooled Margin	1	Upgrade temperature transducers
30	Reactor Level Monitoring	1	Detailed design underway
31	Core Exit Thermocouples	1	Preliminary engineering underway
32	RCS Boron Concentration	3	No changes necessary
33	RCP Status	3	No changes necessary
34	Main Feedwater Flow	3	No changes necessary
35	Auxiliary Feedwater Flow	2	No changes necessary
36	HPSI Flow	2	Possible upgrade of flow transducers

TABLE 1 (Cont.)

Regulatory Guide 1.97, Rev. 3
Position Summary

<u>ITEM</u>	<u>VARIABLE</u>	<u>CATEGORY</u>	<u>POSITION</u>
37	LPSI Flow	2	Possible upgrade of flow transducers
38	Decay Heat Removal Flow	2	Possible upgrade of flow transducers
40	Boric Acid Charging Flow	2	Preliminary engineering underway
41	Neutron Flux	1	Upgrade being considered
42	CEA Position	3	No changes necessary
43	Containment Pressure	1	Second qualified channel to be added
44	Containment Temperature	2	Upgrade temperature transducers
45	Cntmt H2 Concentration	1	No changes necessary
46	Cntmt Heat Removal	2	Upgrade Flow Transmitter
47	Cntmt Spray Flow	2	Upgrade Flow Transmitter
48	Cntmt Isol. Valve Position	1	No changes necessary
49	CCW to ESF, Temp.	2	Upgrade temperature transducer
50	CCW to ESF, Flow	2	Need for inst. being evaluated
51	Emergency Vent Damper Pos.	2	Add position indication where required
52	Status of Standby Power	2	Misc. Wiring Upgrade
53	RCS Radiation	3	No changes necessary
54	RCS Radiation Gamma	3	No changes necessary
55	Cntmt Area Radiation	1	No changes necessary
56	Condenser Off-gas Radiation	N/A	Not required
57	Main Vent Radiation/Flow	2	No changes necessary
58	Area Radiation	3	No changes necessary
59	Rad Monitor Safety RV's & Atmospheric Dump	3	No changes necessary
60	Airborne Radiation	3	No changes necessary
61	Plant & Environment Rad.	3	No changes necessary
62	Meteorology	3	No changes necessary
63	Accident Sample Analysis	3	No changes necessary

TABLE 2

Reg. Guide 1.97, Rev. 3
Implementation Plan

<u>FCR NO.</u>	<u>DESCRIPTION</u>	<u>IMP. SCHEDULE</u>
80-1010	Reactor Vessel Level Monitoring System Installation	Fall 1986 Outage (Unit 1) Fall 1985 Outage (Unit 2)
82-150	Wide Range Ex-core Detector Upgrade	Fall 1986 Outage (Unit 1) Spring 1987 Outage (Unit 2)
83-47	Boronometer Modification	Late 1985
83-125	Boric Acid Charging Flow Indication	Late 1985
83-1057	CET Upgrade	Schedule Under Development
84-1086	EQ Upgrade for RG 1.97	Late 1986
84-1087	Misc. Electrical Upgrades for RG 1.97	Late 1986
84-1088	Misc. Instrument Modification for RG 1.97	Late 1986

ATTACHMENT A

COMPARISON OF PLANT SPECIFIC VARIABLES
WITH REGULATORY GUIDE 1.97, REVISION 3

BALTIMORE GAS AND ELECTRIC COMPANY

DECEMBER 1, 1984

EVALUATION SHEET FORMAT

Item of 63

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable:	Variable name as listed in Table 3 of RG 1.97, Rev. 3 or BG&E's variable name if more appropriate. The number in parenthesis is a sequence number.
Required Range:	The range as listed in Table 3 of RG 1.97, Rev. 3
Category:	The Category as listed in Table 3 of RG 1.97, Rev. 3.
Existing Design:	A description of the present CCNPP design for the instrumentation loop.
Evaluation:	A statement regarding the degree to which the instrumentation meets the guidelines of RG 1.97 and an assessment of the role of the variable in plant operation.
Position:	A description of the specific actions that are proposed for CCNPP.
Imp. Schedule:	The FCR under which the necessary changes will be accomplished.

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Pressurizer Level (A-1 & D-11)

Required Range: Top to bottom

Category: 1

Existing Design: Two (2) separate channels are provided with each covering a range extending from the bottom of the pressurizer to the code safety and electromatic relief valve nozzles. This corresponds to a span of 0 to 360 inches of water.

Indicators are provided on panels C06 and C43 and one channel (switch selectable) with setpoint is recorded on C06. Both channels are also input to the DL.

Power for each loop (with the exception of the recorder) is supplied from separate inverter fed, battery backed-up, Class 1E sources. The electrical installation is in accordance with BG&E's criteria for safety related circuits with the exception of (1) the power cables from the Class 1E power panels to C06, (2) the indicator/recorder circuits to C06 and (3) the containment electrical penetrations.

The harsh environment equipment is qualified in accordance with the requirements of 10 CFR 50.49 as applicable.

Evaluation: The instrumentation provided is adequate and sufficient for PAM except as noted above.

Position: The containment electrical penetrations, the power cables from the Class 1E power panel to C06 and the C06 indicator/recorder circuits will be reviewed and upgraded where necessary. The power circuit to the recorder is satisfactory as installed, since the source, although not 1E, is highly reliable and backed-up by a diesel generator.

Imp. Schedule: FCR 84-1087

CCNPP Units 1 & 2
R.G. 1.97, Revision 3

Variable: Pressurizer Pressure (A-2,B-7,B-11,C-4 & C-9)
Required Range: 0-4000 psig
Category: 1
Existing Design: Two (2) separate channels are provided with each covering a range of 0 to 4000 psig.

Indicators for Channel A are provided on panels C06 and C43. Channel B is recorded on panel C06 and indicated on C43. Channel A is also input to the TSC.

Power for each loop is supplied from separate inverter fed, battery backed-up, Class 1E sources and the electrical installation is in accordance with BG&E's criteria for safety related circuits with the exception of the containment electrical penetrations.

The harsh environment equipment is qualified in accordance with the requirements of 10 CFR 50.49 as applicable.

The instrumentation provided is adequate and sufficient for PAM except as noted above.

Position: The containment electrical penetrations will be upgraded or replaced as required.

Imp. Schedule: FCR 84-1087

CCNPP Units 1 & 2
R.G. 1.97, Revision 3

Variable: Pressurizer Temperature (N/A)

Required Range: Not required by RG 1.97

Category: 3

Existing Design: Two (2) separate instrument loops are provided to measure pressurizer temperature. One loop measures the water phase temperature in the pressurizer and the other loop measures the surge line temperature. Primary elements are RTD's with a range of 0 to 650 degrees C.

Indicators with a scale of 0 - 700 degrees F are provided on panel C06. Both loops are also input to the DL.

These instruments are used for operator guidance in EOP-12 for limiting cooldown rate of the pressurizer to reduce thermal fatigue on equipment but serve no safety function.

Power for each loop is supplied from separate, highly reliable, non-Class 1E instrumentation buses that are backed-up by diesel generators.

Evaluation: The instrumentation is adequate and sufficient for the intended post accident function.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Pressurizer Auxiliary Spray Temperature (N/A)

Required Range: Not required by RG 1.97

Category: 3

Existing Design: One (1) instrument loop is provided to measure pressurizer auxiliary spray temperature. The loop measures the temperature of the auxiliary spray feed from the regenerative heat exchanger.

An indicator with a scale of 0-600 degrees F is provided on C07 for the auxiliary spray temperature.

These instrument loops are used for operator guidance in EOP-12 to reduce thermal fatigue on equipment but serve no safety function.

Power for each loop is supplied from separate, highly reliable, non-Class 1E instrumentation buses that are backed-up by diesel generators.

Evaluation: The instrumentation provided is adequate and sufficient for the intended post accident function.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Pressurizer Heater Status (D-12)

Required Range: Electric Current

Category: 2

Existing Design: CT's are installed on the feeders to the two (2) proportional controllers (each consisting of twelve (12) heaters). The other four (4) banks of back-up heaters (each consisting of twenty-four (24) heaters) are only controlled in an "on-off" manner.

