Omaha Public Power District
1623 Harney Omaha, Nebraska 68102-2247
402/536-4000

October 21, 1986
LIC-86-532

Mr. D. E. Sells, NRC Project Manager
PWR Project Directorate #8
Division of PWR Licensing - B
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

References:
1. Docket No. 50-285
2. Letter NRC (D. E. Sells) to OPPD (R. L. Andrews) dated June 18, 1986
3. Letter OPPD (R. L. Andrews) to NRC (D. E. Sells) dated July 8, 1986 (LIC-86-328)
4. Letter OPPD (R. L. Andrews) to NRC (D. E. Sells) dated April 1, 1985 (LIC-85-117)

Dear Mr. Sells:

Conformance to Regulatory Guide 1.97, Revision 2

Omaha Public Power District received Reference 1 regarding your review of OPPD's response to Generic Letter 82-33 forwarded by Reference 4. Included in Reference 2 was a request for additional information regarding certain items related to exceptions taken to Regulatory Guide 1.97, Revision 2.

Forwarded herewith is Revision 1 to OPPD's response to Generic Letter 82-33 which provides the additional information requested. A table is provided in Attachment 2 which summaries your comments and OPPD's response.

In addition to the specific information requested, Revision 1 also provides other revised information pertaining to the conformance of Fort Calhoun Station to the provisions of Regulatory Guide 1.97, Revision 2. Attachment 1 lists the page reference and summary of changes included in Revision 1. If you have any questions, please contact us.

Sincerely,

R. L. Andrews
Division Manager
Nuclear Production

RLA/me

cc: LeBoeuf, Lamb, Leiby & MacRae
1333 New Hampshire Ave., N.W.
Washington, DC 20036
Mr. P. H. Harrell, NRC Senior Resident Inspector

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ATTACHMENT 1
LIST OF CHANGES

FORT CALHOUN STATION
REGULATORY GUIDE 1.97, REV. 2
RESPONSE, REVISION 1

Page 2	Changed 5.0 to Include Status
Page 4	Editorial Correction
Page 5	Update Section 2.3.2.2a to Reflect Update of Electrical Equipment Qualification Program
Page 8	Update A.3., OPPD Position to Reflect New Inverters and Battery Chargers
Page 20	Change 5.0 Title to Include Status
Page 20	Added EOP Abbreviation and Define SPDS Term
Page 21	Update 5.1.2 to Include ATWS Transmitter Modification
Page 22	Continued 5.1.2 Update Changed Subcooled Margin Monitor to Reflect SPDS Only Added Discussion on Subcooling and ATWS to 5.1.3
Page 23	Changes 5.1.3 Summary to Reflect SPDS Being Operable
Page 25	Revised 5.4.1 to Provide Additional Information Concerning Accumulator Tank Level and Pressure
Page 26	Continued Revision of 5.4.1 from Page 25
Page 27	Change 5.4.3 to Reflect Proposed Addition Versus Upgrade Added Units to "200 RDT" in 5.4.4 Revised 5.4.5 to Reflect Addition Versus Upgrade
Page 28	Deleted Exception Taken to Containment Sump Water Temperature Changed 5.4.7 to 5.4.6 Change 5.4.8 to 5.4.7
Page 29	Changed 5.4.8 to 5.4.7 Changed 5.4.9 to 5.4.8 Changed 5.4.10 to 5.4.9
Page 30	Changed 5.4.10 to 5.4.9

Page 31	Added 5.4.10 to Discuss Component Cooling Water Temperature Added 5.4.11 to Discuss Component Cooling Water Flow Added Section 5.5 Type E Variables Added Revised Meteorology Commitment
Page 32	Updated 6.1.1 to Show Complete Updated 6.1.2 to Show Complete Updated 6.1.3 to Show Installed Updated 6.1.4 to Reflect ATWS Updated 6.2.1 to Clarify Category and Equipment Addition Updated 6.2.3 to Reflect Proposed New Channels Move 6.2.5 to Page 33
Page 33	Moved 6.2.5 from Page 32 Added 6.2.6 Sump Temperature Schedule Added 6.3 Type E Variables Added 6.3.1 Meteorological Schedule
Table 1, Page 1	Updated II.2 to Reflect ATWS Updated II.3 to Reflect QSPDS/SPDS
Table 1, Page 2	Updated III.1 to Reflect New RTDs Updated III.2 to Reflect New RTDs Updated III.3 to Reflect Qualified CETs
Table 1, Page 20	Updated VII.3 to Reflect New Channels to be Installed Updated VII.4 to Reflect Installation Schedule Updated VIII.2,3 Changed Reference Number
Table 1, Page 21	Updated IV.1 and IV.2 to Provide Additional Discussion
Table 1, Page 21	X.2 Changed Reference Number
Table 1, Page 25	Updated Meteorology V.1 and V.2 to Reflect Calibration Revision Required
Table 1, Page 26	Updated V.3 to Reflect Calibration Revision Required
Table 1, Page 28	Updated VI.B.2 to Reflect SER

ATTACHMENT 2

VARIABLE	EXCEPTION TAKEN BY OPPD Revision 0	RESPONSE SUMMARY Revision 1
1. Accumulator (Safety Injection) Tank Level and Pressure	Tank status is not required for safe shutdown from a DBA.	Additional justification for not including these variables is provided.
2. Containment Sump Water Temperature	Sump temperature is not a permissive for RAS. Sump temperature can be inferred from CET's.	Recommend adding a single channel of measurement qualified to 10 CFR 50.49 and IEEE 344-1975 during the 1988 refueling outage.
3. Component Cooling Water Flow to ESF System	Transmitter is in a mild environment for at least the first 20 minutes of a DBA. This is considered adequate to establish proper system operation.	Provide additional justification for the use of alternate means of measurement which is environmentally qualified or is in a mild environment.
4. Component Cooling Water Temperature	TE-2800 is in a mild environment for at least the first 20 minutes of a DBA. This is considered adequate to establish proper system operation.	Provide justification for an alternate means of measuring these temperatures. Variables are located in a mild environment.
5. Wind Direction	OPPD submitted an accuracy of ±5.4°, required is ±5°.	Establish a calibration procedure to insure ±5° uncertainty limit. This will require an uncertainty analysis as defined in Regulatory Guide 1.23. Please note this analysis will have to be completed for wind speed and atmospheric stability (T) as well.

REVISION 1

FORT CALHOUN STATION

REGULATORY GUIDE 1.97, REV 2

RESPONSE

CQE

OBJECTIVE

The objectives of this review are to:

I. Provide additional information on certain Reg. Guide 1.97 variables which the NRC has taken issue with the District's request for exemptions (see Reference a and Table 1, attached).

II. Determine an installation schedule if the review conducted in Item 1 indicates hardware should be added.

III. Update the Reg. Guide 1.97 submittal to reflect Items 1 and 2 and those modifications which have been completed since the April 1, 1985 submittal date (see Reference b for original submittal).

METHOD

I. Each variable will be reviewed for its:

a. Requirement in the EOP's

b. Alternate indication available to support correct system performance, and availability of alternate indication to derive the variable in question.

c. Each section will contain a conclusion section.

II. Variables requiring hardware installation:

a. Assess if it is an online or outage modification.

b. Recommend inclusion in the 1987 outage or online list or the 1988 outage list.

III. Update of the Reg. Guide 1.97 submittal will be completed by:

a. Review of the Reg. Guide 1.97 submittal and update to reflect I and II, (Reference 2).

b. Review of the MR files and related SER's.

REFERENCES:

a. Letter D. E. Sells to R. L. Andrews, dated June 18, 1986, "Conformance to Regulatory Guide 1.97, Revision 2."

b. LIC-85-117, dated April 1, 1985, "Reg. Guide 1.97 Compliance".

c. EOP-01, Reactor Trip

d. EOP-03, Loss of Coolant Accident

e. EOP-05, Uncontrolled Heat Extraction

f. EOP-20, Functional Recovery Procedure

g. OI-RC-4, OI-RC-11, OP-7, OP-8

h. USAR Section 6

i. 11405-M-10

j. TS-FC-86-121P

k. Pass SER's dated 1/1/83 and 9/1/83

l. Meteorological calibration procedures:

6272, 6273, 6274, 6275, 6276, 6277, 6278, 6279, 6280, 6281, 6282, 6283, 6284, 6285

m. Hot and cold leg temperature calibration procedures:

B/112C, B/112H

n. Reg. Guide 1.23, "Meteorology"

o. GSE Task FC-75-21, "110M Weather Tower"

p. 15381-ICE-3219 Rev. 3, "QSPDS Data Base Description"

q. Rosemount drawing 104MA

r. CP493, 494, 495, 496

s. MR-FC-84-140, MR-FC-81-99

REVIEW

Review the five Reg. Guide 1.97, Revision 2 variables listed in Section 4 of Reference a. to determine what additional justification is available to support the exemption request, or what other action (including hardware upgrade) should be taken.

I. Accumulator Tank (SI tank) Pressure and Level

a. EOP requirement:

A review of EOP - 1, 3, 5 and 20 (References c, d, e, f) indicate that no specific information on the SI tanks is required. The only reference to SI tank pressure in the EOP is by reference to the cold (normal cooldown) shutdown procedure OI-RC-4 in which the tanks are isolated at less than 400 psia prior to going below SI tank pressure in the RCS. The 400 psia can be determined by RCS instrumentation, which precludes the need for SI tank information in the EOP's.

b. Alternate indication to support correct system performance or indicate the variable in question

The SI tanks are passive in nature in that no operator or automatic action via any active component (air or electric powered) is required, nor could any be expected to be used in insuring the SI tank inventory is used in DBA function. With this criteria there is no specific confirmatory action for the SI tank, nor is there any criteria to determine proper function of the SI tanks based on SI tank parameters.

Proper tank performance is concluded based on the reactor parameters of cooling (CET's and/or RTD's) and RCS inventory. This is considered adequate since these are the EOP goals.

c. Conclusion:

Based on the above discussion, no further action is required. The SI tank level and pressure instruments do not require upgrading.

II. Containment sump water temperature

a. EOP requirement:

A review of EOP 1, 3, 5, and 20 (References c, d, e, f) indicates no requirement for the sump temperature. The only reference to a sump temperature requirement is in the USAR Section 6.2.5. The ESF system performs adequately to insure the NPSH of the SI pumps is adequate for recirculation actuation (USAR Section 6.2.6 Reference 8).

b. Alternate indication to support correct system performance or indicate the variable in question

There is no action the operator can take (above automatic actuation of the ESF system) to insure SI pump NPSH, thus additional indication would not be beneficial.

There is no alternate method of determining the sump temperature. In the case of a LOCA it can be inferred from RCS temperature many hours into the DBA but inaccurately due to the containment cooling, and becomes more inaccurate with reduced break size.

In the event of a MSLB there is no way of determining the sump temperature.

c. Conclusion:

A Category 2 instrument per Regulatory Guide 1.97 should be added to assist in overall system performance evaluation.

III. Component cooling water flow to ESF system

a. EOP requirements:

EOP - 1, 3, 5, and 20 safety function status check require pump running verification.

b. Availability of alternate indication to determine system performance and alternate variable indication.

The CCW system operation can be confirmed by motor current (which is proportional to flow), direct reading containment cooling unit discharge flows, (F416, F417, F418, F419) and CCW system valve position indication.

c. Conclusion:

The alternate indication available provide ample system performance indication. It should also be noted that the raw water system is provided as a fully redundant system to the CCW system. This system is provided with adequate flow indication (F-2890 and F2891).

No further instrumentation is required.

IV. Component cooling water temperature

a. EOP requirement:

EOP - 1, 3, 5, and 20 do not require CCW temperature monitoring.

b. Alternate indication to support correct system performance, and availability of alternate indication.

T-493, T-494, T-495, and T-496 provide heat exchanger outlet temperature to CCW pump suction, T-2800 is provided for CCW pump discharge temperature. These are considered equivalent in monitoring CCW system performance.

The four temperatures are located in a mild environment and are considered CQE.

c. Conclusion:

TE-493, TE-494, TE-495, and TE-496 should be substituted as the category 2 variables. No other action is required.

V. Wind Direction

a. EOP requirement:

This variable is required for the EPIP dose assessment.

b. Alternate indication available to support system performance and alternate variable indication.

The Omaha NOAA weather station serves as a backup source of information.

It should be noted that according to specification of GSE Task FC-75-21 (110M Weather Tower) the instruments are designed to meet the Reg. Guide 1.23 accuracy of $\pm 5°$.

c. Conclusion:

All wind speed, wind direction, and differential temperature require an analysis and calibration uncertainty determination to meet Regulatory Guide 1.97 and 1.23 uncertainties.

VI. Replacement schedule

Containment Sump Water Temperature

The addition of this sensor will require a refueling outage for installation and will include a cable installation from the Control Room to the containment. Based on the outage installation requirements, installation should be completed in the 1988 refueling outage.

Wind Direction

An uncertainty analysis in compliance with Reg. Guide 1.23 is required. The next scheduled time for calibration is the spring of 1987 six month calibration. Please note, all meteorological instruments must have the uncertainty analysis completed.

VII. Regulatory Guide 1.97 Submittal Update to Reflect Completed Construction

A. Reactor Coolant Pressure (Cat. 1)

Based on the ATWS event analysis, the expected peak RCS pressure resulting for a Diverse Scram System trip is 2600 psia. A transmitter range of 1900 to 2900 psia is being installed during the 1987 refueling outage. This is considered acceptable as stated in the NRC letter (Reference a).

B. Reactor Coolant System Hot and Cold Leg Temperature; Subcooled Margin Monitor (Cat. 1).

The hot and cold leg RTD's have been replaced per MR-FC-84-140. Subcooling is calculated by the QSPDS, which was installed per MR-FC-81-99.

Temperature ranges were revised from the proposed 0°F-750°F to 50°F-700°F which is in conformance to Reg. Guide 1.97 requirements. Subcooling is calculated using the wide range pressure channels (0 to 2500 psia). It should be noted that the ATWS event pressure channels (1900 - 2900 psia) are not considered to be required for subcooling calculations. The ATWS event is an overpressure event in which subcooling is not of prime concern.

C. Vessel Level Monitoring (Cat. 1)

The vessel level system has been installed and is functional. The District has not yet received an SER from the NRC.