Ammeters with a range of 0-300 amps are provided on C06 for the two (2) proportional heater banks. All six (6) heater banks have "on-off" indicating lights on C06 to indicate operating status.

No equipment in the instrumentation loop is in a harsh environment.

Evaluation: While electric current is not measured for all heater banks, the existing design provides sufficient and adequate information for PAM.

Position: No changes are necessary

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Primary System Relief Valve Position/Flow
(D-10)

Required Range: Closed-Not Closed

Category: 2

Existing Design: Acoustic monitors are installed downstream of the two (2) Code Valves and the two (2) Power Operated Relief Valves to detect flow through the valves.

Digital indicators are provided on panels C06 and C31 to allow the operator to detect flow through the valves. Additional indications of relief valve positions are provided through the D.L. and plant annunciator.

Power for each indicator on C31 is supplied from separate 1E sources. Power for each indicator on C06 is supplied from highly reliable non-Class 1E instrumentation buses that are backed-up by diesel generators. The electrical installation is in accordance with BG&E's criteria for Class 1E circuits with the exception of the power cables and the indicators on C06.

The harsh environment equipment is "qualified" in accordance with the requirements of 10 CFR 50.49 as applicable.

Evaluation: The instrumentation is adequate and sufficient for PAM.

Position: No changes are necessary

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Steam Generator Level (A-4 and D-16)

Required Range: From tube sheet to separators

Category: 1

Existing Design: Both steam generators are provided with four (4) channels of level measurement with a range of -401 to 63.5 inches of water relative to the normal operating level. The tops of the steam separators are 39 1/4 inches above NOL and the tube sheet is 444 11/16 inches below NOL.

One (1) channel is indicated and one (1) channel is recorded on panel C04 and two (2) channels are displayed on C43 for both steam generators.

Power for each channel is supplied from separate inverter fed, battery backed-up, Class 1E sources and the electrical installation is in accordance with BG&E's criteria for safety related circuits with the exception of the containment electrical penetrations.

The harsh environment equipment is "qualified" in accordance with the requirements of 10 CFR 50.49 as applicable.

Evaluation: While the range is slightly less than required by RG 1.97, it is adequate and sufficient for PAM.

Position: The containment electrical penetrations will be upgraded or replaced as required.

Imp. Schedule: FCR 84-1087

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Steam Generator Pressure (A-3 and D-17)

Required Range: Atm to 20% above lowest safety valve

Category: 1

Existing Design: Both steam generators are provided with four (4) channels of pressure measurement on the steam side with a range of 0 to 1200 psia. The lowest safety valve is set at 1000 psia.

Indicators are provided on panel C03 for all four (4) channels for both steam generators. One channel for both steam generators is input to the DL and TSC.

Power for each loop, with the exception of the indicators on C03, is supplied from separate inverter fed, battery backed-up, Class 1E sources and the electrical installation is in accordance with BG&E's criteria for safety related circuits.

The harsh environment equipment is "qualified" in accordance with the requirements of 10 CFR 50.49 as applicable.

Evaluation: The instrumentation provided is adequate and sufficient for PAM.

Position: The indicators on C03 will be repowered from separate Class 1E sources. Mild environment equipment will be evaluated in accordance with the requirements of EEDP-18.

Imp. Schedule: FCR 84-1087

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Main Steam Flow (D-18)

Required Range: No range specified

Category: 2

Existing Design: One (1) instrument loop is provided for each steam generator to measure flow over a range of 0 to 6×10^6 LB/HR. This corresponds to the design flow for the steam generators. One (1) indicator and one (1) recorder is provided for each steam generator on panel C03 with a scale of 0 to 6×10^6 LB/HR.

Power for each loop is supplied from separate, inverter fed, battery backed-up Class 1E sources. The installation is not in accordance with BG&E's criteria for safety related circuits.

The installation is not in accordance with BG&E's criteria for safety related circuits.

The transmitters were included in our EQ program.

Evaluation: The equipment provided meets the guidelines of RG 1.97. However, main steam flow is not considered a significant parameter in the CCNPP EOP's.

Position: A downgrade to a Category 3 indication requirement is appropriate for this parameter. No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Accumulator Tank (SIT) Level (D-3)

Required Range: 10% to 90% Volume

Category: 2

Existing Design: One (1) instrument loop is provided for each of the four (4) SIT's to measure level over a 333 inch range. This corresponds to 5% to 95 % of the tank volume.

Two (2) indicators are provided on panels C08 or C09 for each tank to indicate WR (0 to 336 inches) or NR (184 to 202 inches)level.

Power for the loop is supplied form highly reliable non-Class 1E instrumentation buses that are backed-up by a diesel generator. The installation is not in accordance with BG&E's criteria for safety related circuits.

The harsh environment instruments are not "qualified".

Evaluation: The equipment does not meet the guidelines of RG 1.97. However, SIT level is only used for pre-accident indication of the status of SIT's to assure that the SIS is prepared to serve its safety function.

Position: A downgrade to a Category 3 indication requirement is appropriate. No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Accumulator Tank (SIT) Pressure (D-3)

Required Range: 0 to 750 psig

Category: 2

Existing Design: One (1) instrument loop is provided for each of the four (4) SIT's to measure pressure over a 0 to 250 psig range. Relief valves on the tank are set to relieve at 250 psig.

Two (2) indicators for each of the four (4) tanks are provided on either panels C08 or C09 to indicate WR (0 to 250 psig) or NR (200 to 240 psig) pressure.

Power for the WR loop is supplied from highly reliable non-Class 1E instrumentation buses that are backed-up by a diesel generator. The installation is not in accordance with BG&E's criteria for safety related circuits. Containment electrical penetrations are non-Class 1E.

The harsh environment instruments are not "qualified".

Evaluation: The equipment does not meet the guidelines of RG 1.97. However, SIT pressure is only used for pre-accident indication of the SIT pressure to assure that the SIS is prepared to serve its safety function .

Position: A downgrade to Category 3 indication requirements is appropriate. No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Accumulator Tank Isolation Valve Position (D-4)

Required Range: Closed or Open

Category: 2

Existing Design: Open/Closed indicator lights are provided on C08 or C09 to indicate valve status.

The indicators are powered from Class 1E buses that are backed up by diesel generators. The limit switches were included in our EQ program.

Evaluation: The instrument provided meets the guidelines of RG 1.97. However, the instrumentation provides only pre-accident information to assure that the SIS is prepared to serve its safety function.

Position: A downgrade to Category 3 is appropriate. No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Quench Tank Level (D-13)

Required Range: Top to Bottom

Category: 3

Existing Design: One (1) instrument loop is provided to measure level over a 48 inch range that extends from 6 inches below the top. This corresponds to 4% to 96% of the tank volume.

One (1) indicator is provided on panel C06 the level is also input to the DL.

Power is supplied from highly reliable non-Class 1E instrumentation buses that are backed-up by diesel generators.

Evaluation: While the range is less than required, the instrumentation provided is adequate and sufficient for the intended PAM function.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Quench Tank Pressure (D-15)

Required Range: 0 to design pressure

Category: 3

Existing Design: One (1) instrument loop is provided to measure pressure over a 0 to 25 psig range. The rupture disc pressure is 100 psig.

One (1) indicator is provided on panel C06 and the pressure is also input to the DL.

Power for the loop is supplied from a highly reliable non-Class 1E instrumentation bus that is backed up by a diesel generator.

Evaluation: The instrumentation is not in accordance with the guidelines of RG 1.97.

Position: The range will be increased to 0 to 100 psig.

Imp. Schedule: FCR 84-1088

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Quench Tank Temperature (D-14)

Required Range: 50 to 750 degrees F

Category: 3

Existing Design: One (1) instrument loop is provided to measure temperature with a dual element RTD with a range of 0 to 650 degrees C.