D. Containment Atmosphere Temperature (Cat. 2)

The containment ventilation fan inlet temperatures as proposed in the Reg. Guide 1.97 compliance letter (Reference b) are not considered to be adequate to provide a representative temperature for containment, see Reference j. A multisensor system monitoring temperature at various levels of containment is proposed.

E. Primary coolant oxygen content

This variable is not required per SER's (Reference k) transmitted to the District.

TABLE 1

	VARIABLE	EXCEPTION TAKEN BY OPPD
1.	Accumulator (safety injection) Tank Level and Pressure	Tank status is not required for safe shutdown from a DBA.
2.	Containment Sump Water Temperature.	Sump temperature is not a permissive for RAS. Sump temperature can be inferred from the CET's.
3.	Component Cooling Water Flow to ESF System.	Transmitter is in a mild environment for at least the first 20 minutes of a DBA. This is considered adequate to establish proper system operation.
4.	Component Cooling Water Temperature.	TE-2800 is in a mild environment for at least the first 20 minutes of a DBA. This is considered adequate to establish proper system operation.
5.	Wind Direction	OPPD submitted an accuracy of $\pm 5.4°$, required is $\pm 5°$.

FORT CALHOUN STATION
REGULATORY GUIDE 1.97, Rev. 2 RESPONSE

ES-84-07

OCTOBER 1986

Rev. 1

CONTENTS

1.0 PURPOSE

1.1 INTRODUCTION

NUREG-0737, Supplement 1 (Ref. 7.1) required utilities to review compliance with Reg. Guide 1.97, Rev. 2, dated December 1980, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," and to identify instrumentation necessary to monitor plant variables and systems following an accident. In response to these requirements, the District submitted a plan and a schedule for performance of Reg. Guide 1.97, Rev. 2 review (Ref. 7.2). The purpose of this report is to summarize the evaluation of applicable existing instrumentation at the Fort Calhoun Station against the criteria of Reg. Guide 1.97, Rev. 2. The evaluation was intended to determine compliance, compliance with exceptions, or non-compliance with the criteria of Reg. Guide 1.97, Rev. 2. Based upon this evaluation, several upgrades are planned for the accident monitoring instrumentation at the Fort Calhoun Station to comply with the requirements of Reg. Guide 1.97, Rev. 2. A schedule for implementation of these upgrades is included in Section 6.0 of this report.

2.0 CRITERIA

2.1 GENERAL

2.1.1 The following sections describe the specific criteria utilized by OPPD in evaluating the accident monitoring instrumentation at the Fort Calhoun Station.

2.2 IDENTIFICATION OF VARIABLES

2.2.1 PWR Variables Per Reg. Guide 1.97, Rev. 2

The following are definitions of variables investigated in this study, quoted directly from Reg. Guide 1.97, Rev. 2:

A. Type A

Those variables to be monitored that provide the primary information required to permit the control room operators to take the specified manually controlled actions for which no automatic control is provided and that are required for safety systems to accomplish their safety functions for design basis accident events.

Primary information is information that is essential for the direct accomplishment of the specified safety functions; it does not include those variables that are associated with contingency actions that may also be identified in written procedures.

A variable included as a Type B, C, D or E does not preclude that variable from also being included as Type A.

B. Type B

...those variables that provide information to indicate whether, plant safety functions are being accomplished. Plant safety functions are (1) reactivity control, (2) core cooling, (3) maintaining reactor coolant system integrity, and (4) maintaining containment integrity (including radioactive effluent control). Variables are listed with designated ranges and category for design and qualification requirements. Key variables are indicated by design and qualification Category 1.

C. Type C

Those variables that provide information to indicate the potential for being breached or the actual breach of the barriers to fission product releases. The barriers are (1) fuel cladding, (2) primary coolant pressure boundary, and (3) containment.

D. Type D

Those variables that provide information to indicate the operation of individual safety systems and other systems important to safety. These variables are to help the operator make appropriate decisions in using the individual systems important to safety in mitigating the consequences of an accident.

E. Type E

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

2.3 Design and Qualification Criteria (Reg. Guide 1.97, Rev. 2)

2.3.1 Each licensee must identify the different types of instrumentation, explain their function and show that this instrumentation is within the Reg. Guide 1.97, Rev. 2 parameters. To accomplish this, each individual variable was assigned a Design and Qualification Criteria Category that outlines the specific requirements that each variable is to meet. The Design and Qualification requirements applicable to these categories are discussed in Section 2.3.3 below.

2.3.2 Clarifications and Revisions to NRC Reg. Guide 1.97, Rev. 2 requirements.

2.3.2.1 Fort Calhoun Unit 1 was operating at the time Regulatory Guide 1.97, Rev. 2, was issued. Accordingly Fort Calhoun is required to meet the provisions of NUREG-0737 and the Commission Memorandum and Order (CLI-80-21) instead of Reg. Guide 1.97 for those items addressed by NUREG-0737.

2.3.2.2 Subsequent to issuance of Reg. Guide 1.97, Rev. 2, the staff has issued several clarifications and revisions, amending the applicability and requirements of the Reg. Guide. A summary of these changes as they apply to Fort Calhoun Unit 1 is provided below.

a. NUREG-0737 Supplement #1 stated that it was acceptable to rely on currently installed equipment if it would measure over the range indicated in Reg. Guide 1.97 (Rev. 2) even if the equipment was presently not environmentally qualified. Environmental qualification requirements were codified in 10 CFR 50.49. Based on the date of the Fort Calhoun Operating License, these requirements are as specified in the DOR guidelines. Accordingly it is our interpretation that the environmental qualification requirements of Reg. Guide 1.97 have been superseded by 10 CFR 50.49. Items referenced in Table 1 as being qualified to 10 CFR 50.49 have been included in the District's EEQ program. Δ

b. During regional briefings the staff clarified that QA requirements for existing instrumentation shall be better than or consistent with the QA requirements as they applied at the time of issuance of construction permit (instead of Regulatory Guide 1.97 requirements).

2.3.3 The Design and Qualification requirements applicable to various categories defined in Reg. Guide 1.97, Rev. 2 are as follows. The District's position on each specification follows the Reg. Guide's category requirements for the respective specification.

A. CATEGORY 1

1. EQUIPMENT QUALIFICATION

Reg. Guide Requirements

The instrumentation should be qualified in accordance with Reg. Guide 1.89, "Qualification of Class 1E Equipment for Nuclear Power Plants," and the methodology described in NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment." Qualification applies to the complete instrumentation channel from sensor to display where the display is a direct-indicating meter or recording device. Where the instrumentation channel signal is to be used in a computer-based display, recording, and/or diagnostic program, qualification applies from the sensor to and includes the channel isolation device. The location of the isolation device should be such that it would be accessible for maintenance during accident conditions. The seismic portion of qualification should be in accordance with Reg. Guide 1.100, "Seismic Qualification of Electrical Equipment for Nuclear Power Plants," Instrumentation should continue to read within the required accuracy following, but not necessarily during, a safe shutdown earthquake.

Instrumentation whose ranges are required to extend beyond those ranges calculated in the most severe design basis accident event for a given variable should be qualified using the guidance provided in paragraph 6.3.6 of ANS-4.5.

DISTRICT'S POSITION

Environmental Qualification

As discussed in Section 2.3.2, the environmental qualification criteria outlined in the Reg. Guide has been superseded by 10 CFR 50.49 for Categories 1 and 2. Compliance with 10 CFR 50.49 ruling is therefore considered adequate to meet the environmental qualification requirements of Reg. Guide 1.97 Category 1 (and 2) instrumentation. For Category 1 variables, the sensors and/or transmitters which are located in a harsh environment have been or will be replaced to comply with 10 CFR 50.49 requirements. However, the remaining components of these instrument loops (such as indicators, power supplies, etc.) are located in a mild environment, were not required to be qualified to 10 CFR 50.49 requirements and were not replaced. These components were analyzed/tested per the requirements applicable at the time of issue of construction permit.

A. CATEGORY 1 (Continued)

Seismic Qualification

Reg. Guide 1.97, Rev. 2 requires certain post-accident monitoring instrumentation to be qualified to Reg. Guide 1.100. The District has complied with this requirement (where applicable) on post-accident monitoring instrumentation installed per NUREG 0737 requirements (such as containment hydrogen analyzers, containment high-range radiation monitors, etc.) However, the majority of the post-accident monitoring instrumentation was installed during initial construction and was not upgraded. The seismic qualification issue is also being addressed by the Commission through other means such as unresolved safety issue G-46. Pending final resolution of this issue, the District believes that the seismic qualification requirements applicable at the time of issuance of the construction permit are adequate to meet the intent of Reg. Guide 1.97. Seismic qualification of electrical components is discussed in the Fort Calhoun USAR, Appendix F. Requalification or replacement of these components to latest requirements would not significantly improve plant safety. The District, therefore, takes exceptions to upgrading the existing instrumentation to comply with Reg. Guide 1.100 requirements.

In summary, the seismic requirements of Reg. Guide 1.97, Rev. 2 have been applied to post-accident instrumentation installed because of the requirements of NUREG-0737 and instrumentation upgraded per 10 CFR 50.49. These requirements (where applicable) will also be applied to future upgrades. However, the existing instrumentation which was not upgraded per NUREG-0737 or 10 CFR 50.49, complies with the requirements applicable at the time of issuance of the construction permit. This is considered adequate to meet the intent of Reg. Guide 1.97, Rev. 2.

2. REDUNDANCY

Reg. Guide Requirements

No single failure within either the accident-monitoring instrumentation, its auxiliary supporting features, or its power sources concurrent with the failures that are a condition or result of a specific accident should prevent the operators from being presented the information necessary for them to determine the safety status of the plant and to bring the plant to and maintain it in a safe condition following that accident. Where failure of one accident monitoring channel results in information ambiguity (that is, the redundant displays disagree) that could lead operators to defeat or fail to accomplish a required safety function, additional information should be provided to allow the operators to deduce the actual conditions in the plant. This may

2. REDUNDANCY (Continued)

Reg. Guide Requirements (Continued)
be accomplished by providing additional independent channels of information of the same variable (addition of an identical channel) or by providing an independent channel to monitor a different variable that bears a known relationship to the multiple channels (addition of a diverse channel.) Redundant or diverse channels should be electrically independent and physically separated from each other and from equipment not classified important to safety in accordance with Regulatory Guide 1.75, "Physical Independence of Electric Systems," up to and including any isolation device. At least one channel should be displayed on a direct-indicating or recording device. (Note: Within each redundant division of a safety system, redundant monitoring channels are not needed except for steam generator level instrumentation in two-loop plants.)

DISTRICT'S POSITION

The District has reviewed the redundancy requirements of Reg. Guide 1.97, Rev. 2. The majority of the Category 1 variable monitoring instrumentation at the Fort Calhoun Station is comprised of four completely independent channels. Only a few cases have been noted in which two completely independent channels are available. In these cases we believe there is sufficient diversity among the instrumentation systems currently available so that information ambiguity will not be caused by a failure of any single channel. The District believes that the use of two completely independent channels meets the intent of Category 1 redundancy requirements and thus it has been noted in Table 1 that these loops are in compliance with the Reg. Guide.

3. POWER SOURCE

Reg. Guide Requirements

The instrumentation should be energized from station Standby Power sources as provided in Regulatory Guide 1.32, "Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants," and should be backed up by batteries where momentary interruption is not tolerable.

DISTRICT'S POSITION

The instrumentation which is identified as being powered from a Class 1E power supply in Table 1 is energized from the station standby power sources and is backed up by batteries. However, the power distribution system was designed and installed in accordance with the requirements that applied at the time of issuance of the construction permit (Ref. USAR Section 8) rather than those of Reg. Guide 1.32. Note that during the 1985 refueling outage the station's battery chargers and inverters were replaced with "equal to or better than" equipment. The USAR Section 8 criteria is still considered valid.

4. CHANNEL AVAILABILITY

Reg. Guide Requirements

The instrumentation channel should be available prior to an accident except as provided in paragraph 4.11, "Exemption", as defined in IEEE Standard 279 or as specified in the Technical Specifications.

DISTRICT'S POSITION

No exception is taken to this criteria. The availability of vital instrumentation is governed by the Fort Calhoun Technical Specification requirements. This criterion is not specifically headlined in Table 1 since the District is in compliance with this criteria.

5. QUALITY ASSURANCE

Reg. Guide Requirements

The recommendations of the following regulatory guides pertaining to quality assurance should be followed:

Regulatory Guide 1.28	"Quality Assurance Program Requirements (Design and Construction)"
Regulatory Guide 1.30	"Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment"
Regulatory Guide 1.38	"Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants"
Regulatory Guide 1.58	"Qualification of Nuclear Power Plant Inspection, Examination, and Testing Personnel"
Regulatory Guide 1.64	"Quality Assurance Requirements for the Design of Nuclear Power Plants"
Regulatory Guide 1.74	"Quality Assurance Terms and Definitions"
Regulatory Guide 1.88	"Collection, Storage, and Maintenance of Nuclear Power Plant Quality Assurance Records"
Regulatory Guide 1.123	"Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants"

Reg. Guide Requirements (Continued)

Regulatory Guide 1.144	"Auditing of Quality Assurance Programs for Nuclear Power Plants"
Regulatory Guide 1.146	"Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants"

Reference to the above regulatory guides (except Regulatory Guide 1.30 and 1.38) is being made pending issuance of a regulatory guide (Task RS 002-5) that is under development and will endorse ANSI/ASME NQA-1-1979, "Quality Assurance Program Requirements for Nuclear Power Plants."

DISTRICT'S POSITION

As discussed before, it was clarified during regional meetings that the QA requirements for existing instrumentation shall be better than or consistent with the QA requirements as they applied at the time of issuance of the construction permit rather than Reg. Guide 1.97 requirements. Additionally, NUREG-0737 contained certain QA requirements of its own. The District's position on the various QA requirements applicable to Fort Calhoun Unit 1 is delineated in the Fort Calhoun QA program as described in the Fort Calhoun USAR (Appendix A), and the Quality Assurance Plan.