One (1) indicator with a range of 0 to 300 degrees F is provided on panel C06 and the RTD is also input to the DL with a range of 32 to 850 degrees F.

Power for the loop is supplied by a highly reliable non-Class 1E instrumentation bus that is backed up by a diesel generator.

Evaluation: The range is less than required and is not in accordance with the guidelines of RG 1.97. With a rupture disc pressure of 100 psig a maximum saturation temperature of 338 degrees F is possible and the indicator range should cover this.

Position: The indicator will be recalibrated and the scale changed to cover 50 to 350 degrees F.

Imp. Schedule: FCR 84-1088

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Volume Control Tank Level (D-28)

Required Range: Top to bottom

Category: 2

Existing Design: One (1) instrument loop is provided to measure level over a 120 inch range that extends from 21 3/8 inches above the bottom to 26 5/8 inches below the top. This corresponds to 8% to 86% of the tank volume.

One (1) indicator is provided on panel C07 with a range of 0 to 120 inches and the level is also input to the DL.

Power for the loop is supplied by a highly reliable non-Class 1E instrumentation bus that is backed up by a diesel generator.

The harsh environment equipment is not "qualified".

Evaluation: The instrumentation does not meet the guidelines of RG 1.97. However, the volume control tank level indication is only used during normal operation. The RCS let down line and the VCT make-up to the RCS is isolated by control valves in the event of Safety Injection Actuation.

Position: A downgrade to Category 3 indication requirements is appropriate. No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: CVCS Make-up Flow-In (Demin. Water),(D-26)

Required Range: 0 to 110% Design Flow

Category 2

Existing Design: The instrument loop provides control room indication of 0-150 gallons per minute. The design flow is 160 gpm. The percentage flow monitored is 0-94%.

An indicator and a flow recorder are on panel C07 with annunciation and plant computer input.

Power for the loop is provided by reliable non-Class 1E instrumentation bus that is backed up by a diesel generator. The installation is in accordance with BG&E's criteria for non-safety related circuits.

The harsh environment is not "qualified".

Evaluation: The equipment does not meet the guidelines of RG 1.97 for Category 2. However, this equipment is not required for PAM since the make-up flow is isolated to the VCT which in turn is isolated from the RCS in the event of a Safety Injection Actuation. The instrument loop only monitors flow to the VCT not to the RCS.

Position: A downgrade to the Category 3 indication requirements is appropriate. No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: CVCS Make-up Flow In (Boric Acid), (D-26)

Required Range: 0 to 110% Design Flow

Category: 2

Existing Design: One (1) instrument loop is provided to measure boric acid make up flow to the VCT over a range of 0-30 gallons per minute. This corresponds to 0-150% design flow.

One (1) indicator is provided on control room panel C07.

Power for the loop is provided by a reliable non-Class 1E instrumentation bus that is backed up by a diesel generator. The installation is in accordance with BG&E's criteria for non-safety related circuits.

The harsh environment equipment is not "qualified".

Evaluation: The equipment does not meet the guidelines of R.G. 1.97. However, boric acid make-up flow to the VCT is isolated in the event of Safety Injection Actuation. This instrument is only used during normal operation and is not required for PAM.

Position: A downgrade to Category 3 indication requirements is appropriate. No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: CVCS Letdown Flow (D-27)

Required Range: 0-110% Design Flow

Category: 2

Existing Design: One (1) instrument loop is provided to monitor the letdown flow over a range of 0-150 gpm. This corresponds to 0-110% of design flow.

One (1) indicator is provided on control room panel C07 and a plant computer input is also provided.

Power for the loop is provided from a reliable non-Class 1E instrumentation bus that is backed up by a diesel generator. The installation is in accordance with BG&E's criteria for non-safety related circuits.

The harsh environment equipment is not "qualified".

Evaluation: The letdown line flow instrumentation does not meet the guidelines of RG 1.97. However, it is only used for normal plant operation. In the event of Safety Injection Actuation, the letdown line is isolated and this instrument is not required for PAM.

Position: A downgrade to Category 3 indication requirements is appropriate. No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Refueling Water Storage Tank Level (D-8)

Required Range: Top to Bottom

Category: 2

Existing Design: Two (2) separate instrument loops (wide range and narrow range) with indicators are provided. The narrow range covers a span of 444 inches to 468 inches with indication on C08. Indication on C09 is for the wide range which spans 18" above the bottom to 12 " below the top of the tank.

Two computer inputs and 1 Tech Support Center computer input are provided.

Power for both loops is supplied from highly reliable non-Class 1E instrumentation buses and the installation is in accordance with BG&E's criteria for non-safety related circuits.

No equipment is located in a harsh environment.

Evaluation: The instrumentation meets the guidelines for PAM. The narrow range is not necessary for RG 1.97.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Condensate Storage Tank No. 12 Water Level (D-21, A-10)

Required Range: Plant Specific

Category: 1

Existing Design: Two (2) separate and redundant instrument loops provide a continuous monitoring of the level from 12 inches above the bottom of the tank to the top of the tank (a span of 38 feet).

Indicators are provided on panels C04 and C43 for each loop. Additional indication is provided to the Tech Support Center Computer.

Power for each loop is supplied from separate inverter fed, battery backed up class 1E sources. The electrical installation is in accordance with BG&E's criteria for non safety related circuits.

No equipment is located in a harsh environment.

Evaluation: The instrumentation provided is adequate and sufficient for PAM.

Position: The electrical installation will be upgraded to comply with BG&E's criteria for safety related circuits.

Imp. Schedule: FCR 84-1087

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Containment Sump Water Level, Narrow Range (B-12 & C-6)

Required Range: Sump

Category: 2

Existing Design: Two (2) separate instrument loops are provided to measure water level in the containment sump over a 0 to 30 inch range.

One (1) indicator per loop is provided with one loop indicator on C08 and the other on C09.

Power for the loops is provided from separate highly reliable non-Class 1E instrumentation buses that are backed up by diesels. The installation is in accordance with BG&E's criteria for non-safety related circuits.

The harsh environment instruments are not "qualified".

Evaluation: The equipment does not meet the guidelines for Category 2. However, this equipment is used only during normal operation. Post Accident Monitoring of the sump is accomplished by the wide range monitors.

Position: A downgrade to Category 3 indication requirements is appropriate. No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Containment Sump Water Level, Wide Range (B-12 & C-6)

Required Range: Plant Specific

Category: 1

Existing Design: Two (2) separate and redundant instrument loops are provided to measure level from 9 inches above the containment floor to 4 feet above the 600,000 gallon level.

Two (2) indicators are provided on panel C10 , one for each loop with an indicating range of 0 to 120 inches.

Power for the loops is provided from separate inverter fed, battery backed up class 1E sources. The installation is in accordance with BG&E's criteria for safety related circuits.

The harsh environment equipment is "qualified" in accordance with the requirements of 10 CFR 50.49 as applicable.

Evaluation: The instrumentation provided is adequate and sufficient for PAM.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Containment Sump Water Temperature (D-25)

Required Range: 50 to 250 degrees F

Category: 2

Existing Design: No instrumentation exists

Evaluation: The guidelines of RG 1.97 are not met.
However, this variable is not used in the
management of a design basis accident and is not
required for PAM.

Position: No instrumentation is necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: High Level Radioactive Liquid Tank Level (D-31)

Required Range: Top to bottom

Category: 3

Existing Design: The two (2) RC Waste Receiver Tanks and two (2) RC Waste Monitor Tanks are each provided with one (1) instrument loop to measure level over a 0 to 32 ft span. This covers a range from 73 inches above the bottom to 60 inches below the top. This corresponds to 93% of the tank volume.

Indicators with a range of 0-32 ft. are provided for each tank in the MCR on panel C33 plus each level is input to the DL.

Power for each loop is supplied from a highly reliable non-Class 1E instrumentation bus that is backed up by a diesel.

Evaluation: While the range does not meet the guidelines stated in RG 1.97, the instrumentation provided is adequate and sufficient for PAM.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Radioactive Gas Holdup Tank Pressure (D-32)

Required Range: 0 to 150% design pressure

Category: 3

Existing Design: The three (3) holdup tanks and one (1) surge tank that are common to both U1 and U2 are each provided with one (1) instrument loop to measure pressure. Holdup tank pressure is measured over a range of 0 to 150 psig with a design pressure of 150 psi. Holdup tanks relieve to the surge tank at 150 psig, which is measured over a range of 0 to 100 psig with a design pressure of 50 psig.

Indicators are provided on C63 for all tanks and the holdup tank pressures are also input to the DL.

Evaluation: While the range does not meet the guidelines stated in R.G. 1.97, and the only MCR display is via the DL, the instrumentation provided is adequate and sufficient for PAM.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: RCS Hot Leg Water Temperature (A-5 & B-5)

Required Range: 50 to 700 degrees F

Category: 1

Existing Design: Wide range RCS Hot Leg temperature is currently available for display via the Sub-cooled Margin Monitor Display. Narrow range indicators (515 to 615 degrees F) are also provided and one narrow range channel is recorded. In addition, two (2) channels of wide range indicators are available on the auxiliary shut-down panel.

Power for the loops is provided from separate inverter fed battery backed up Class 1E sources. The installation is in accordance with BG&E's criteria for non-safety related circuits.

None of the instrumentation loops are fully qualified.

Evaluation: The instrumentation does not meet the stated guidelines of RG 1.97.

Position: The instrumentation will be added to our EQ program and upgraded where required. In addition, one additional wide range channel will be provided. The existing recorder range is adequate since T cold is being recorded over the wide range.

Imp. Schedule: FCR 84-1086 and 84-1088

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: RCS Cold Leg Temperature (A-6 & B-6)

Required Range: 50 to 700 degrees F

Category: 1

Existing Design: Wide range RCS Cold Leg Temperature (0 to 600 degrees F) is displayed on a digital indicator that receives an auctioneered signal from RPS transducers and also on the Subcooled Margin Monitor. The temperature is also recorded. Power for the loops is provided from separate inverter fed battery backed up Class 1E sources. The installation is in accordance with BG&E's criteria for non-safety related circuits.

None of the instrumentation loops are fully qualified.

Evaluation: The instrumentation does not meet the stated guidelines of RG 1.97.

Position: The instrumentation will be added to our EQ program and upgraded where required.

Imp. Schedule: FCR 84-1086

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Degrees of Subcooling (A-7 and B-10)

Required Range: 200 degrees F subcooling to 35 degrees F superheat

Category: 1

Existing Design: Two (2) redundant instrument loops are provided to determine subcooled margin. Hot and cold leg temperatures are measured over a range of 212 to 705 degrees F and RCS pressure is measured over a range of 15 to 3208 psia. Subcooled margin is calculated over a range of 100 to 0 degrees F of subcooling.

Indicators are provided on panel C05 that display either temperature or pressure margin.

Power for each loop is supplied from separate inverter fed, battery backed up, Class 1E sources. The electrical installation is in accordance with BG&E's criteria for safety related circuits.

The harsh environment equipment with the exception of the temperature transmitters is "qualified" in accordance with the requirements of 10 CFR 50.49 as applicable.

Evaluation: The instrumentation does not meet all of the guidelines for RG 1.97. The range provided, however, is adequate to meet the needs of our EOP's. RCS pressure and temperature indications allow a manual calculation of the saturation margin over a greater range if required.

Position: Harsh environment equipment not covered already will be reviewed and/or upgraded in accordance with the requirements of BG&E's EQ Procedures.

Imp. Schedule: FCR 84-1086

CCBPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Coolant Inventory (B-9)

Required Range: Bottom of hot leg to top of vessel

Category: 1

Existing Design: No provisions currently exist to monitor coolant inventory (level) in the reactor vessel.

Evaluation: No instrumentation exists at Calvert Cliffs Nuclear Power Plant for the PAM of reactor vessel level.

Position: A HJTC reactor vessel level measuring system based on Combustion Engineering generic design will be provided. The RVLMS will be designed to meet the intent of RG 1.97 in accordance with Section 3 of this submittal.

Imp. Schedule: FCR 80-1010

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Core Exit Temperatures (B-8 and C-1)

Required Range: 200 to 2300 degrees F

Category: 1

Existing Design: Core exit temperatures are measured by type K thermocouples included with the forty-five (45) in-core detector assemblies. Temperatures are input to the DL with a range of 32 to 2000 degrees F.

The harsh environment equipment has not been evaluated as part of our EQ program.

Evaluation: The existing instrumentation for the PAM of core exit temperatures does not meet the guidelines of RG 1.97.

Position: We are evaluating the adequacy of the existing ICI design and the adequacy of the existing electrical installation and will upgrade if necessary.

Imp. Schedule: FCR 83-1057

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: RCS Soluble Boron Concentration (B-3)

Required Range: 0 to 6000 ppm

Category: 3

Existing Design: Two (2) systems are provided each with ranges of 0-5000 ppm. One system becomes inoperable after a SIAS since it takes its sample from the letdown line. The other system is the PASS. Indicators are provided on panel C06 for the first system and on panel 2C126 for the PASS system. In addition, a recorder is provided on panel C07 for the first system.

Evaluation: The equipment meets the guidelines of RG 1.97 with the exception of range. The range provided, however, adequately covers the anticipated range of Boron concentration.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Reactor Coolant Pump Status (D-9)

Required Range: Motor Current

Category: 3

Existing Design: The status indication for RCP motor current is provided by one (1) ammeter for each motor covering a range of 0 to 400 amperes with a normal running current of 200 amperes. The indicators are located on panel C06. The instrumentation derives power from the monitored source.

Evaluation: The instrumentation is adequate and sufficient for PAM.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Main Feedwater Flow (D-19)

Required Range: 0 to 110% design flow

Category: 3

Existing Design: One (1) channel per steam generator feedline is provided covering a range of 0 to 6×10^6 lbs/hr.

Indication of Feedwater Flow is provided by an indicator/controller and a recorder for each feedline. In addition both loops are input to the Plant Computer and the Technical Support Center Computer.

Power is provided from inverter fed, battery backed up Class 1E sources. The installation is in accordance with BG&E's criteria for non-safety related circuits.

Evaluation: The instrumentation provided is adequate and sufficient for PAM.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Auxiliary Feedwater Flow (D-20)

Required Range: 0 - 110% design flow

Category: 2

Existing Design: One (1) channel of flow instrumentation per feed-line is provided with a range of 0-750 GPM for the steam driven pumps and 0 to 500 GPM for the motor driven pumps.

Indication is provided by indicator/controllers on the Main Control Panels and by indicators at the Auxiliary Shutdown Panel.

The instruments are powered from inverter fed, battery backed-up class 1E sources. The installation is in accordance with BG&E's criteria for safety related circuits.

None of the instrumentation is located in a harsh environment.

Evaluation: The installed instrumentation is adequate and sufficient for PAM.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: HPSI Flow (D-6)

Required Range: 0 to 110% design flow

Category: 2

Existing Design: Four (4) separate instrument loops are provided, one for each train of safety injection, to measure High Pressure Safety Injection flow. The indicated range is 0 to 300 gpm.

Indication is provided at panels C08 and C09 and all four loops are input to the Technical Support Center Computer.

Power for each loop is supplied from highly reliable non class 1E instrumentation buses that are backed up by diesels. The electrical installation is in accordance with BG&E's criteria for non safety related circuits.

The harsh environment equipment is not "qualified" in accordance with the requirements of 10 CFR 50.49 as applicable.

Evaluation: The instrumentation provided is not in accordance with the guidelines of RG 1.97.

Position: Harsh environment equipment will be evaluated and/or upgraded in accordance with the requirements of BG&E's EQ Procedures.

Imp. Schedule: FCR 84-1086

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Flow in LPSI System (D-7)

Required Range: 0-110% design flow

Category: 2

Existing Design: One (1) instrument loop is provided to measure the total LPSI flow to the RCS over a range of 0-8000 GPM. The two (2) LPSI pumps each have a design capacity of 3000 GPM for a total design capacity of 6000 GPM. In addition, one (1) instrument loop is provided for each of the four (4) RC loop cold leg LPSI feeds over a range of 0-2500 GPM.