Nuclear Safety Related components and services which fall within the scope of 10 CFR 50 Appendix B and 10 CFR 50.49 are classified as CQE (Critical Quality Elements). CQE components are procured and maintained in accordance with the District's QA plan. Unless otherwise noted in Table 1, Category 1 and 2 instrumentation falls with the definition of CQE and is procured and maintained in accordance with the applicable requirements.

The District believes that compliance with the requirements as outlined in our Quality Assurance Plan is adequate to meet the intent of Reg. Guide 1.97 Rev. 2. We therefore take exception to meeting the QA requirements as detailed in Reg. Guide 1.97.

6. DISPLAY

Reg. Guide Requirements

Continuous indication (it may be by recording) display should be provided. Where two or more instruments are needed to cover a particular range, overlapping of instrument span should be provided.

DISTRICT'S POSITION

The District, while taking no exception to this requirement, would like to clarify that the displays available on demand on the Safety Parameter Display System (SPDS) are considered continuous displays.

7. RECORDING

Reg. Guide Requirements

Recording of instrumentation readout information should be provided. Where direct and immediate trend or transient information is essential for operator information or action, the recording should be continuously available on dedicated recorders. Otherwise, it may be continuously updated, stored in computer memory, and displayed on demand. Intermittent displays such as data loggers and scanning recorders may be used if no significant transient response information is likely to be lost by such devices.

DISTRICT'S POSITION

Recording capabilities are noted in Table 1.

B. CATEGORY 2

1. EQUIPMENT QUALIFICATION

Reg. Guide Requirements

The instrumentation should be qualified in accordance with Regulatory Guide 1.89 and the methodology described in NUREG-0588. Seismic qualification according to the provisions of Regulatory Guide 1.100 may be needed provided the instrumentation is part of a safety-related system. Where the channel signal is to be processed or displayed on demand, qualification applies from the sensor through the isolator/ input buffer. The location of the isolation device should be such that it would be accessible for maintenance during accident conditions.

DISTRICT'S POSITION

The District's position on equipment qualification for Category 2 requirements is the same as that discussed in Section 2.3.3.A.1 for Category 1 instrumentation. For Category 2 instrumentation located in a mild environment it is noted that the requirements of 10 CFR 50.49, (environmental qualification) are not applicable.

No specific seismic qualification requirements were referenced in Reg. Guide for Category 2. However, there are several systems used for accident monitoring which have transmitters that are seismically qualified to IEEE-344-1975. If qualified to the standard, it is so noted.

2. REDUNDANCY

Reg. Guide Requirements

No Specific Provision.

DISTRICT'S POSITION

Since no specific provisions for redundancy were listed, the District finds that the instrumentation loops provided meet the Category 2 requirements.

3. POWER SOURCE

Reg. Guide Requirements

The instrumentation should be energized from a high-reliability power source, not necessarily Standby Power, and should be backed up by batteries where momentary interruption is not tolerable.

DISTRICT'S POSITION

Instrumentation as specified in the Reg. Guide is to be powered by a highly reliable source. The District has reviewed the power supply systems for Category 2 instrumentation and takes no exception to this requirement.

4. CHANNEL AVAILABILITY

Reg. Guide Requirements

The out-of-service interval should be based on normal Technical Specification requirements on out of service for the system it serves where applicable or where specified by other requirements.

DISTRICT'S POSITION

The District takes no exception to this requirement. Out of service intervals for instrumentation are based on the Technical Specifications in accordance with the Reg. Guide requirements.

5. QUALITY ASSURANCE

Reg. Guide Requirements

The recommendations of the Regulatory Guide pertaining to quality assurance listed under paragraph 1.3. i.e. of this guide should be followed. Reference to the above reg. guides (except Reg. Guides 1.30 and 1.38) is being made pending issuance of a Reg. Guide (Task RS 002-5) that is under development and will endorse ANSI/ASME NQA-1-1979. Since some instrumentation is less important to safety than other instrumentation, it may not be necessary to apply the same quality assurance measures to all instrumentation. The quality assurance requirements that are implemented should provide control over activities affecting quality to an extent consistent with the importance to safety of the instrumentation. These requirements should be determined and documented by personnel knowledgeable in the end use of the instrumentation.

DISTRICT'S POSITION

The District's position on QA requirements is as discussed in Section 2.3.3.A.5 for Category 1 instrumentation.

6. DISPLAY

Reg. Guide Requirements

The instrumentation signal may be displayed on an individual instrument or it may be processed for display on demand by a CRT or by other appropriate means.

DISTRICT'S POSITION

The District takes no exception to the above requirements, and specifies display location in Table 1.

7. RECORDING

The method of display may be by dial, digital, CRT, or stripchart recorder indication. Effluent radioactivity monitors, area radiation monitors, and meteorology monitors should be recorded. Where direct and immediate trend or transient information is essential for operator information or action, the recording should be continuously available on dedicated recorders. Otherwise, it may be continuously updated, stored in computer memory, and displayed on demand.

DISTRICT'S POSITION

The District takes no exception to the above requirements.

C. CATEGORY 3

1. EQUIPMENT QUALIFICATION

Reg. Guide Requirements

The instrumentation should be of high-quality commercial grade and should be selected to withstand the specified service environment.

DISTRICT'S POSITION

The District takes no exceptions to this requirement.

2. REDUNDANCY

Reg. Guide Requirements

No Specific Provisions.

DISTRICT'S POSITION

Same as per the Reg. Guide requirement.

3. POWER SOURCE

Reg. Guide Requirements

No Specific Provisions.

DISTRICT'S POSITION

Same as per the Reg. Guide requirement.

4. CHANNEL AVAILABILITY

Reg. Guide Requirements

No specific provisions.

DISTRICT'S POSITION

Same as per the Reg. Guide requirement.

5. QUALITY ASSURANCE

Reg. Guide Requirements

No Specific Provisions.

DISTRICT'S POSITION

Same as per the Reg. Guide requirement.

6. DISPLAY

Reg. Guide Requirements

The method of display may be by dial, digital, CRT, or strip chart recorder indication. Effluent radioactivity monitors, area radiation monitors, and meteorology monitors should be recorded. Where direct and immediate trend or transient information is essential for operator information or action, the recording should be continuously available on dedicated recorders. Otherwise, it may be continuously updated, stored in computer memory, and displayed on demand.

DISTRICT'S POSITION

Same as per Reg. Guide requirement.

D. ADDITIONAL CRITERIA FOR CATEGORIES 1, 2, and 3

Reg. Guide Requirements

1. The following criteria should apply to Categories 1 and 2:

a. Any equipment that is used for either Category 1 or Category 2 should be designated as part of accident monitoring instrumentation or systems operation and effluent-monitoring instrumentation. The transmission of signals from such equipment for other use should be through isolation devices that are designated as part of the monitoring instrumentation and that meet the provisions of this document.

DISTRICT'S POSITION

We believe that the above requirement is overly restrictive. The use of post-accident instrumentation should be encouraged for both normal operation and for other safety functions. This will improve operator awareness and confidence in such instrumentation. If the loop consists of safety grade (CQE) and non-safety grade (non-CQE) components, the non-CQE portion should be isolated from the CQE portion through isolators.

Isolation devices meeting the requirements as they applied at the time of issuance of the construction permit are provided between safety grade (CQE) and non-safety grade (non-CQE) portions of instrument loops. Isolation devices for instrumentation installed per NUREG-0737 requirements comply with the requirements of NUREG-0737.

In view of the above the District takes exception to the specified Reg. Guide 1.97, Rev. 2 requirements outlined above.

D. ADDITIONAL CRITERIA FOR CATEGORIES 1, 2, and 3

Reg. Guide Requirements

1. (Continued)

b. The instruments designated as Types A, B, and C and Categories 1 and 2 should be specifically identified on the control panels so that the operator can easily discern that they are intended for use under accident conditions.

DISTRICT'S POSITION:

Identification and marking is being addressed by NUREG-0737, Supplement 1, item I.D.I. (Control Room Design Review). Where appropriate, the instrumentation will be identified to improve operator interface.

2. In addition to the above criteria, the following criteria should apply to Categories 1, 2 and 3:

a. Servicing, testing and calibration programs should be specified to maintain the capability of the monitoring instrumentation. For those instruments where the required interval between testing will be less than the normal time interval between generating station shut-downs, a capability for testing during power operation should be provided.

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

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

d. The monitoring instrumentation design should minimize the development of conditions that would cause meters, annunciators, recorders, alarms, etc., to given anomalous indications potentially confusing to the operator. Human factors analysis should be used in determining type and location of displays.

e. The instrumentation should be designed to facilitate the recognition, location, replacement, repair, or adjustment of malfunctioning components or modules.

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

D. ADDITIONAL CRITERIA FOR CATEGORIES 1, 2, and 3

Reg. Guide Requirements

2. (Continued)

g. To the extent practicable, the same instruments should be used for accident monitoring as are used for the normal operations of the plant to enable the operators to use, during accident situations, instruments with which they are most familiar. However, where the required range of monitoring instrumentation results in a loss of instrumentation sensitivity in the normal operating range, separate instruments should be used.

h. Periodic checking, testing, calibration, and calibration verification should be in accordance with the applicable portions of Regulatory Guide 1.118. "Periodic Testing of Electric Power and Protection Systems," pertaining to testing of instrument channels. (Note: Response time testing not usually needed.)

DISTRICT'S POSITION:

To the extent applicable, and as required by IEEE-279-1968 and NUREG-0737, the above requirements are incorporated in the instrumentation provided at Fort Calhoun. The additional criteria of Reg. Guide 1.97, Rev. 2, section 1.5 will be applied to any new instrumentation.

D. ADDITIONAL CRITERIA FOR CATEGORIES 1, 2, and 3

Reg. Guide Requirements

3. Sections 6.2.2, 6.2.3, 6.2.4, 6.2.5, 6.2.6, 6.3.2, 6.3.3, 6.3.4 and 6.3.5 of ANS-4.5 pertain to variables and variable ranges for monitoring Types B and C variables. In conjunction with the above-listed sections of ANS-4.5, Tables 1 and 2 of this regulatory guide (which include those variables mentioned in these sections) should be considered as the minimum number of instruments and their respective ranges for accident-monitoring instrumentation for each nuclear power plant.

DISTRICT'S POSITION

Exceptions are noted in Table 1.

3.0 METHODOLOGY FOR REVIEW

3.1 Type A Variables

The District reviewed Reg. Guide 1.97, Rev. 2 to evaluate whether the Fort Calhoun Accident Monitoring Instrumentation complied with the specified requirements. The District's first step in evaluation of the Reg. Guide was to identify all systems which could provide the variables which were defined in the Reg. Guide. All variable types were identified in the Reg. Guide with the exception of Type A variables. These variables, according to the Reg. Guide, are plant specific and should meet the definition of Type A variables as noted in Section 2.2 of this response.

The District delineates Type A variables as those that are the plant specific variables, which provide the primary information required to permit the Control Room operator to take pre-planned manual action to accomplish safe shutdown for a DBA event. Variables associated with contingency actions are not included.

After review of the Combustion Engineering Emergency Procedures Guidelines, Rev. 2, (Ref. 7.3) the Type A list was developed. The Fort Calhoun Station designated Type A variables are:

	Safety Functions	FC Type "A" Variables
I	Reactivity Control	Neutron Flux
II	RCS Inventory/Pressure Control	Hot and Cold Leg Temperatures
III	Core & RCS Heat Removal	Subcooled Margin Monitor Core Exit Temperature RV Level Pressurizer Level Pressurizer Pressure S/G Level, S/G Pressure
IV	Containment Combustible Gas Control	Containment H_2 Concentration
V	Containment Radiation	High-Range Containment Radiation Monitors

This list is consistent with the ANSI/ANS 4.5 (1980) recommendations which were the basis for the Reg. Guide 1.97 requirements.

4.0 SUMMARY OF DISTRICT'S REVIEW

4.1 After a thorough review of the Reg. Guide and tabulation of the data sheets, a brief summary for each variable was tabulated. The result is the information as shown in Table 1. The following information is found in Table 1:

1. Reg. Guide 1.97 Category requirements or NUREG-0737 Specifications
2. Instrument Range
3. Environmental Qualification
4. Seismic Qualification
5. Quality Assurance
6. Redundancy
7. Power Supply
8. Recording
9. Location of Display
10. Comments

Data Sheets used for preparation of Table 1 are not included in this package but will be retained by the District as back up documen ation. Table 1 identifies the Regulatory Guide requirements in the areas specified, as well as the District's position in meeting those specifications. In those cases where the criteria is not met, a justification for non-compliance is provided or a commitment for component upgrade is made.

4.2 The instrument ranges and categories which were specified in Reg. Guide 1.97, Rev. 2 were used unless Reg. Guide 1.97, Rev. 3 provided less stringent requirements. Table 1 footnotes specify those variables on which the District has referenced Reg. Guide 1.97, Rev. 3 instrument ranges or categories.

Where Table 1 references a range of 0-100% for various tank levels, this indication is referred to the actual instrument taps rather than full span of the tank. The District believes that this is a conservative measurement and provides the control room operators with the necessary information.