Indicators for all five flow measurements are provided on either panel C08 or C09 and all signals are also input to the TSC.

Power for each loop is supplied from highly reliable non-Class 1E instrumentation buses that are backed up by diesels. The electrical installation is in accordance with BG&E's criteria for non-safety related circuits.

The harsh environment equipment is not "qualified" in accordance with the requirements of 10 CFR 50.49 as applicable.

Evaluation: The instrumentation provided is not in accordance with the guidelines of RG 1.97.

Position: Harsh environment equipment will be evaluated and/or upgraded in accordance with the requirements of BG&E's EQ Procedures.

Imp. Schedule: FCR 84-1086

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable:	RHR System Flow/Decay Heat Removal Flow (D-1)
Required Range:	0-110 % design flow
Category:	2
Existing Design:	<p>Decay heat removal is provided by the shutdown cooling system which utilizes the two (2) LPSI pumps and two (2) shutdown cooling heat exchangers.</p> <p>Instrument loops provided for LPSI flow measurement (see Item 37) provide the required flow indications.</p>
Evaluation:	The instrumentation is not in accordance with the guidelines of RG 1.97.
Position:	Harsh environment equipment will be evaluated and/or upgraded in accordance with the requirements of BG&E's EQ Procedures.
Imp. Schedule:	FCR 84-1086

CCNPP Unit 1 & 2
Reg. Guide 1.97, Revision 3

Variable: RHR Heat Exchanger Outlet Temperature (D-2)

Required Range: 40 to 350 degrees F

Category: 2

Existing Design: Decay heat removal is provided by the two (2) shutdown cooling heat exchangers. The outlet temperatures of both exchangers are measured with RTD's with a range of 0-650 degrees C.

Indicators with a scale of 0 to 400 degrees F are provided on panels C08 or C09. Both loops are also input to the TSC.

The instruments are powered by highly reliable non class 1E instrumentation bus that is backed-up by a diesel. The electrical installation is in accordance with BG&E's criteria for non-safety related circuits.

None of the equipment is in a harsh environment.

Evaluation: The instrumentation provided is sufficient and adequate for PAM.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Boric Acid Charging Flow (D-5)

Required Changes: 0-110 % design flow

Category: 2

Existing Design: Boric acid charging flow is provided by three (3) positive displacement charging pumps with design capacities of 44 GPM. Existing flow instrumentation has not operated properly due to pump induced pulsations, and was therefore taken out of service.

Evaluation: The instrumentation provided is not in accordance with the guidelines of RG 1.97.

Position: A means for monitoring charging pump flow will be established.

Imp. Schedule: FCR 83-125

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Neutron Flux (B-1)

Required Range: 10E-6% to 100% full power

Category: 1

Existing Design: Four (4) independent and redundant channels are provided. Each channel has a Wide Range (10E-8% to 150% full power) and a Power Range (0.1% to 125% full power).

Two (2) indicators per channel are provided on panel C05. One (1) indicator is for the Wide Range and the other indicator is for the Power Range.

Power for each loop is supplied from separate Class 1E sources and the electrical installation is in accordance with BG&E's criteria for safety related circuits.

The harsh environment instruments are not "qualified".

Evaluation: The system functionally meets the guidelines of RG 1.97. However, the in-containment equipment is not "qualified".

Position: Upgrading of the harsh environment equipment is being evaluated under a separate FCR. Resolution is pending additional operating experience with the new ex-core detectors installed on the Auxiliary Shutdown Panel.

Imp. Schedule: FCR 82-150

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Control Rod Position (B-2)

Required Range: Full-in or not full-in

Category: 3

Existing Design: Three (3) separate Control Rod Position indicators are provided. The primary indicator is a digital rod position indicator (1 rod per group) which displays rod position in increments of $3/4$ " from full-in to full-out via the plant computer. A bar graph display is provided on the metrascope for all CEA's from full-out to full-in in increments of 2". The third position indication utilized the reed switches to drive a mimic board with four multi-colored indicator lights.

Evaluation: The instrumentation meets the requirements of RG 1.97

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Containment Pressure (A-10, B-13, B-15, C-5 and C-11)

Required Range: -5 psig to three x design pressure

Category: 1

Existing Design: Three (3) instrument loops are provided to measure containment pressure. Only one (1) loop covers the full range required from -5 psig to 150 psig (design pressure is 50 psig)

All three channels are indicated on panel C09 and the -5 to 150 psig channel is also input to the TSC.

Power for the loops is supplied from inverter fed, battery backed-up Class 1E power sources. The electrical installation is in accordance with BG&E's criteria for safety related circuits.

Only the one (1) loop covering -5 to 150 psig has been "qualified" in accordance with the requirements of 10 CFR 50.49.

Evaluation: Only one (1) loop meets the guidelines of R. G. 1.97.

Position: An additional "qualified" containment pressure loop with a range of -5 to 150 psig will be provided.

Imp. Schedule: FCR 84-1086

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Containment Atmosphere Temperature (D-24)

Required Range: 40 degrees F to 400 degrees F

Category: 2

Existing Design: One (1) instrument loop which monitors from 50 degrees F to 300 degrees F. The instrument sensor is located in the containment dome.

Indication is provided on C10 with an indicator range of 50 degrees F - 300 degrees F.

Power for the loop is supplied from highly reliable instrumentation bus that is backed-up by a diesel generator. The electrical installation is in accordance with BG&E's criteria for non-safety related circuits.

The harsh environment equipment is not "qualified" in accordance with the requirements of 10 CFR 50.49 as applicable.

Evaluation: The instrumentation does not meet the required span range of 40 degrees F - 400 degrees F. However, the maximum temperature predicted during a postulated accident is 274 degrees F inside the containment. Therefore, the range of 50 degrees F - 300 degrees F is satisfactory for PAM.

Position: Harsh environment equipment will be evaluated and/or upgraded in accordance with the guidelines of BG&E's EQ Procedures.

Imp. Schedule: FCR 84-1086

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Containment Hydrogen Concentration (C-10)

Required Range: 0 to 10% Volume Hydrogen

Category: 1

Existing Design: Two (2) redundant instrument loops are provided to measure the % volume of hydrogen from 0 to 10%.

Indication is on C10 and is provided via an indicator/recorder.

Power for each loop is supplied from separate Class 1E buses that are backed-up by diesels. The electrical installation is in accordance with BG&E's criteria for safety related circuits.

The harsh environment equipment is "qualified" in accordance with the requirements of 10 CFR 50.49 as applicable.

Evaluation: The instrumentation provided is adequate and sufficient for PAM.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Heat Removal by Containment Fan Heat Rem. System (D-23)

Required Range: Plant Specific

Category: 2

Existing Design: Each fan has its own cooling water flow instrument loop which is used to remove heat.

Flow indicators are provided on C09 to monitor the flow over a range of 0-2500 gpm.

Power for each loop is supplied from highly reliable instrumentation buses that are backed-up by diesels. The electrical installation is in accordance with BG&E's criteria for non-safety related circuits.

The harsh environment equipment is not "qualified".

Evaluation: The instrumentation provided does not meet the guidelines of R.G. 1.97.

Position: The harsh environment equipment will be evaluated and/or upgraded in accordance with the guidelines of BG&E's EQ Procedures.

Imp. Schedule: FCR 84-1086

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Containment Spray Flow (D-22)

Required Range: 0-110% Design Flow

Category: 2

Existing Design: One (1) instrument loop is provided for each Containment Spray header. The instrumentation spans a design flow of 60 to 148%.

Indication is provided on C09 for one spray header and the other header has indication on C08. The indicator range is 0-2000 gpm and the design flow is 1350 gpm.

Power for each loop is supplied from highly reliable instrumentation buses that are backed-up by diesels. The electrical installation is in accordance with BG&E's criteria for non-safety related circuits.

The harsh environment equipment is not "qualified".