4.3 For each variable listed in the Reg. Guide it is noted whether the District had existing instrumentation to provide the monitoring of the variable. Identification tag numbers are listed beneath the variable. The abbreviations shown in the table are defined as follows:

AI-100	-	Radwaste Panel
AI-194	-	Post Accident Sampling System (PASS) Panel
Aux. Bldg.	-	Auxiliary Building
CAT.	-	Category from Reg. Guide 1.97, Rev.2
CCW	-	Component Cooling Water
Cont.	-	Containment
CET	-	Core Exit Thermocouple
CSS	-	Containment Spray System
DP(F)	-	Design Pressure (Flow)

4.0 SUMMARY OF DISTRICT'S POSITION

4.1 (Continued)

CR	-	Control Room
EDG	-	Emergency Diesel Generator
EOF	-	Emergency Operation Facility
EOP	-	Emergency Operating Procedures
EP	-	Emergency Procedure
ERF	-	Emergency Response Facility
HJTC	-	Heated Junction Thermocouple
HPSI	-	High Pressure Safety Injection
HX	-	Heat Exchanger
LPSI	-	Low Pressure Safety Injection
NPSH	-	Net Positive Suction Head
N/R	-	Not Required
PASS	-	Post Accident Sampling System
QT	-	Quench Tank
RCS	-	Reactor Coolant System
RG	-	Regulatory Guide
RV	-	Reactor Vessel
SCHX	-	Shutdown Cooling Heat Exchanger
SCMM	-	Subcooled Margin Monitor
S/G	-	Steam Generator
SI	-	Safety Injection
SIRWT	-	Safety Injection Refueling Water Tank
SIT	-	Safety Injection Tank
SPDS	-	Safety Parameter Display System, (synonymous with plant computer)
TS	-	Technical Specifications
USAR	-	Updated Safety Analysis Report

5.0 EXCEPTIONS TO REGULATORY GUIDE 1.97 REV. 2 AND STATUS UPDATE

General

Table 1 provides a comparison of the Reg. Guide requirements with the available instrumentation. This table also notes compliance or non-compliance in the Comment section of the Table. No further review was deemed necessary upon determination that the instrument loop was qualified to the appropriate category requirements. This section addresses those loops which were not determined to be in compliance with the areas governed by the Reg. Guide. A majority of these areas were determined to be acceptable based on further analysis. This consisted of analyzing the existing equipment functions and design bases. Areas where analysis indicated that the intent of the Reg. Guide was not met were considered for upgrading. Equipment upgrade was identified in Table 1 and the actual design description and upgrade schedule are discussed further in Section 6.0. The following justifications are the District's basis for deviations from the Reg. Guide. The intent of the guideline, which is to provide monitoring systems in the accident situation, is met in all cases. The analyses have been segregated into sections covering the specific variable types.

5.1 Type A Variables

5.1.1 Neutron Flux (CAT.1)

The function specified above is performed by instrument loops N-001,002,003,004 made up of the excore detectors located in containment, amplifiers located in the Auxiliary Building and Wide Range Log Channel Drawers located in the control room. Four source range monitors (SRM's) and four wide range instrument monitors (IRM's) are provided for flux indication. All SRM and IRM detectors consist of dual fission chambers. The Excore detectors were replaced during the 1984 outage with fully qualified components. The detectors, amplifiers, and cable assemblies are qualified to Reg. Guide 1.89 and 1.100 and with the methodology described in NUREG-0588, CAT I. However, the balance of the equipment such as the Wide Range Log Channel Drawers, which provide signal processing and indication for neutron flux, have not been upgraded and are in compliance with the requirements applicable at the time of issuance of the construction permit. The District believes the above deviations from the requirements are justified as discussed in Section 2.3.3.A.1 of this report.

Summary Position - The District believes that the existing instrumentation loops for neutron flux measurement are adequate to perform the intended accident monitoring function. Thus, no modifications are proposed.

5.1.2 Reactor Coolant System Pressure (CAT.1)

The function specified above is performed by pressurizer pressure instrument loops P-105/P-115 and by proposed loops P-120A and P120B (scheduled to be installed during the 1987 refueling outage). These loops are in compliance with the requirements of Reg. Guide 1.97 Rev. 2 except as noted herein: ⚠1

This function is performed by P105/P115 pressure loops for the LOCA/MSLB bounded DBA events, and by P120A/P120B pressure loops for the ATWS bounded Design Basis Events (DBE).

5.1.2 Reactor Coolant System Pressure (CAT.1) (Continued)

Range

P105/P115	0 psia to 2500 psia
P120A/P120B	1900 psia to 2900 psia

An analysis of the pressure transient for Fort Calhoun Station ATWS and assuming a Diverse Scram System (ATWS rule) reactor trip results in a peak pressure of 2600 psia. OPPD believes the range of 0 psia to 2900 psia is adequate for all DBE's. ⚠1

Seismic

Certain portions of the P105/P115 instrument loops have been upgraded to IEEE-344-1975. However, the entire loops are not qualified to IEEE-344-1975. The sensors are qualified. Other components of the loop are qualified to the seismic requirements which were applied at the time the construction permit was issued.

Instrument loops P120A and P120B will be qualified to meet the requirements of IEEE344-1975. ⚠1

For further discussion with regard to seismic qualification, see Section 2.3.3.A.1.

Summary Position

The proposed additions to address the ATWS rule will resolve the Reg. Guide 1.97 RCS pressure requirement. ⚠1

5.1.3 Reactor Coolant System Hot and Cold Leg Water Temperature, Subcooled Margin Monitoring (CAT.1)

Fort Calhoun Unit 1 is provided with redundant subcooled margin monitors which were designed and installed to the requirements of Reg. Guide 1.97 Rev. 2. The SPDS SMM's receive their inputs from the following temperature and pressure loops:

Hot Leg Temperature:	T112H A/B
	T122H A/B
Cold Leg Temperature:	T112C A/B
	T122C A/B
Pressurizer Pressure	P-105
	P-115

Note, subcooled margin indication is not provided above 2500 psia. The ATWS event (trip occurring via the Diverse Scram System) is a high pressure transient of brief duration, thus subcooling is of secondary concern. Performance can be monitored via the loop RTDs, the CET's and P120A or P120B. OPPD considers the instrumentation adequate. ⚠1

DISTRICT'S POSITION:

The SPDS performs two additional subcooled margin calculations. These additional calculations are based on representative Core Exit Thermocouple (CET) temperature, and upper head temperature as sensed by the reactor vessel level Heated Junction Thermocouple (HJTC) probes. 4

Both of the above mentioned temperature input (CET and HJTC) loops are fully qualified to both 10 CFR 50.49 and Reg. Guide 1.100. Their temperature ranges of 32-2300°F far exceed those required by the Reg. Guide for SMM temperature inputs. 4

All three calculations share the same pressure inputs (P-105 and P-115). These transmitters and loops are discussed in Section 5.1.2.

SUMMARY

The District believes that adequate instrumentation is provided to perform the intended Accident Monitoring Function, and meets the requirements of Reg. Guide 1.97 Rev. 2.

5.1.4 Vessel Level Monitoring (CAT. 1)

The function specified above is indirectly measured by the Reactor Vessel Level Monitoring System (loops Y-116A/B) comprised of the Heated Junction Thermocouples and the Safety Parameter Display System (SPDS). The displays are provided in the control room, TSC and EOF through the SPDS portion of the ERF computer.

These loops are in compliance with the requirements of Reg. Guide 1.97. 4

5.2 Type B Variables

5.2.1 Containment Isolation Valve Position (CAT.1)

Containment Isolation Valve Position is provided via the limit switches on the valves. These limit switches are environmentally qualified to 10 CFR 50.49 requirements. As noted in Table 1, limit switches provided on the following valves are environmentally qualified to 10 CFR 50.49 (DOR Guidelines) but do not meet the Category 1 seismic requirements of Reg. Guide 1.97.

5.2.1 Containment Isolation Valve Position (CAT.1) (Continued)

Containment Isolation Valve	Location
PCV-742 F/H	Aux. Bldg.
HCV-746B	Aux. Bldg.
HCV-425 B/D	Aux. Bldg.
HCV-467 B/D	Aux. Bldg.
HCV-204	Aux. Bldg.
HCV-206	Aux. Bldg.
HCV-1388B/1387B	Aux. Bldg.
HCV-1559A/1559B	Aux. Bldg.
HCV-1550A/1560B	Aux. Bldg.
HCV-2603A/2603B	Aux. Bldg.
HCV-2983	Aux. Bldg.
HCV-400C/401C/402C/403C	Aux. Bldg.
HCV-438 B/D	Aux. Bldg.
HCV-500 A/B	Aux. Bldg.
HCV-506 A/B	Aux. Bldg.
HCV-507 A/B	Aux. Bldg.
HCV-508 A/B	Aux. Bldg.
HCV-509 A/B	Aux. Bldg.
HCV-1385, 1386	Aux. Bldg.
HCV-1749, PCV-1849	Aux. Bldg.

DISTRICT'S POSITION

The above listed limit switches were seismically designed to the requirements applicable at the time of issuance of the construction permit. The justification for not upgrading the seismic qualification of these limit switches is provided in Section 2.3.3.A.1.

5.2.1 Containment Isolation Valve Position (CAT.1) (Continued)

Summary Position

The District believes that valve position indication provided by the existing limit switches is adequate. Thus, no modifications are proposed.

5.3 Type C Variables

No exceptions taken.

5.4 Type "D" Variables

5.4.1 Accumulator Tank Level and Pressure

The four (4) Safety Injection Tanks (Accumulators) are passive devices which discharge into the Reactor Coolant System (RCS) in the event of a Loss of Coolant Accident and certain of the Uncontrolled Heat Extraction (steam line break) events.

It remains the District's position that environmentally qualified instrumentation is not required on the Safety Injection (SI) tanks. For the design basis accidents discussed in the USAR the addition of the SI Tank level and pressure provides little, if any, information in establishing the status of the core, the RCS, or the containment.

The goal of the Emergency Core Cooling System (ECCS) is to maintain the core in a cooled, covered, and subcritical condition. The SI Tanks provide a readily available source of borated water available without any active (pump start, remotely operated valve opening, etc.) equipment function. The SI Tank isolation valves are open and their motor operator's power source is switched off. Two check valves are forced open by the SI Tank's over pressure (a minimum of 240 psig) and discharge directly into the cold legs of the RCS. 4

Based on the above description the following discussions are provided to support the District's position:

1. Instrumentation provided for operator intervention

The SI Tank discharge to the RCS requires only that two check valves open. The only remote operated valve is open and deenergized. There is no action that can be taken by the operator. In addition, the SI Tanks discharge at a time into the event where operator action is not assumed or credited. Automatic action must mitigate the event.

5.4.1 Accumulator Tank Level and Pressure (Continued)

2. Overpressurization of the SI Tanks Following a DBA

This is not considered a credible event. If the check valves between each of the SI Tanks and the Low Pressure Safety Injection System (LPSI) were to fail the LPSI system would pressurize the tank to approximately 195 psig which is less than the tank relief valve pressure set point of 275 psig. The LPSI system remains functional.

Two check valve failures would be required to result in RCS pressure on the tank. This is not considered to be a credible event.

3. Indicator of ECCS Performance/Core Cooling

The SI Tank instrumentation would provide no useful information in any long term core status and at best shows that the tanks did supply some cooling water to the RCS. Given the passive nature of the SI Tanks' function this can be surmised from RCS pressure. Exact volume is unneeded.

Core cooling and inventory are confirmed by direct verification for the RCS hot and cold leg by RTD's, the Core Exit Thermocouples, and Reactor Vessel Level Monitor. These provide evidence of proper ECCS function. No information could be inferred about the core by using SI Tank information than can not already be derived by several other available variables. ⚠

4. Loss of an SI Tank at the Time of DBA

There is no action an operator can take to correct this problem should it occur. Instrumentation will be operable up to the time of a DBA insuring accumulator inventory to mitigate a DBA. If failure were to occur at the time of the DBA, all resources available to the operator are automatically started as part of the system response to the DBA. On line failures are governed by the Technical Specifications. Instrument qualification will not increase SI Tank reliability.

Based on these four discussion regarding the function, accident diagnosis, failure and reliability, it is OPPD's position that these variables (SI Tank Pressure and Level) are not required for safe shutdown.

5.4.2 Safety Injection Tank Pressure (CAT.2)

See 5.4.1 discussion.

5.4.3 Quench Tank (QT) Pressure (CAT. 3)

The function specified above is performed by the QT pressure instrument loop, (I.D. No. P-131).

The quench tank pressure loop is in compliance with the requirements of Reg. Guide 1.97 except as noted below:

Range: Reg. Guide 1.97, Rev. 2 specifies that quench tank pressure measurement should be 0 psig to design pressure. The design pressure of the Fort Calhoun Quench Tank is 100 psig. The existing range on the pressure transmitters is 0-25 psig.

Summary Position

Additional indication will be added consistent with Reg. Guide 1.97 requirements. The proposed modification is discussed further in Section 6.2.1.

5.4.4 Quench Tank Temperature (CAT. 3)

The function specified above is performed by the Quench Tank temperature instrument loop (I.D. No. T-133).

This loop is in compliance with the requirements of Reg. Guide 1.97 except as noted below:

Range: The temperature sensor is a 200 ohm dual-element, platinum RTD. One element of this RTD is input directly into a panel indicating meter, TI-133. This indicator is calibrated for a range of 0-300°F. The second element of the RTD is input directly into the SPDS computer. The SPDS will indicate temperature over the entire range of the 200 ohm RTD. This range encompasses the specified 50-750°F range of Reg. Guide 1.97, Rev. 2.

Summary Position

The District believes that the ranges described above are sufficient to cover all postulated conditions for the Quench Tank.

5.4.5 Containment Atmosphere Temperature (CAT.2)

A review of the location of T-714, 716, 718, and 720 indicates that these sensors cannot provide an accurate representation of containment temperature. The District plans to install a multi-sensor temperature measuring system in containment which meets category 2 requirements.

5.4.5 Containment Atmosphere Temperature (CAT.2) (Continued)

Environmental Qualification: The Reg. Guide 1.97, Rev. 2 specifies that the instrument loops are to be environmentally qualified to IEEE-323-1974.

Summary Position

The District will install environmentally qualified loops in accordance with 10 CFR 50.49. See Section 6.2.3 for schedule. 4

5.4.6 Radioactive Gas Decay Tank Pressure (CAT. 3)

The function of measuring the specified variable is to monitor the storage volume of the Radwaste System.

The function specified above is performed by instrument loops (I.D. No. P-517,518,519,520) located on the Radioactive Gas Decay Tanks in the Auxiliary Building.

These loops are in compliance with the requirements of Reg. Guide 1.97 except as noted below:

Range: Reg. Guide 1.97, Rev. 2 requires that, for Decay Tank, monitoring an instrument range of 0-150% of the tank's design pressure should be provided. The existing range for the Decay Tanks sensors is 0-100% of the tank's design pressure. The tank's design pressure is 150 psig.

DISTRICT'S POSITION

The District will upgrade the range to 0-150% of the tank's design pressure.

Summary Position

The existing instrumentation loops, after upgrading, will be adequate to perform the intended Accident Monitoring Function. See Section 6.2.2 for schedule of modification. 4

5.4.7 RCS Letdown Flow (CAT.2)

The variable listed above is to provide operator information with the status of RC letdown flow.

The function specified above is performed during normal operation by the Letdown flow transmitter loop (F-212).