Evaluation: The instrumentation provided does not meet the guidelines of R.G. 1.97.

Position: The harsh environment equipment will be evaluated and/or upgraded in accordance with the guidelines of BG&E's EQ Procedures.

Imp. Schedule: FCR 84-1086

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Containment Isolation Valve Position (B-14)

Required Range: Closed-Open

Category: 1

Existing Design: All remotely operated containment isolation valves have remote valve indication. Manual valves are procedurally controlled without remote indication.

The design bases for fluid penetrations which require isolation after an incident are given in section 5.2.2 of the FSAR. Penetrations which require redundant remotely operated valves have redundant indication for that penetration with a position indicator on each valve.

Position indication for remotely operated valves are designed and installed in accordance with the valve's required function and failure mode.

Position switches on valves which have their normal, failed and functionally safety related position different from the other, or change position in the performance of its safety related function are installed in accordance with BG&E's criteria for safety related circuits.

Power for indication of valve position for all isolation in valves (except MOV 6200) is supplied from Class 1E sources. These Class 1E sources are either a 125 volt battery bus or an AC bus backed-up by a diesel. The electrical installation (except for MOV 6200, SV 517, SV 518, SV 519 and SV 5460) for all the valve position indications is in accordance with BG&E's criteria for safety related circuits.

The harsh environment equipment for the safety related position switches is "qualified" in accordance with the requirements of 10 CFR 50.49 as applicable.

Evaluation: The instrumentation provided is adequate and sufficient for PAM.

Position: No changes are necessary

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Component Cooling Water Temp. to ESF (D-29)

Required Range: 40 to 200 degrees F

Category: 2

Existing Design: One (1) instrumentation channel is provided for each of the component cooling heat exchanger outlet lines. These instruments cover a range of 50 degrees F to 200 degrees F. Indicators are provided on panel C13.

Power for each of the loops is supplied by highly reliable non-Class 1E instrumentation buses that are backed-up by diesels. The electrical installation is in accordance with BG&E's criteria for non-safety related circuits.

The equipment was not included in our EQ program.

Evaluation: While the range is slightly less than required, the instrumentation range provided is adequate and sufficient for PAM. The EQ status of equipment must be determined.

Position: Harsh environment equipment will be evaluated and/or upgraded in accordance with the guidelines of our EQ program.

Imp. Schedule: FCR 84-1086

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable:	Component Cooling Water Flow to ESF (D-30)
Required Range:	0 to 110% design flow
Category:	2
Existing Design:	CCNPP does not have any flow indicators for Component Cooling Water flow to the ESF system.
Evaluation:	The instrumentation provided is not in accordance with R.G. 1.97 guidelines.
Position:	The need to monitor CCW flow will be re-evaluated and, if the review indicates that it is necessary, provisions for monitoring flow will be provided.
Imp. Schedule:	FCR 84-1088

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Emergency Ventilation Damper Position (D-33)

Required Range: Open-Closed Status

Category: 2

Existing Design: Three ventilation systems provide filter ventilation in the Auxiliary Building.

The Penetration Room Exhaust Damper Indication is provided by indication on C09 of the damper positioning air solenoid valve energized/de-energized state and the fan motor run condition. Damper position switches also provide input to the plant computer.

The ECCS Exhaust Damper Indication is provided by indication on 1C34 of the damper positioning air solenoid valve energized/de-energized state and the fan motor run condition.

The Fuel Pool Exhaust Damper Indication is provided by indication on 1C34 of the damper positioning air solenoid valve energized/de-energized state and the fan motor run condition.

Evaluation: The indications provided for the ECCS and Fuel Pool Exhaust Dampers do not meet the stated guidelines of RG 1.97.7.

Position: Damper position indication should be added to the ECCS and Fuel Pool Exhaust Dampers.

Imp. Schedule: FCR 84-1088

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Status of Standby Power, etc. (D-34)

Required Range: Voltages, currents, pressures

Category: 2

Existing Design: 4KV Class 1E System:

Each of the 4, 4 KV Class 1E buses have the following instrumentation available in the control room for monitoring purposes.

480V Bus Voltage
4KV Bus Voltage
4KV Bus Potential Indicator
4KV Bus Current
Individual 4KV load Ammeters
480V Bus Potential Indicator

The 4KV Class 1E systems have the following annunciated in the control room:

4KV Bus Main Bkr, Load Center Feeder Bkr.
and DG Feeder Bkr Trip Alarm
4KV Motor Overload Alarm
480V Motor Overload/Undervoltage Alarm

Diesel Generators

Each of the 3 diesel generators have the following instrumentation available in the control room for monitoring purposes:

Varmeter	(2500-0-2500)
Wattmeter	(0-3500 KW)
Ammeter	(0-600 A)
Voltmeter	(0-5.25 KV)
Frequency Meter	(58-62 Hertz)

Each of the 3 diesel generators have the following alarms in the control room:

- Voltage or Frequency Abnormal
- Engine or Exciter Shutdown
- Generator Fault Trip

120 Volt Vital AC System

Each of the 4-120V Vital AC Systems(per unit) have the following instrumentation available in the control room:

- Inverter AC Voltmeter (0-150V)
- Inverter AC Ground Indication
- Inverter Position Switch Indication

Each of the 4-120V Vital AC Systems per unit have the following alarms:

- Inverter AC Undervoltage

Each of the 4 120 volt Vital AC Systems have the following local instrumentation:

- Inverter DC Input Voltmeter
- Inverter AC Output Voltmeter
- Inverter AC Output Ammeter
- Inverter AC Frequency Meter

Each of the 4-120V Vital AC Systems have the following annunciating on the Plant Computer:

- Inverter AC Ground Indication
- Inverter AC Undervoltage

125 Volt Vital DC System

All 4 Class 1E 125 volt DC systems have the following instrumentation available in the control room for monitoring purposes.

- 125 Volt DC Bus Voltage (0-150V)
- 125 Volt Battery Current (1000-0-1000A)
- 125 Volt DC Bus Ground Indication
- Battery Charger Current (0-500A)
- Battery Breaker Open Indication
- 125 Volt DC Panel Potential Indication

The 125 Volt DC Systmes have the following alarms in the control room:

- Battery Breaker Open Alarm
- 125 Volt DC Bus Undervoltage Alarm
- Charger AC Undervoltage Alarm
- Charger DC Undervoltage Alarm
- 125 Volt Panel Undervoltage Alarm

The 125 Volt DC Systems have the following local instrumentation:

- 125 Volt DC Bus Voltage
- 125 Volt Battery Current
- 125 Volt DC Bus Ground Indication
- Battery Charger Current
- Battery Charger Voltage

The 125 Volt DC Systems have the following alarm points also annunciating on the Plant Computer:

- 125 Volt DC Bus Undervoltage
- Charger AC Undervoltage
- Charger DC Undervoltage

The electrical installation of all instrumentation associated with the 125 Volt DC Class 1E System and the 120 Volt AC Class 1E system is in accordance with BG&E's criteria for safety related circuits.

The electrical installation of the 4KV Class 1E system is in accordance with BG&E's criteria for non-safety related circuits (with the exception of individual 4KV load ammeters and Diesel Generator 12 instrumentation).

Evaluation: The instrumentation provided is adequate and sufficient PAM.

Position: The control room instrumentation associated with Diesel Generators 11 and 21 will be upgraded.

The control room instrumentation associated with the 4KV & 480V Class 1E buses will be upgraded.

Imp. Schedule: FCR 84-1091 and FCR 84-1092

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Primary Coolant Rad Monitor (C-2)

Required Range: 1/2 Tech. Spec. limit to 100 times Tech. Spec. limit.

Category: 1

Existing Design: One (1) instrument loop is provided to measure activity over a range of 0 to 10 CPM. One (1) indicator/recorder is provided on panel C07.