DISTRICT'S POSITION:

During an accident situation the letdown system is isolated, and thus readout of letdown flow would be meaningless. Thus this parameter is not required for accident monitoring.

5.4.7 RCS Letdown Flow (CAT.2) (Continued) | ⚠

Summary Position

No upgrades are proposed for this instrumentation loop.

5.4.8 Volume Control Tank Level (CAT.2) | ⚠

The variable listed above is to provide operator information with the status of the VCT level.

The function specified above is performed during normal operation only by the VCT level transmitter loop (L-219).

DISTRICT'S POSITION:

Upon SIAS the Safety Injection Pumps take suction from the SIRWT and inject borated water at refueling boron concentration into the reactor coolant system, to increase shutdown margin. The Volume Control Tank portion of the Chemical Volume and Control System is bypassed during this emergency injection mode. Thus monitoring of the VCT level for injection purposes would be meaningless. This instrument loop is not required for achieving safe shutdown or for performing accident monitoring.

Summary Position

Thus, the District will not upgrade the currently installed level transmitters to meet the 50.49 ruling.

5.4.9 Residual Heat Removal | ⚠

The Fort Calhoun Station Residual Heat Removal (RHR) is accomplished in a post-accident situation by either the steam generators and shutdown coding or the Long Term Core Cooling System and shutdown cooling depending on the type of Design Basis Event being considered.

The Steam Generators (defined as intact generator, Auxiliary Feedwater, and Main Steam Power Operated Safety Valves) are used to cool down for all DBE's including the class of LOCA (breach of the the RCS) in which the primary system remains above 700 psia.

Long Term Core Cooling (defined as HPSI, pressurizer auxiliary spray, HPSI-CVCS inter-connection, and SDCHX to HPSI suction flow) provides both hot and cold leg injection to prevent boron precipitation. This system is used when the RCS is below 700 psia.

5.4.9 Residual Heat Removal (Continued)

Shutdown cooling is defined as RCS hot leg to LPSI suction, LPSI system, and SDCHX including spray isolation and LPSI-Containment Spray cross-connect. This system may be used below 265 psia, 300°F.

Please note that for the RCS breach resulting in pressures above 700 psia the use of the PORV's as a flow path if both steam generators are not available is used. This is considered a backup. The District believes that the performance of RHR can be monitored by the use of the CET's and Vessel Level Monitoring previously discussed (Category 1 items).

The District believes that for RHR monitoring the following variables insure operator information of system performance:

Steam Generators
- SG Pressure
- SG Level
- AFW Flow
- Main Steam Safety Position Indication

LTCC
- HPSI Flow
- Charging Flow
- Aux Spray Valve Position

SD Cooling
- LPSI Flow
- Cont Isol Vlv on RCS Position Indication
- SDC Flow*
- SDCHX Outlet Temp.*

RCS Information
- RCS Pressure
- RCS Hot Leg Temp.
- RCS Cold Leg Temp.
- CET
- HJTC - Vessel Level

*Require Upgrade

DISTRICT'S POSITION

The District will upgrade the two noted items as described in 6.2.4 and 6.2.5.

5.4.10 Component Cooling Water Temperature to Engineered Safety Features (ESF) System

Fort Calhoun has presently installed one RTD instrument loop on each of the four (4) component cooling/raw water heat exchanger outlets. These are installed in a mild environment and meet the original plant design requirements which OPPD interprets as equivalent to Category 2. These process signals are not recorded. Each of the temperature channels is equipped with a high temperature alarm set at 120°F. The instruments' calibrated span is 0°F to 300°F.

Core and containment cooling are the central issues with respect to the Component Cooling Water (CCW) system function. Cooling malfunctions can be diagnosed using direct, i.e. RCS temperature indication. The existing CCW heat exchanger outlet temperature can then be consulted to aid in determining if a CCW malfunction has occurred.

It is the District's position that these four temperature channels in their present configuration provide adequate system performance information and is of adequate resolution to determine proper system function. 4

No change to this existing instrumentation is believed to be required.

5.4.11 Component Cooling Water Flow to ESF System

It is the District's position that adequate instrumentation is presently installed to monitor the performance of the Component Cooling Water (CCW) system.

CCW pump motor current, which is proportional to flow, can be monitored on each of three CCW pump motors. In addition, low CCW flow out of each of the containment air cooling units provides alarmed indication of CCW system failure.

All the previously discussed CCW system monitoring instruments presently meet Category 2 requirements.

5.5 Type E Variables

No exceptions taken.

5.5.1 Wind Direction, Wind Speed Atmospheric Stability

Calibration and instrument uncertainties for meteorology variables will be redefined to comply with Regulatory Guide 1.97 accuracy requirements.

6.0 DESIGN DESCRIPTION AND SCHEDULE FOR IMPLEMENTATION OF IDENTIFIED UPGRADES

6.1 Type A Variables

6.1.1 RCS Hot Leg Temperature

Complete.

6.1.2 RCS Cold Leg Temperature

Complete.

6.1.3 Reactor Vessel Level Monitoring

Complete SER not issued.

6.1.4 RCS Pressure

The high range pressure transmitters will be installed during the 1987 refueling outage.

6.2 Type D Variables

6.2.1 Quench Tank Pressure

The existing equipment does not meet the Reg. Guide 1.97 range requirement of 0 to design pressure. In order to be in compliance a new instrument loop will be installed with an increased range of measurement. The installation will meet Category 3 requirements.

The loop will be modified during the 1987 refueling outage, to provide the required range.

6.2.2 Radioactive Gas Decay Tank Pressure

The pressure transmitter ranges on the radioactive gas decay tanks will be broadened from 0-100% of the design pressure to 0-150% design pressure. This modification will be performed during or before the 1987 refueling outage.

6.2.3 Containment Atmosphere Temperature

Temperature channels will be added, which meet the requirements of Category 2. This will be completed during the 1987 refueling outage.

6.2.4 Shutdown Cooling Flow

The transmitter for Shutdown Cooling Flow will be replaced with an environmentally qualified component. This modification will be performed during the 1987 refueling outage.

6.2.5 Shutdown Cooling Heat Exchanger Outlet Temperature

The RTDs for Shutdown cooling heat exchanger outlet temperature (T-339, 340) will be replaced with environmentally qualified components. This modification will be performed during the 1987 refueling outage.

6.2.6 Containment Sump Temperature

A Category 2 temperature loop will be added during the 1988 refueling outage. 4

6.3 Type E Variables

6.3.1 Calibration will be redefined and implemented during the first biannual calibration during the spring of 1987. 4

7.0 REFERENCED DOCUMENTS

7.1 Supplement 1 to NUREG-0737 Requirements For Emergency Response Facilities (Generic Letter No. 82-33)

7.2 Letter from OPPD (W.C. Jones) to NRC (R.A. Clark) dated April 15, 1983 (LIC-83-093).

7.3 Combustion Engineering Emergency Procedures Guidelines, Rev. 2.

7.4 Fort Calhoun Emergency Procedures

7.5 Fort Calhoun System Descriptions

7.6 Fort Calhoun Critical Quality Element List

7.7 Fort Calhoun Electrical Equipment Qualification Report (10 CFR 50.49, Generic Letter 82-09).

7.8 Regulatory Guide 1.97, Rev. 2 and Rev. 3.

7.9 Fort Calhoun Station Unit No. 1 Updated Safety Analysis Report (USAR)

7.10 Fort Calhoun Station AMI Status Sheets; GSE - Nuclear Engineering Study 84-07.

7.11 Letter from OPPD (R. L. Andrews) to NRC (J. R. Miller) dated September 28, 1984 (LIC-84-323)

TABLE 1

COMPARISON OF FORT CALHOUN STATION UNIT NO. 1

INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "A" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
I REACTIVITY CONTROL											
1. Neutron Flux	R.G.	1	-	10^{-6}%-100%	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	In compliance with exceptions noted in Section 5.1.1
(NT-001, 002, 003, 004)	OPPD	1	USAR	10^{-8}%-125%	10CFR50.49	IEEE-344-75**	YES	1E	SPDS	CR, SPDS	
II RCS INVENTORY/PRESSURE CONTROL											
1. Pressurizer Level	R.G.	1	-	0-100%	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	
(LT-101X/Y)	OPPD	1	USAR	0-100%	10CFR50.49	IEEE-344-75+	YES	1E	Recorded	CR, SPDS	In Compliance
2. RCS Pressure	R.G.	1	-	0- psig	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	
(PT-105, 115)	OPPD	0737	0737	0-2500 psig	10CFR50.49	IEEE-344-75*	YES	1E	Recorded	CR, SPDS	See Section 5.1.2
(PT-120A, PT-120B)		1	0737	1900-2900 psig	10CFR50.49	IEEE-344-1975	YES	1E	SPDS	CR, SPDS	See Section 6.1.4
3. Degrees of Subcooling	R.G.	1	-	200°F to 35°F	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	In Compliance
(SPDS)	OPPD	0737	0737	618°F subcooled to 668°F superheated	10CFR50.49	IEEE-344-75	YES	1E	SPDS	CR, SPDS	See Section 5.1.3

N/R- Not required.

+ - The entire loop is not qualified to IEEE-344-1975, only portions, including the sensors are qualified.

* - The transmitters located in the harsh environment were replaced per 10CFR50.49. The new transmitters are qualified per IEEE344-1975 and 10CFR50.49. All other components of the loop are qualified per the seismic requirements which applied at the time the construction permit was issued. (Reference Appendix F of the USAR).

**- The entire loop is not qualified to IEEE-344-1975, only the excore detectors and amplifiers are qualified. The balance of equipment is qualified to original seismic qualification.

- QA requirements for categories 1,2, and 3 are shown in Section 2.3.3.A.5.

R.G. - Regulatory Guide 1.97, Rev. 2 requirements.

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TABLE 1

COMPARISON OF FORT CALHOUN STATION UNIT NO. 1

INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "A" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
III CORE & RCS HEAT REMOVAL											
1. Cold Leg Temperature	R.G.	1	-	50-700°F**	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	See 5.1.3
	OPPD	0737	0737	50-700°F	10CFR50.49	IEEE-344-75	YES	1E	SPDS	SPDS	
2. Hot Leg Temperature	R.G.	1	-	50°F-700°F**	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	See 5.1.3
	OPPD	0737	0737	50°F-700°F	10CFR50.49	IEEE-344-75	YES	1E	SPDS	SPDS	
3. Core Exit Temperature RC-7D (1-28)	R.G.	1	-	200-1650°F	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	See Ref. 7.11
	OPPD	0737	0737	32-2300°F	10CFR50.49	IEEE-344-75	YES, 7 per quad.	1E	SPDS	SPDS	In Compliance
4. Degrees of Subcooling	R.G.	1	-	200°F to 35°F	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	
	OPPD		See Type A Variables, Item III.3								

+ - The entire loop is not qualified to IEEE-344-1975, only the sensors are qualified.
- QA requirements for categories 1,2 and 3 are shown in Section 2.3.3.A.5
* - Proposed range
** - Reg. Guide 1.97, Rev. 3

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TABLE 1

COMPARISON OF PORT CALHOUN STATION UNIT NO. 1

INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "A" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
III CORE & RCS HEAT REMOVAL (Continued)											
5. RV Level (Y-116A/B)	R.G.	1	-	Bottom of Hot Leg to top of Vessel *	CAT.1	R.G. 1.100	REQUIRED	1E	REQUIRED	One Channel Continuous	In Compliance
	OPPD	0737	0737	Top of Core to top of Vessel	10CFR50.49	IEEE-344-75	YES	1E	SPDS	SPDS	
6. S/G Level (LT-911 A/B) (LT-912 A/B)	R.G.	1	-	Tube Sheet to Separator	CAT.1	R.G. 1.100	REQUIRED	1E	REQUIRED	One Channel Continuous	
	OPPD	0737	0737	Tube Sheet to Separator (0-100%)	10CFR50.49	IEEE-344-75	YES	1E	SPDS	SPDS, CR	In Compliance
7. S/G Pressure (PT-913 A/B) (PT-914 A/B)	R.G.	1	-	ATM to 20% above lowest safety valve setting.	CAT.1	R.G. 1.100	REQUIRED	1E	REQUIRED	One Channel Continuous	
	OPPD	0737	0737	ATM to 20% 0-1200 psia	10CFR50.49	IEEE-344-75	YES	1E	SPDS	CR, SPDS	In Compliance

* - Reg. Guide 1.97 Rev. 3 requirement.

- QA requirements for categories 1,2 and 3 are shown in Section 2.3.3.A.5

TABLE 1

COMPARISON OF FORT CALHOUN STATION UNIT NO. 1

INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "A" VARIABLES

	INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
IV	CONTAINMENT COMBUSTIBLE GAS CONTROL											
1.	Containment H_2 Concentration (VA-81A/B)	R.G.	1	-	0-10%	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	
		OPPD	0737	0737	0-10%	10CFR50.49	IEEE-344-75	YES	1E	Recorded	SPDS, CR,	In Compliance
V	CONTAINMENT RADIATION											
1.	Containment High Range Radiation (RM-091A, RM-091B)	R.G.	1	-	1.10^{-7}R/HR 1.10^{-7}R/HR	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	
		OPPD	0737	0737	1.10^{-7}R/HR	10 CFR 50.49	IEEE-344-75	YES	1E	Recorded	CR, SPDS	In Compliance

- QA requirements for categories 1,2 and 3 are shown in Section 2.3.3.A.5

TABLE 1

COMPARISON OF FORT CALHOUN STATION UNIT NO. 1

INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "B" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
I REACTIVITY CONTROL											
1. Neutron Flux	R.G.	1	-	10^{-6}%-100%	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	
	OPPD			See Type A Variables, Item 1.1							
2. Control Rod Position (CEDM's)	R.G.	3	-	Full in or Not	N.S.P.	N.S.P.	N.S.P.	N.S.P. Highly Reliable	N/R	On Demand	
	OPPD	3	USAR	Full in or Not						CR, SPDS	In Compliance
3. RCS Soluble Boron Concentration (SL-25)	R.G.	3	-	0-6000 ppm	N.S.P.	N.S.P.	N.S.P.	N.S.P.	Required	On Demand	
	OPPD	0737	0737	0-6000 ppm			Backup by Grab Sample		Recorded	Chart Recorder	In Compliance See Note 1
4. RCS Cold Leg Water Temperature (TT-113 TT-123)	R.G.	3	-	50-400°F	N.S.P.	N.S.P.	N.S.P.	N.S.P.	Required	On Demand	
	OPPD	3	USAR	0-600°F				1E	Recorded	CR, SPDS	In Compliance
II CORE COOLING											
1. RCS Hot Leg Temp.	R.G.	1	-	50-700°F**	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	
	OPPD			See Type A Variables, Item III.2							

Note 1 - The PASS ion chromatograph will be used as the primary boron concentration measurement for accident monitoring in lieu of the boronmeter. The ion chromatograph was design d to NUREG-0737 requirements and can measure RC, LPSI and containment sump samples.

- QA requirements for categories 1,2 and 3, Section 2.3.3.A.5

N/R - Not Required

** - Reg. Guide 1.97, Rev. 3

N.S.P. = No Specific Provision

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TABLE 1

COMPARISON OF FORT CALHOUN STATION UNIT NO. 1

INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "B" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
II CORE COOLING (Continued)											
2. RCS Cold Leg Temp.	R.G. OPPD	1	-	50-700°F** See Type A Variables, Item III.1	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	
3. RCS Pressure	R.G. OPPD	1	-	0-4000 psig See Type A Variables, Item II.2	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	
4. CET	R.G. OPPD	3	-	200-1650°F See Type A Variables Item III.3	N.S.P.	N.S.P.	N.S.P.	N.S.P.	Required	On Demand	
5. RV Level Monitoring	R.G. OPPD	1	-	Btm of Hot Leg** to top of Vessel See Type A Variables, Item III.5	CAT.1	R.G. 1.100	REQUIRED	1E	N/R	One Channel Continuous	
6. Degrees of Subcooling	R.G. OPPD	2	-	200°F - -35°F See Type A Variables, Item II.3	CAT.2	N.S.P.	N.S.P.	Highly Reliable	Required	On Demand	

** - Reg. Guide 1.97, Rev. 3.

- QA requirements categories 1,2 and 3 shown in Section 2.3.3.A.5

N/R - Not Required

N.S.P. = No Specific Provision

TABLE 1

COMPARISON OF FORT CALHOUN STATION UNIT NO. 1

INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "B" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
III MAINTAINING REACTOR COOLANT SYSTEM INTEGRITY											
1. RCS Pressure	R.G. OPPD	1	-	0-4000 psig See Type A Variables, Item II.2	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	
2a. Containment Sump Water Level (Narrow) (LT-599, 600)	R.G. OPPD	2 0737	- 0737	Sump, (0-32") 5 - 37 in.	CAT.2 10CFR50.49	N.S.P. IEEE-344-75	N.S.P. YES	Highly Reliable 1E	Required Recorded	On Demand CR, SPDS	 In Compliance
2b. Containment Sump Water Level (Wide) (LT-387 A/B/C/D LT-388 A/B/C/D)	R.G. OPPD	1 0737	- 0737	0-600,000 Gal. 0-600,000 Gal. (0-27.5 ft.)	CAT.1 10CFR50.49	R.G. 1.100 IEEE-344-75	REQUIRED YES	1E 1E	Required Recorded	One Channel Continuous CR, SPDS	 In Compliance
3. Containment Pressure (PT-783, 784)	R.G. OPPD	1 1	- USAR	0-D.P. -5-195 psig	CAT.1 10CFR50.49	R.G. 1.100 IEEE-344-75+	REQUIRED YES	1E 1E	Required Recorded	One Channel Continuous CR, SPDS	In Compliance
IV MAINTAINING CONTAINMENT INTEGRITY											
1. Containment Isolation Valve Position	R.G.	1	-	Clsd/Not Clsd See list below: those Containment Isolation Valves which close upon receipt of CIAS ("Containment Isolation Actuation Signal")	CAT.1	R.G. 1.100	REQUIRED	1E	N/R	On Demand	See Section 5.2.1

+ - The entire loop is not qualified to IEEE-344-1975, only the sensors are qualified.
- QA requirements categories 1,2 and 3 shown in Section 2.3.3.A.5
N/R - Not Required
N.S.P. = No Specific Provision

TABLE 1
COMPARISON OF FORT CALHOUN STATION UNIT NO. 1
INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "B" VARIABLES

INSTRUMENT	CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
IV MAINTAINING CONTAINMENT INTEGRITY (Continued)										
A. PCV-742 A/C/E/G	1	USAR	Clsd/Not Clsd	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance
B. PCV-742 B/D	1	USAR	Clsd/Not Clsd	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance
C. PCV-742 F/H	1	USAR	Clsd/Not Clsd	10CFR50.49	Original Plant	YES*	1E	N/R	CR, SPDS	See 5.2.1
D. HCV-746 A	1	USAR	Clsd/Not Clsd	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance
E. HCV-746 B	1	USAR	Clsd/Not Clsd	10CFR50.49	Original Plant	YES*	1E	N/R	CR, SPDS	See 5.2.1
#F. HCV-425 A/C	1	USAR	Clsd/Not Clsd	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance
G. HCV-425 B/D	1	USAR	Clsd/Not Clsd	10CFR50.49	Original Plant	YES*	1E	N/R	CR, SPDS	See 5.2.1
H. HCV-467 A/C	1	USAR	Clsd/Not Clsd	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance

* - With the exception of those penetrations which are exempt from the requirement of double isolation (Ref. USAR Section 5.9.5) all mechanical penetrations are provided with two isolation valves
N/R - Not Required

TABLE 1
COMPARISON OF FORT CALHOUN STATION UNIT NO. 1
INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "B" VARIABLES

	INSTRUMENT	CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
IV	MAINTAINING CONTAINMENT INTEGRITY (Continued)										
I.	HCV-467 B/D	1	USAR	Clsd/Not Clsd	10CFR50.49	Original Plant	YES*	1E	N/R	CR, SPDS	See 5.2.1
J.	HCV-500 A/B	1	USAR	Clsd/Not Clsd	10CFR50.49	Original Plant	YES*	1E	N/R	CR, SPDS	See 5.2.1
K.	HCV-506 A/B	1	USAR	Clsd/Not Clsd	10CFR50.49	Original Plant	YES*	1E	N/R	CR, SPDS	See 5.2.1
L.	HCV-507 A/B	1	USAR	Clsd/Not Clsd	10CFR50.49	Original Plant	YES*	1E	N/R	CR, SPDS	See 5.2.1
M.	HCV-508 A/B	1	USAR	Clsd/Not Clsd	10CFR50.49	Original Plant	YES*	1E	N/R	CR, SPDS	See 5.2.1
N.	HCV-509 A/B	1	USAR	Clsd/Not Clsd	10CFR50.49	Original Plant	YES*	1E	N/R	CR, SPDS	See 5.2.1
O.	TCV-202	1	USAR	Clsd/Not Clsd	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance
P.	HCV-204	1	USAR	Clsd/Not Clsd	10CFR50.49	Original Plant	YES*	1E	N/R	CR, SPDS	See 5.2.1
Q.	HCV-241	1	USAR	Clsd/Not Clsd	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance

* - With the exception of those penetrations which are exempt from the requirement of double isolation (Ref. USAR Section 5.9.5) all mechanical penetrations are provided with two isolation valves

N/R - Not Required

TABLE 1
COMPARISON OF FORT CALHOUN STATION UNIT NO. 1
INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "B" VARIABLES

	INSTRUMENT	CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
IV	MAINTAINING CONTAINMENT INTEGRITY (Continued)										
R.	HCV-206	1	USAR	Clsd/Not Clsd	10CFR50.49	Original Plant	YES*	1E	N/R	CR, SPDS	See 5.2.1
S.	HCV-1387A, 1388A	1	USAR	Clsd/Not Clsd	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance
T.	HCV-1387B,1388B	1	USAR	Clsd/Not Clsd	10CFR50.49	Original Plant	YES*	1E	N/R	CR, SPDS	See 5.2.1
U.	HCV-1385, 1386, HCV-1749, PCV-1849	1	USAR	Clsd/Not Clsd	10CFR50.49	Original Plant	NO*	1E	N/R	CR, SPDS	See 5.2.1
V.	HCV-1559 A/B HCV-1560 A/B	1	USAR	Closed/Open	10CFR50.49	Original Plant	YES*	1E	N/R	CR, SPDS	See 5.2.1
W.	HCV-2603A, 2604A	1	USAR	Closed/Open	10CFR50.49	Original Plant	YES*	1E	N/R	CR, SPDS	See 5.2.1
X.	HCV-2603B, 2604B	1	USAR	Closed/Open	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance
Y.	HCV-2504A, 2506A HCV-2507A	1	USAR	Closed/Open	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance
Z.	HCV-2504B, 2506B HCV-2507B	1	USAR	Closed/Open	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance

* - With the exception of those penetrations which are exempt from the requirement of double isolation (Ref. USAR Section 5.9.5) all mechanical penetrations are provided with two isolation valves
N/R - Not Required

TABLE 1
COMPARISON OF FORT CALHOUN STATION UNIT NO. 1
INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "B" VARIABLES

	INSTRUMENT	CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
IV	MAINTAINING CONTAINMENT INTEGRITY (Continued)										
AA.	HCV-820A, 821A	1	USAR	Closed/Open	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance
BB.	HCV-820B, 821B	1	USAR	Closed/Open	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance
CC.	HCV-881, 882	1	USAR	Closed/Open	10CFR50.49	IEEE-344-75	NO*	1E	N/R	CR, SPDS	In Compliance
DD.	HCV-400A/B/D HCV-401A/B/D HCV-402A/B/D HCV-403A/B/D	1	USAR	Closed/Open	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance
EE.	HCV-400C HCV-401C HCV-402C HCV-403C	1	USAR	Closed/Open	10CFR50.49	Original Plant	YES*	1E	N/R	CR, SPDS	See 5.2.1
FF.	HCV-438 A/C	1	USAR	Closed/Open	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance
GG.	HCV-438 B/D	1	USAR	Closed/Open	10CFR50.49	Original Plant	YES*	1E	N/R	CR, SPDS	See 5.2.1

* - With the exception of those penetrations which are exempt from the requirement of double isolation (Ref. USAR Sect. 5.9.5) all mechanical penetrations are provided with redundant isolation valves
N/R - Not Required

TABLE 1

COMPARISON OF FORT CALHOUN STATION UNIT NO. 1

INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "B" VARIABLES

	INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
IV	MAINTAINING CONTAINMENT INTEGRITY (Continued)											
HH.	HCV-883A HCV-884A		1	USAR	Closed/Open	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance
II.	HCV-883B HCV-884B		1	USAR	Closed/Open	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance
JJ.	HCV-1107A HCV-1108A		1	USAR	Closed/Open	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance
KK.	HCV-1107B HCV-1108A		1	USAR	Closed/Open	10CFR50.49	IEEE-344-75	YES*	1E	N/R	CR, SPDS	In Compliance
LL.	HCV-2983		1	USAR	Closed/Open	10CFR50.49	ORIGINAL PLANT	NO*	1E	N/R	CR, SPDS	See 5.2.1
MM.	HCV-742 A/B/C/D		1	USAR	Closed/Open	10CFR50.49	IEEE-344-75	NO*	1E	N/R	CR, SPDS	In Compliance
2.	Containment Pressure	R.G. OPPD	1	-	10 psia-D.P.	CAT.1 See Type B Variables, Item III.3	R.G. 1.100	REQUIRED	1E	Required	One Continuous Channel	

* - With the exception of those penetrations which are exempt from the requirement of double isolation (Ref. USAR Sect. 5.9.5) all mechanical penetrations are provided with redundant isolation valves

- QA requirements categories 1,2 and 3 shown in Section 2.3.3.A.5.

N/R - Not Required

TABLE 1

COMPARISON OF FORT CALHOUN STATION UNIT NO. 1

INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "C" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
I FUEL CLADDING											
1. CET	R.G. OPPD	1	-	200-1650°F See Type A Variables, Item III.3	CAT.1	R.G. 1.100	REQUIRED	1E	N/R	One Continuous Channel	
2. Radioactivity Concentration in primary coolant (SL-16,40)	R.G. OPPD	1 0737	- 0737	½T.S.-100 T.S. ½T.S.-100 T.S. (.5µCi/cc-100µ Ci/cc)	CAT. 1 0737	R.G. 1.100 Not Applicable	REQUIRED None	1E Non-Class	N/R	One Channel Continuous AI-194	See Note 1 In Compliance
3. Analysis of Primary Coolant (Gamma Spectrum) (SL-17 Grab Samples)	R.G. OPPD	3 0737	- 0737	10µCi/ml-10Ci/ml** 10µCi/ml-10Ci/ml**	N.S.P.	N.S.P.	N.S.P.	N.S.P.	N/R	On Demand AI-194	See Note 1 In Compliance
II REACTOR COOLANT PRESSURE BOUNDARY											
1. RCS Pressure	R.G. OPPD	1	-	0-4000 psig See Type A Variables, Item II.2	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	
2. Containment Pressure	R.G. OPPD	1	-	10-DP psia See Type B Variables, Item III.3	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	
3a. Containment Sump Water Level (Narrow)	R.G. OPPD	2	-	Sump, 0-32 in. See Type B Variables, Item III.2a	CAT.2	N.S.P.	N.S.P.	Highly Reliable	Required	On Demand	

Note 1 - The PASS gross gamma detectors will be used as on line monitors for radioactivity and gamma spectrum analysis of RC samples in lieu of the Rad. Monitor on the letdown line. This monitor cannot be used since the letdown line is isolated in an accident. The gross gamma detectors are fully qualified to NUREG-0737 and can measure RC, LPSI and sump.

- QA requirements categories 1, 2 and 3 shown in Section 2.3.3.A.5.