Evaluation: The Tech. Spec. limits are 1 $\mu\text{Ci}/\text{gram}$ Dose Equivalent I-131 and 100/ \bar{E} $\mu\text{Ci}/\text{gram}$. Grab samples are taken and analysis to verify Tech. Spec. activity limits. The instrument loop is not used for Tech. Spec. compliance. In addition, this process radiation instrument loop is isolated in the event of Safety Injection Actuation via the RCS Letdown Isolation Control Valves. This instrument loop is only used during operation and for gross activity changes. PAM is accomplished by accident sampling analysis (Item 63).

Power for each loop is supplied by highly reliable non-Class 1E instrumentation buses that are backed-up by diesel generators. The electrical installation is in accordance with BG&E's criteria for non-safety related circuits.

position: A downgrade to Category 3 indication requirements is appropriate. No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable:	Primary Coolant Gamma Spectrum (C-3)
Required Range:	Isotopic Analysis
Category:	3
Existing Design:	One (1) instrument is provided to measure gamma emitting isotopes over a range of 80 KeV to 3 MeV. This instrument is connected to a multi-channel analyzer located in the Chemistry Analysis Lab.
Evaluation:	The instrumentation meets the stated guidelines of RG 1.97.
Position:	No changes are necessary.
Imp. Schedule:	N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Containment Area Radiation - High Range (C-7 & E-1)

Required Range: 1 to 10E+7 R/Hr

Category: 1

Existing Design: Two (2) separate channels of High Range Containment Area Radiation are provided. The displayed range is 1 to 10E+8 R/Hr with an energy response from 0.1 to 3 MeV. The indicators are located in the Main Control Room on panel 2C24B with high level annunciation on the main annunciator system.

Power for each loop is supplied from separate inverter fed, battery backed up Class 1E sources. The electrical installation is in accordance with BG&E's criteria for safety related circuits.

The harsh environment equipment is qualifiable in accordance with the requirements of 10 CFR 50.49 as applicable.

Evaluation: The instrumentation provided is adequate and sufficient for the intended monitoring function.

Position: No changes are required

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Containment Purge Effluent Radioactivity, Auxiliary Building Effluent Radioactivity, Condenser Air Removal System Exhaust Radioactivity and All Other identified Effluent Points Radioactivity (C-8, C-12, C-13, E-3, E-4, E-5, E-6 and E-9).

Required Range: Various - from $10E-6$ to $10E+2$ $\mu\text{Ci/cc}$
to $10E-6$ to $10E+5$ $\mu\text{Ci/cc}$

Category: 2

Existing Design: Airborne process radiation monitors exist for monitoring condenser vacuum pump discharge radiation and ventilation exhaust radiation for certain rooms in the Auxiliary Building. However, in accordance with RG 1.97, Rev. 3 these monitors are not needed for PAM due to the fact that the effluents discharge through the common plant vent. (See variable sheet later for common plant vent monitor).

Evaluation: Individual radiation monitors are not needed since effluents exhaust to a common plant vent that is monitored.

Position: No changes are required

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Common Plant Vent - Noble Gas and Vent Flow Rate (E-7)

Required Range: $10E-6$ $\mu\text{Ci/cc}$ to $10 E+3$ $\mu\text{Ci/cc}$

Category: 2

Existing Design: High range, midrange and low range detectors monitor Main Vent Noble Gas activity in a range from $10E-7$ to $10E+5$ $\mu\text{Ci/cc}$.

Indication is provided for activity and flow on panel 2C24B and activity is recorded on trend recorders on 2C26.

A modification to existing design will re-power each loop from highly reliable instrumentation buses that are backed up by diesels. The electrical installation will be in accordance with BG&E's criteria for non-safety related circuits after the above referenced design change.

The harsh environment equipment is "qualified" in accordance with the requirements of 10 CFR 50.49 as applicable.

Evaluation: This instrumentation is adequate and sufficient for the intended monitoring function.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Area Radiation (E-2)

Required Range: 0.1 to 10E+4 R/Hr

Category: 3

Existing Design: The Area Radiation Monitoring System reads out and records beta-gamma radiation levels in selected areas throughout the plant and alarms (audible and visual) if these levels exceed a preset value or if a detector fails. Indicators with a range of 0.1 mR/hr to 10R/hr are located on Main Control Room panel 1C22.

Evaluation: The range is not within the recommendations of RG 1.97.

Position: The intended function of the Area Radiation Monitoring System is personnel protection and the present range is sufficient for that purpose. The functions of detection of releases, release assessment and surveillance are performed through Health Physics procedures with supplemental information provided by the effluent monitors.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Radiation Monitoring for the Vent from Steam Generator Safety Relief Valves and Atmospheric Dump Valves (E-8)

Required Range: 0.1 $\mu\text{Ci/cc}$ to $10\text{E}+3$ $\mu\text{Ci/cc}$ mass of steam released (E-8)

Category: 2

Existing Design: One detector located adjacent to each steam line upstream from the Relief Valves and Dump Valves monitor steam line activity. The detectors are located in lead shields to prevent interference from background radiation .

Indication with a range of 1R/hr to $10\text{E}+7$ R/hr is provided on Main Control Room panel 2C24B. Correlation curves will allow conversion of the indicator readings in R/hr to $\mu\text{Ci/cc}$.

Power is supplied from inverter from inverter fed, battery backed-up Class 1E sources and the electrical installation in accordance with BG&E's criteria for safety related circuits.

The instrumentation is not environmentally qualified for post accident conditions and was not included in the EQ Program.

Evaluation: Since the only postulated event requiring this equipment is a Steam Generator tube rupture, the instrumentation does not require qualification for steam line break or LOCA.

Position: This equipment is being downgraded to Category 3 and no changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: All identified plant release points (E-10)

Required Range: 0.001 $\mu\text{Ci/cc}$ to 100 $\mu\text{Ci/cc}$

Category: 3

Existing Design: Instrumentation is provided to monitor the Main Vent effluent for radioactive particulates and halogens. The range is $10\text{E}-11$ $\mu\text{Ci/cc}$ to 5×10 $\text{E}-7$ $\mu\text{Ci/cc}$ for particulates. Halogens are sampled and analyzed offline.

Indication is provided on Main Control Room panel C22 and high radiation is alarmed on the annunciator system.

Power is supplied from highly reliable non-Class 1E instrumentation buses that are backed-up by diesels. The electrical installation is in accordance with BG&E's criteria for non-safety related circuits.

Evaluation: The range does not meet the guidelines of RG 1.97. However, it is sufficient for the purpose of monitoring plant releases.

Position: No changes are necessary

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Environ Radiation and Radioactivity (E-11, E12 and E-13)

Required Range: Various

Category: 3

Existing Design: Portable instrumentation and on-site instrumentation exist at CCNPP to measure and analyze samples to meet the general intent of RG 1.97.

Evaluation: The equipment and facilities are adequate and sufficient for PAM.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Wind Direction (E-14)

Required Range: 0 to 360 degrees \pm 5 degrees

Category: 3

Existing Design: Instrumentation is provided to measure wind direction on the meteorological tower at the 60 meter and 10 meter elevations. The range is 0 degrees to 540 degrees \pm 3.6 degrees with a starting threshold of 0.33 meters per second. Indication is provided on Main Control Room panel 1C22G.

Evaluation: The instrumentation provided is adequate and sufficient for the intended monitoring function.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Wind Speed (E-15)

Required Range: 0 to 22 meters per second ± 0.2 mps with starting threshold of less than 0.4 mps.

Category: 3

Existing Design: Instrumentation exists to measure wind speed on the meteorological tower at the 60 meter and 10 meter elevations. The range is 0 to 50 meters per second ± 0.11 meters per second with a starting threshold of 0.33 meters per second. Indication is provided on Main Control Room panel 1C22G.

Evaluation: The instrumentation is adequate and sufficient for the intended monitoring function.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Estimation of Atmospheric Stability (E-16)

Required Range: -5 degrees C to 10 degrees C \pm 0.15 degrees C
per 50 meter intervals.

Category: 3

Existing Design: Instrumentation is provided to measure atmospheric
stability on the meteorological tower. Sensors
mounted at 60 meters and 10 meters have a range of
-30 degrees C to 50 degrees C. Temperatures differ-
ence are displayed in the Main Control Room on panel
1C22G with a range of -3 degrees C to 7 degrees C
 \pm 0.16 degrees C.