N/R - Not Required

** - Reg. Guide 1.97, Rev. 3 Requirement

N.S.P. = No Specific Provision

TABLE 1

COMPARISON OF FORT CALHOUN STATION UNIT NO. 1

INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "C" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
II REACTOR COOLANT PRESSURE BOUNDARY (Continued)											
3b. Containment Sump Water Level (Wide)	R.G. OPPD	1	-	0-600,000 gal. See Type B Variables, Item III.2b	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	
4. Containment Area Radiation (RM-070 thru 075)	R.G.	3	-	1R/HR-10^{4}R/HR	N.S.P.	N.S.P.	N.S.P.	N.S.P.	Required	Continuous	In Compliance
	OPPD	3	USAR	.1mR/HR-10^{7}mR/HR					Recorded		
5. Effluent Radioactivity Noble Gas (RM-057) CONDENSER OFF GAS	R.G.	3	-	10^{-6}μ Ci/cc-10^{-2}μ Ci/cc	N.S.P.	N.S.P.	N.S.P.	N.S.P.	Required	On Demand	In Compliance
	OPPD	3	USAR	10^{-6}μ Ci/cc-10^{-2}μ Ci/cc					Recorded		
III CONTAINMENT											
1. RCS Pressure	R.G. OPPD	1	-	0-4000 psig See Type A Variables, Item II.2	CAT.1	R.G. 1.100	REQUIRED	1E	Required	Continuous	
2. Containment H_2 Concentration	R.G. OPPD	1	-	0-10% See Type A Variables, Item IV.1	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	

- QA requirements categories 1, 2 and 3 shown in Section 2.3.3.A.5.
N.S.P. = No Specific Provision

TABLE 1

COMPARISON OF FORT CALHOUN STATION UNIT NO. 1

INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "C" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
III CONTAINMENT (Continued)											
3. Containment Pressure (PT-783, 784)	R.G.	1	-	10-3xD.P. psia	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	In Compliance
	OPPD	0737	0737	-5-195 psig	10CFR50.49	IEEE-344-75+	YES	1E	Recorded	CR, SPDS	
4. Containment Effluent Radioactivity (Noble Gases) (RM-063)	R.G.	2	-	10^{-6}µCi/cc-10^{-2}µCi/cc	CAT.2	N.S.P.	N.S.P.	Highly Reliable	Required	On Demand	
	OPPD	0737	0737	10^{-6}µCi/cc-10^{5}µCi/cc	0737			Non-Class	Recorded	CR	In Compliance
5. See Note 1											
6. Effluent Radioactivity (Aux. Bldg.) (RM-063)	R.G.	2	-	10^{-6}µCi/cc-10^{3}µCi/cc	CAT.2	N.S.P.	N.S.P.	Highly Reliable	Required	On Demand	
	OPPD	0737	0737	10^{-6}µCi/cc-10^{5}µCi/cc	0737			Non-Class	Recorded	CR	In Compliance

+ - The entire loop is not qualified to IEEE-344-1975, only the sensors are qualified.

- QA requirements categories 1, 2 and 3 shown in Section 2.3.3.A.5.

Note 1: Reg. Guide 1.97, Rev. 3 deleted requirement for "Radiation Exposure Rates (inside buildings or areas in direct contact with containment penetrations or hatchways)"

N.S.P. = No Specific Provision

TABLE 1
COMPARISON OF FORT CALHOUN STATION UNIT NO. 1
INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "D" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
I RESIDUAL HEAT REMOVAL SYSTEM											
1. RHR System Flow	R.G. OPPD	2	-	0-110% D.F. 0-110% D.F.	CAT.2	N.S.P.	N.S.P.	Highly Reliable	N/R	On Demand	See Section 5.4.9, 6.2.4
2. RHR System HX Outlet Temp	R.G. OPPD	2	-	40-350°F+	CAT. 2	N.S.P.	N.S.P.	Highly Reliable	N/R	On Demand	See Section 5.4.9, 6.2.5
II SAFETY INJECTION SYSTEMS											
1a.S. I. Tank Level (LT-2904, 2924, 2944, 2964)	R.G. OPPD	2 2	- USAR	10%-90% 0-100%	CAT.2 Commercial Grade	N.S.P.	N.S.P.	Highly Reliable Non-Class	N/R	On Demand CR, SPDS	See Section 5.4.1
1b.S.I. Tank Pressure (PT-2901, 2921, 2941, 2961)	R.G. OPPD	2 2	- USAR	0-750 psig 0-300 psig	CAT.2 Commercial Grade	N.S.P.	N.S.P.	Highly Reliable Non-Class	N/R	On Demand CR, SPDS	See Section 5.4.2
2. S.I. Tank Isolation Valve Position (HCV-2914, 2934 2954, 2974)	R.G. OPPD	2 2	- USAR	Open/Closed Open/Closed	CAT.2 10CFR50.49	N.S.P.	N.S.P.	Highly Reliable Class 1E	N/R	On Demand CR, SPDS	In Compliance See Section 2.3.3.B
3. Boric Acid Charging Flow (FT-236)	R.G. OPPD	2 2	- USAR	0-110% D.F. 0-140 gpm 0-117% D.F.	CAT.2 Commercial Grade*	N.S.P.	N.S.P.	Highly Reliable Non-Class	N/R	On Demand CR, SPDS	In Compliance

+ - Reg. Guide 1.97, Rev. 3
N/R - Not Required
- QA requirements categories 1,2 and 3 shown in Table 2.
* It is located in mild environment and is exempt from 10CFR50.49 as discussed in Sections 2.3.3.A.1 and 2.3.3.B.1.
N.S.P. = No Specific Provision

TABLE 1
COMPARISON OF FORT CALHOUN STATION UNIT NO. 1
INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "D" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
III SAFETY INJECTION SYSTEMS (Continued)											
4. Flow In HPSI (FT-313, 316, 319, 322)	R.G. OPPD	2 2	- USAR	0-110% D. F 0-300 gpm (0-110%)	CAT.2 10CFR50.49	N.S.P. IEEE-344-75+	N.S.P.	Highly Reliable 1E	N/R	On Demand CR, SPDS	In Compliance
5. Flow in LPSI (FT-328, 330, 332, 334)	R.G. OPPD	2 2	- USAR	0-110% 0-1500 gpm (0-110%)	CAT.2 10CFR50.49	N.S.P. IEEE-344-75+	N.S.P.	Highly Reliable 1E	N/R	On Demand CR, SPDS	In Compliance
6. SIRWT Level (LT-381, 382)	R.G. OPPD	2 2	- USAR	Top to Bottom Top to Bottom	CAT.2 10CFR50.49	N.S.P.	N.S.P.	Highly Reliable Non-Class	N/R	On Demand CR, SPDS (LT-382 Not On SPDS)	In Compliance
IV PRIMARY COOLANT SYSTEM											
1. RC Pump Status (Y-3268, 3269, 3270, 3271)	R.G. OPPD	3 3	- USAR	Meter Current 0-4200KW	N.S.P.	N.S.P.	N.S.P.	N.S.P.	N/R	On Demand CR, SPDS	In Compliance
2. Primary System Relief Valve Position (PORV) or Flow Through (FT-141, 142) (F102-1, 102-2)	R.G. OPPD	2 2	- 0737	Closed/Not Closed Flow Through (accoustic)	CAT.2 10CFR50.49	N.S.P. IEEE-344-75+	N.S.P. YES	Highly Reliable	N/R	On Demand CR, SPDS	In Compliance
3. Pressurizer Level	R.G. OPPD	1	-	Bottom to Top See Type A Variables, Item II.1	CAT.2	R.G. 1.100	REQUIRED	1E	Required	One Channel Continuous	

N/R - Not Required
+ - The entire loop is not qualified to IEEE-344-1975, only the sensors are qualified.
- QA requirements categories 1,2 and 3 shown in Section 2.3.3.A.5.
N.S.P. = No Specific Provision

TABLE 1

COMPARISON OF FORT CALHOUN STATION UNIT NO. 1

INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "D" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
IV PRIMARY COOLANT SYSTEM (Continued)											
4. Pressurizer Heater Status (Y-3272)	R.G. OPPD	2 2	- USAR	Electric Current 0-900KW	CAT 2 Commercial Grade**	N.S.P.	N.S.P. YES	Highly Reliable Non-Class	N/R	On Demand CR, SPDS	In Compliance
5. Quench Tank Level (LT-132)	R.G. OPPD	3 3	- USAR	Top to Bottom Top to Bottom	N.S.P.	N.S.P.	N.S.P.	N.S.P.	N/R	On Demand CR, ERF, SPDS	In Compliance
6. Quench Tank Temperature (TE-133)	R.G. OPPD	3 3	- USAR	50-750°F 50-300°F(CR) 50-750°F(SPDS)	N.S.P.	N.S.P.	N.S.P.	N.S.P.	N/R	On Demand CR, SPDS	See Sec. 5.4.4 In Compliance
7. Quench Tank Pressure (PT-131)	R.G. OPPD	3 3	- USAR	0 to [illegible] P. 0-25 psig [illegible] psig)*	N.S.P.	N.S.P.	N.S.P.	N.S.P.	N/R	On Demand CR, SPDS	See Sec. 5.4.3 and Sec. 6.2.1
SECONDARY SYSTEM											
1. Steam Generator Level	R.G. OPPD	1	-	Tube Sheet to Separators See Type A Variables, Item III.6	CAT.1	R.G. 1.100	REQUIRED	1E	N/R	One Channel Continuous	
2. Steam Generator Pressure	R.G. OPPD	2	-	20% Above Lowest Valve Setting See Type A Variables, Item III.7	CAT.2	N.S.P.	N.S.P.	Highly Reliable	N/R	On Demand	

N/R - Not Required

- QA requirements categories 1,2 and 3 shown in Section 2.3.3.A.5.

* Proposed Range

** - It is located in mild environment and is exempt from 10CFR50.49 as discussed in Sections 2.3.3.A.1 and 2.3.3.B.1.

N.S.P. = No Specific Provision

TABLE 1

COMPARISON OF FORT CALHOUN STATION UNIT NO. 1

INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "D" VARIABLES

	INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
V	SECONDARY SYSTEM (Continued)											
3.	Relief Valve Position	R.G.	2	-	Clsd/Not Clsd	CAT.2	N.S.P.	REQUIRED	Highly Reliable	N/R	On Demand	
	(MS-291,292)	OPPD	2	USAR	Clsd/Not Clsd	10CFR50.49	IEEE-344-75	NO	1E		CR	In Compliance
4.	Main Feedwater Flow	R.G.	3	-	0-110% D.F.	N.S.P.	N.S.P.	N.S.P.	N.S.P.	Required	On Demand	
	(FT-1101, 1102)	OPPD	3	USAR	0-110% D.F. ($0-4 \times 10^6$ lbs/hr)					Recorded	CR, SPDS	In Compliance
VI	AUX FEEDWATER											
1.	Aux Feedwater Flow	R.G.	2	-	0-110% D.F.	CAT.2	N.S.P.	N.S.P.	Highly Reliable	N/R	On Demand	
	(FT-1109, 1110)	OPPD	2	USAR	0-110% D.F. (0-300 gpm)	10CFR50.49	IEEE-344-75+	YES	Highly Reliable		CR, SPDS	In Compliance
2a.	Condensate Storage Tank Water Level	R.G.	3	-	Plant Specific	N.S.P.	N.S.P.	N.S.P.	N.S.P.	N/R	On Demand	In Compliance
	(LT-1191)	OPPD	3	USAR	Top-Bottom	Commercial Grade					CR	
2b.	Emergency Feedwater Tank Level	R.G.	1	-	Plant Specific	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Continuous Channel	
	(LT-1183, 1188)	OPPD	1	USAR	0-160" (0-100%)	10CFR50.49	IEEE-344-75+	YES	1E	SPDS	CR, SPDS	In Compliance
VII	CONTAINMENT COOLING SYSTEMS											
1.	Containment Spray Flow	R.G.	2	-	0-110% D.F.	CAT.2	N.S.P.	N.S.P.	Highly Reliable	N/R	On Demand	
	(FT-342,343)	OPPD	2	USAR	0-5000 gpm (0-110% D.F.)	Commercial Grade *		YES	Highly Reliable		CR, SPDS	In Compliance

N/R - Not Required

+ - The entire loop is not qualified to IEEE-344-1975, only the sensors are qualified.

- QA requirements categories 1,2 and 3 shown in Section 2.3.3.A.5.

* - It is located in mild environment and is exempt from 10CFR50.49 as discussed in Sections 2.3.3.A.1 and 2.3.3.B.1. This device will perform its intended function prior to its environment being considered a harsh environment.

N.S.P. = No Specific Provision

TABLE 1
COMPARISON OF FORT CALHOUN STATION UNIT NO. 1
INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "D" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
VII CONTAINMENT COOLING SYSTEMS (Continued)											
2. Heat Removal by the Containment Fan (FT-416, 417, 418, 419)	R.G. OPPD	2 2	- USAR	Plant Specific 0-2500 gpm	CAT.2 10CFR50.49	N.S.P. IEEE-344-1975	N.S.P.	Highly Reliable Class 1E	N/R	On Demand EPDS, CR	In Compliance
3. Containment Atmosphere Temperature	R.G. OPPD	2 2	- USAR	40-400°F 0-400°F	CAT.2 Commercial Grade	N.S.P.	N.S.P.	Highly Reliable Non-Class	N/R	On Demand SPDS	See 5.4.5, 6.2.3
4. Containment Sump Water Temperature	R.G. OPPD	2	-	50-250°F	CAT.2	N.S.P.	N.S.P.	Highly Reliable	N/R	On Demand	See 6.2.6
VIII CHEMICAL AND VOLUME CONTROL											
1. Makeup Flow	R.G. OPPD	2	-	0-110% D.F. See Type D Variables, Item II.3	CAT.2	N.S.P.	N.S.P.	Highly Reliable	N/R	On Demand	
2. Letdown Flow (FT-212)	R.G. OPPD	2 2	- USAR	0-110% D.F. 0-110% D.F.	CAT.2 Commercial Grade	N.S.P.	N.S.P.	Highly Reliable Non-Class	N/R	On Demand CR, SPDS	See 5.4.7
3. Volume Control Tank Level (LT-219)	R.G. OPPD	2 2	- USAR	Top to Bottom 0-100%	CAT.2 Commercial Grade	N.S.P.	N.S.P.	Highly Reliable Non-Class	N/R	On Demand CR, SPDS	See 5.4.8

N/R - Not Required
- QA requirements categories 1,2 and 3 shown in Section 2.3.3.A.5
N.S.P. = No Specific Presentation

TABLE 1

COMPARISON OF FORT CALHOUN STATION UNIT NO. 1

INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "D" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS	
IV COOLING WATER SYSTEM												
1. Component Cooling Water Temperature (TE-493, 494, 495, 496)	R.G.	2	-	40-200°F++	CAT.2	N.S.P.	N.S.P.	Highly Reliable	N/R	On Demand		
	OPPD	2	USAR	0-300°F					N	CR	See 5.4.10	4
2. Component Cooling Water Flow	R.G.	2	-	0-110% D.P.	CAT.2	N.S.P.	N.S.P.	Highly Reliable	N/R	On Demand	See 5.4.11	4
	OPPD	2	USAR							CR, SPDS		
X RADWASTE SYSTEMS												
1. High Level Rad. Liquid Tank Level (LT-577, 578, 579)	R.G.	3	-	Top to Bottom	No Provision	N.S.P.	N.S.P.	No Specific	N/R	On Demand		
	OPPD	3	USAR	Top to Bottom	Commercial			Non-Class		AI-100, SPDS	In Compliance	
2. Rad. Gas Holdup Tank (PT-517, 518, 519, 520)	R.G.	3	-	0-150% D.P.		N.S.P.	N.S.P.		N/R	On Demand		
	OPPD	3	USAR	0-150%* D.P.			NO	Non-Class		AI-100, SPDS	See 5.4.6 and 6.2.2	4
XI VENTILATION SYSTEMS												
1. Emergency Ventilation Damper Position (HCV-724 A/B HCV-725 A/B)	R.G.	2	-	Open/Closed	CAT.2	No Provision	No Provision	Highly Reliable	N/R	On Demand		
	OPPD	2	USAR	Open/Closed	10CFR50.49	IEEE-344-75+	YES	Non-Class		CR, SPDS	In Compliance	

NOTE 1 - Containment Ventilation Systems were considered only.

* - Proposed range modification.

N/R - Not Required

- QA requirements categories 1,2 and 3 shown in Section 2.3.3.A.5.

+ - The entire loop is not qualified to IEEE-344-1975, only the sensors are qualified.

** - It is located in mild environment and is exempt from 10CFR50.49 as discussed in Sections 2.3.3.A.1 and 2.3.3.B.1. This device will perform its intended function prior to it's environment bieng considered a harsh environment.

++ - Reg. Guide 1.97 Rev. 3.

N.S.P. = No Specific Provision

TABLE 1
COMPARISON OF FORT CALHOUN STATION UNIT NO. 1
INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "D" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
XII POWER SUPPLIES											
1. Status of Standby Power	R.G.	2	-	Plant Specific	CAT.2	N.S.P.	N.S.P.	Highly Reliable	N/R	On Demand	
a. 4kVAC buses	OPPD	2	USAR	Volts, amps, watts	Note 1			1E	N/R	Control Room	In Compliance
b. 480VAC buses	OPPD	2	USAR	Volts, amps,	Note 1			1E	N/R	Control Room	In Compliance
c. 125 VDC buses	OPPD	2	USAR	Volts, amps	Note 1			1E	N/R	Control Room	In Compliance
d. 120VAC busses (Vital bus inverters)	OPPD	2	USAR	Volts (alarm only)	Note 1			1E	N/R	Control Room	In Compliance
e. EDG Status	OPPD	2	USAR	Volts, amps, watts	Note 1			1E	N/R	Control Room SPDS	In Compliance
f. EDG Speed	OPPD	2	USAR	rpm	Note 1			1E	N/R	Control Room	In Compliance
g. Non 1E UPS				(N O I N D I C A T I O N I S P R O V I D E D)							

N/R - Not Required
- QA requirements categories 1,2 and 3 shown in Section 2.3.3.A.5.
Note 1 - This is located in a mild environment and is therefore excluded from the scope of 10CFR50.49. The equipment, however, meets the qualification requirements as they applied at the time of issue of construction permit and therefore meets applicable requirements for a mild environment.
N.S.P. = No Specific Provision

TABLE 1

COMPARISON OF FORT CALHOUN STATION UNIT NO. 1

INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "E" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
I CONTAINMENT RADIATION											
1. Containment Area Radiation (High Range)	R.G. 1 OPPD	1	-	$1-10^{7}$ R/hr See Type A Variables, Item V.1	CAT.1	R.G. 1.100	REQUIRED	1E	Required	One Continuous Channel	
II Area Radiation											
1. Radiation Exposure Rate	R.G. OPPD	3*	-	10^{-1}R-10^{4}R/hr See Type C Variables, Item II.4	CAT.2	N.S.P.	N.S.P.	Highly Reliable	Required	On Demand	
III AIRBORNE RADIOACTIVE MATERIALS RELEASED											
A. Noble Gases											
1. Noble Gases Containment	R.G. OPPD	2	-	10^{-6}µCi/cc - 10^{-5}µCi/cc See Type C Variables, Item III.4	CAT.2	N.S.P.	N.S.P.	Highly Reliable	Required	On Demand	
2. Noble Gases Reactor Bldg.	(PERFORMED BY			INSTRUMENTS	ABOVE)						
3. Noble Gases Aux. Bldg	R.G. OPPD	2	-	10^{-6}µCi/cc - 10^{-3}µCi/cc See Type C Variables, Item III.6	CAT.2	N.S.P.	N.S.P.	Highly Reliable	Required	On Demand	

- QA requirements categories 1,2 and 3 shown in Section 2.3.3.A.5.

* - Reg. Guide 1.97 Rev. 3.

N.S.P. = No Specific Provision

TABLE 1

COMPARISON OF FORT CALHOUN STATION UNIT NO. 1

INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "E" VARIABLES

INSTRUMENT	CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
III AIRBORNE RADIOACTIVE MATERIALS RELEASED (Continued)										
4. Noble Gases Condenser Air Removal	(DISCHARGE EFFLUENT THROUGH COMMON PLANT VENT, THUS NOT REQUIRED AS PER REG. GUIDE)									
5. Noble Gases Common Vent	R.G.	2	-	10^{-6} µCi/cc -10^{-3} µCi/cc	CAT.2	N.S.P.	N.S.P.	Highly Reliable	Required	On Demand	
	OPPD			See Type C Variables, Item III.4							
6. Vent for S/G Safety Relief Valves & Atmosphere Dump Valve, & Feedwater Turbine (RM057) (RM064)	R.G.	2	-	10^{-1} µCi/cc -10^{-3} µCi/cc	CAT.2	N.S.P.	N.S.P.	Highly Reliable	Required	On Demand	
	OPPD	0737	0737	10^{-1} µCi/cc -10^{-3} µCi/cc	0737			Highly Reliable	Recorded	CR	In Compliance (RM064 indirectly monitors steam released through this path.)
7. All Other Identified Release Points	(N O T H E R P O I N T S A R E I D E N T I F I E D)										
B. PARTICULATES & HALOGENS										
1. All Identified Plant Release Points (RM050, 060, 061, 063)	R.G.	3	-	10^{-3} µCi/cc -10^{-2} µCi/cc	N.S.P.	N.S.P.	N.S.P.	N.S.P.	Required	On Demand	
	OPPD	0737	0737	10^{-3} µCi/cc -10^{-2} µCi/cc	0737				Recorded	CR	In Compliance

- QA requirements categories 1,2 and 3 shown in Section 2.3.3.A.5.
N.S.P. = No Specific Provision

TABLE 1

COMPARISON OF FORT CALHOUN STATION UNIT NO. 1

INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "E" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
IV Environs Radiation and Radioactivity											
1. See Note 1											
2. Airborne Radio Halogens and Particulates (Portable)	R.G.	3	-	10^{-9} µCi/cc -10^{-3} µCi/cc	N.S.P.	N.S.P.	N.S.P.	N.S.P.	N/R	On Demand	
	OPPD	3	USAR	10^{-9} µCi/cc -10^{-3} µCi/cc						Continuous Readout (Portable)	In Compliance
3. Plant and Environs Radiation (Portable)	R.G.	3	-	10^{-3} R/hr -10^{4} R/hr	N.S.P.	N.S.P.	N.S.P.	N.S.P.	N/R	On Demand	
	OPPD	3	USAR	10^{-3} R/hr -10^{2} R/hr						Continuous Readout (Portable)	In Compliance
4. Plant and Environs Radioactivity	RG	3	-								
	OPPD	3	Performed by aboye instruments								
METEOROLOGY											
1. Wind Direction (F0031, 0032, 0033, 0034, 0043, 0044, 0045)	R.G.	3	-	0-360° ±5°	N.S.P.	N.S.P.	N.S.P.	N.S.P.	N/R	On Demand	In Compliance
	OPPD	3	USAR	0-360° ±5°						CR, SPDS	See 5.5.1 ⚠1
2. Wind Speed (F0035, 0036, 0037, 0038)	R.G.	3	-	0-67 mph	N.S.P.	N.S.P.	N.S.P.	N.S.P.	N/R	On Demand	
	OPPD	3	USAR	0-80 mph						CR, SPDS	See 5.5.1 ⚠1

- QA requirements categories 1,2 and 3 shown in Section 2.3.3.A.5.

N/R - Not Required

NOTE 1 - Reg. Guide 1.97, Rev. 3 deleted requirements for "Radiation Exposure Meters, Continuous Indication at Fixed Location".

N.S.P. = No Specific Provision

TABLE 1
COMPARISON OF FORT CALHOUN STATION UNIT NO. 1
INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "E" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
V METEOROLOGY (Continued)											
3. Estimation of Atmospheric Stability (F0039, 0040, 0041, 0042)	R.G.	3	-	-5°C - 10°C	N.S.P.	N.S.P.	N.S.P.	N.S.P.	N/R	On Demand	Section 5.5.1
	OPPD	3	USAR	-5°C - 15°C						CR, SPDS	
VI Accident Sampling Capability											
A. Primary Coolant and Sump	R.G.	3	-	Grab Sample	N.S.P.	N.S.P.	N.S.P.	N.S.P.	N/R	On Demand	
	OPPD	0737	0737	Grab Sample							In Compliance
1. Gross Activity (Provided by PASS) (SL-16, 40)	R.G.	3	-	10μCi/ml -10Ci/ml	N.S.P.	N.S.P.	N.S.P.	N.S.P.	N/R	On Demand	
	OPPD	0737	0737	10μCi/ml -10Ci/ml						Readout on Panel AI-194	In Compliance
2. Gamma Spectrum (Provided by PASS) (SL-17)	R.G.	3	-	ISOTOPIC	N.S.P.	N.S.P.	N.S.P.	N.S.P.	Required	On Demand	
	OPPD	0737	0737	ISOTOPIC					Recorded	On Demand	In Compliance
3. Boron Content	R.G.	3	-	0-6000 ppm	N.S.P.	N.S.P.	N.S.P.	N.S.P.	Required	On Demand	
	OPPD			See Type B Variables, Item I.3							

- QA requirements categories 1,2 and 3 shown in Section 2.3.3.A.5.
N/R - Not Required
N.S.P. = No Specific Provision

TABLE 1
COMPARISON OF FORT CALHOUN STATION UNIT NO. 1
INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "E" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
VI ACCIDENT SAMPLING CAPABILITY (Continued)											
A. PRIMARY COOLANT & SUMP (contd)											
4. Chloride Content (Provided by PASS) (SL-25)	R.G.	3	-	0-20 ppm	N.S.P.	N.S.P.	N.S.P.	N.S.P.	Required	N.S.P.	
	OPPD	0737	0737	0-20 ppm					Recorded		In Compliance
5. Dissolved H_2 Hydrogen or Total Gas (Provided by PASS) (SL-24)	R.G.	3	-	0-2000 cc/kg	N.S.P.	N.S.P.	N.S.P.	N.S.P.	N/R	On Demand	
	OPPD	0737	0737	0-2000 cc/kg						Total Gas Analysis per 0737	In Compliance
6. Dissolved Oxygen	R.G.	3	-	0-20 ppm	N.S.P.	N.S.P.	N.S.P.	N.S.P.	N/R	On Demand	
	OPPD	0737	0737	N.S.P.*							District was not required to provide as per 0737 II.B.3.1-2 requirements, and response to requirements.
7. PH (Provided by PASS) (PHE-6742)	R.G.	3	-	1-13	N.S.P.	N.S.P.	N.S.P.	N.S.P.	N/R	On Demand	
	OPPD	0737	0737	0-14						Readout on Panel AI-194	In Compliance
B. CONTAINMENT AIR											
1. Hydrogen Content	R.G.	3	-	0-10%	N.S.P.	N.S.P.	N.S.P.	N.S.P.	Required	On Demand	
	OPPD				See Type A Variables, Item IV-1.						

* No Specific P.A.S.S. Component. Can Take Grab Sample and Analyze Utilizing Chemistry Procedures
- QA requirements categories 1,2 and 3 shown in Section 2.3.3.A.5.
N/R - Not Required
N.S.P. = No Specific Provision

TABLE 1
COMPARISON OF FORT CALHOUN STATION UNIT NO. 1
INSTRUMENTATION WITH REGULATORY GUIDE 1.97 REV. 2 REQUIREMENTS

TYPE "E" VARIABLES

INSTRUMENT		CAT.	QA	RANGE	ENV QUAL.	SEIS QUAL.	REDUND.	POWER SUPPLY	RECORDING	DISPLAY LOCATION	COMMENTS
VI.B CONTAINMENT AIR (Continued)											
2. Oxygen Content	R.G.	3	-	0-30%	N.S.P.	N.S.P.	N.S.P.	N.S.P.	N/R	On Demand	Not required per SER dated 1/31/83 and 9/1/83
				(N O S P E C I F I C I N S T R U M E N T *)							
3. Gamma Spectrum (Provided by PASS) (SL-35, 40)	R.G.	3	-	ISOTOPIC	N.S.P.	N.S.P.	N.S.P.	N.S.P.	N/R	On Demand	
	OPPD	0737	0737	ISOTOPIC						On Demand	In Compliance

* No Specific P.A.S.S. Component. Can Take Grab Sample and Analyze Utilizing Chemistry Procedures
- QA requirements categories 1,2 and 3 shown in Section 2.3.3.A.5.
N/R - Not Required
N.S.P. = No Specific Provision