Evaluation: The range does not meet the recommendations of
RG 1.97 but the instrumentation is adequate for the
intended monitoring function.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Primary Coolant and Sump - Gross Activity (E-17)

Required Range: 1 $\mu\text{Ci/ml}$ to 10 $\mu\text{Ci/ml}$

Category: 3

Existing Design: Instrumentation is provided to provide both remote indication and grab sample capabilities. This equipment can measure a range of 1 $\mu\text{Ci/ml}$ to 10 Ci/ml . Diluted grab samples can be taken and analyzed in the lab facilities.

Evaluation: Meets the guidelines of RG 1.97.

Position: No changes are required

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable:	Primary Coolant and Sump - Boron Content (E-17)
Required Range:	0-6000 ppm
Category:	3
Existing Design:	One (1) Instrument loop is provided for measuring Post Accident RCS and sump for Boron Concentration. The instrument range is 0-5000 ppm. Indication is on panel 1C126 (Auxiliary Building). In addition, a diluted grab sample can be analyzed in the chemistry lab for Boron Concentration that meets the requirement range of 0-6000 ppm.
Evaluation:	Meets the guidelines of RG 1.97.
Position:	No changes are necessary
Imp. Schedule:	N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Primary Coolant and Sump - Chloride Content (E-17)

Required Range: 0-20 ppm

Category: 3

Existing Design: A diluted grab sample can be obtained for analysis in the chemistry lab.

Evaluation: Adequate for PAM.

Position: No changes are necessary.

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Primary Coolant and Sump - Dissolved Hydrogen (E-17)

Required Range: 0-2000 cc/Kg

Category: 3

Existing Design: One (1) instrument loop with two ranges is provided for measuring Post Accident RCS and Sump for Dissolved Hydrogen concentration. The instrument ranges are 0-10% Volume and 0-100% Volume. Indication is on panel 1C126 (Auxiliary Building). In addition, a total gas sample can be obtained for analysis in the chemistry lab.

Evaluation: Existing equipment is adequate for PAM.

Position: No changes are necessary

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Primary Coolant and Sump - Dissolved Oxygen (E-17)

Required Range: 0-20 ppm

Category: 3

Existing Design: One (1) instrument loop with two ranges is provided for measuring Post Accident RCS and Sump for dissolved Oxygen concentration. The instrument ranges are 0-5% Volume and 0-25% Volume. Indication is on panel 1X126 (Auxiliary Building). In addition, a total gas sample can be obtained for analysis in the chemistry lab.

Evaluation: Existing equipment is adequate for PAM.

Position: No changes are necessary

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Primary Coolant and Sump - pH (E-17)

Required Range: 1 to 13

Category: 3

Existing Design: One (1) instrument loop is provided for measuring Post Accident RCS and Sump for pH. The instrument range is 3 to 12. Indication is on panel 1C126 (Auxiliary Building). In addition, a diluted grab sample can be obtained for analysis in the chemistry lab.

Evaluation: Existing equipment is adequate for PAM.

Position: No changes are necessary

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable: Containment Air - Hydrogen content (E-18)

Required Range: 0-10% Volume

Category: 3

Existing Design: Reference Item 45 (Containment Atmosphere Hydrogen Concentration)

Evaluation: Same equipment as for item 45. Meets requirements of RG 1.97 for category 1 equipment.

Position: No changes are necessary

Imp. Schedule: N/A

CCNPP Units 1 & 2
Reg. Guide 1.97, Revision 3

Variable:	Containment Air - Oxygen Content (E-18) - Gamma Spectrum
Required Range:	0-30%
Category:	3
Existing Design:	A grab sample can be obtained and analyzed in the chemistry lab.
Evaluation:	The instrumentation is adequate for PAM.
Position:	No changes are necessary
Imp. Schedule:	N/A

ATTACHMENT B

R. G. 1.97
INPUT SUMMARY

BALTIMORE GAS AND ELECTRIC COMPANY

DECEMBER 1, 1984

ATTACHMENT B

RG 1.97 INPUT SUMMARY

ITEM	VARIABLE	CAT	DAS	SPDS	TSC	EOF
1	Pressurizer Level	1	*	*	*	*
2	Pressurizer Pressure	1	*5	*	*	*
3	Pressurizer Temperature	3	*			
4	Pressurizer Spray Temp	3	*			
5	Pressurizer Heater Status	2				
6	PRV Position/Flow	2	*			
7	Steam Generator Level	1	*5	*	*5	*5
8	Steam Generator Pressure	1	*	*	*	*
9	Steam Generator Steam Flow	3	*			
10	SIT Level	3				
11	SIT Level	3				
12	SIT Isolation Valve Pos	3				
13	Quench Tank Level	3	*	*		
14	Quench Tank Pressure	3	*	*		
15	Quench Tank Temperature	3	*	*		
16	VCT Level	3	*	*		
17	CVCS Make Up Water	3	*			
18	CVCS Make Up Boric Acid	3	*			
19	CVCS Letdown	3	*			
20	RWT Level	2		*	*	*
21	Condensate Storage Tank Lvl	1			*	*
22	Cntmt Sump Level - NR	3				
23	Cntmt Sump Level - WR	1	*	*	*1	*1
24	Cntmt Sump Water Temp			NOT REQUIRED		
25	HI Radiation Liq. Tank Lvl	3				
26	Radiation Gas Tank Press	3				
27	RCS Temperature (HOT)		*5	*	*5	*5
28	RCS Temperature (COLD)		*5	*	*5	*5
29	Subcooled Margin	1	*	*	*	*
30	Reactor Level Monitoring	1	6	*		
31	Core Exit Thermocouples	1	*	*	*	*
32	RCS Boron Concentration	3	*	*		
33	RCP Status	3		*	*4	*4
34	Main Feedwater Flow	3	*		*	*
35	Auxiliary Feedwater Flow	2		*	*	*
36	HPSI Flow	2		*	*	*
37	LPSI Flow	2		*	*	*
38	Decay Heat Removal Flow	2			*	*
39	Decay Heat Removal Temp	2			*	*
40	Boric Acid Charging Flow	2	*	*	*	*
41	Neutron Flux	1	*	*	*1,3	*1,3
42	CEA Position	3	*			
43	Containment Pressure	1	*	*	*	*
44	Containment Temperature	2	*5	*	*1	*1
45	Cntmt Hydrogen Concentration	1	*	*	*2	*2

ATTACHMENT B (Cont.)

ITEM	VARIABLE	CAT	DAS	SPDS	TSC	EOF
46	Cntmt Heat Removal	2		*		
47	Cntmt Spray Flow	2		*	*	*
48	Cntmt Isol. Valve Position	1		*		
49	Comp Cooling Wtr to ESF (Temperature)	1				
50	Comp Cooling Wtr Flow to ESF	2				
51	Emergency Vent Damper Pos.	2	*	*		
52	Status of Standby Power	2		*		
53	RCS Radiation	1	*			
54	RCS Radiation Gamma	3				
55	Cntmt Area Radiation	1	*	*	* 1	* 1
56	Condenser Offgas Radiation	2	*	*	* 1	* 1
57	Main Vent Radiation/Flow	2	*	*	* 1	* 1
58	Area Radiation	3		*		
59	Rad Monitor Safety RV's & Dump Atmo phere	3		*		
60	Airborne Radition	3		*		
61	Plant & Environment Rad.	3		*		
62	Meteorology	3	*		* 1	* 1
63	Accident Sample Anlaysis	3				

NOTE 1: Scheduled to be added with FCR 83-1029 & 82-1000

NOTE 2: Only the Cntmt Dome Sample is Monitored

NOTE 3: Only Thermal Power is currently given

NOTE 4: RCP status is given by RCS Flow

NOTE 5: Same parameter is being measured but not by the same
instrument loop as evaluated in RG 1.97

NOTE 6: Scheduled to be added with FCR 80-1010