Florida Power
CORPORATION

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Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Crystal River Unit 3
Docket No. 50-302
Operating License No. DPR-72
NUREG 0737, Supplement 1
Regulatory Guide 1.97
(TAC 51083)

Dear Sir:

Florida Power Corporation (FPC) is submitting a revised set of R.G. 1.97 variable sheets, which were originally sent to you with our August 21, 1984 transmittal. Revisions include equipment modifications that were made in Refuel VI which ended January 10, 1988.

The status that is shown on the attached variable sheets is considered complete with the exception of the following items which are scheduled to be completed by the end of Refuel VII presently scheduled to begin in Fall 1989, or as otherwise stated.

1. FPC will install environmentally qualified current measurement instrumentation to monitor the status of the pressurizer heaters during an emergency.

2. FPC will install valve position indication for the Main Steam Safety/Relief Valves and the Atmospheric Dump Valves.

3. FPC is still planning to complete the "on demand" displays for the Reactor Building High Range Radiation Monitors and the sump level variables into Recall by September 1988.

A003
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Sincerely,

K. R. Wilson, Manager
Nuclear Licensing

Enclosure

KRW/EMG/sdr

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Regional Administrator, Region II

Mr. T. F. Stetka
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Rev: 01
Date: 2/10/88

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CRYSTAL RIVER 3

REGULATORY GUIDE 1.97 POSITION DOCUMENT

I. INTRODUCTION

Supplement 1 to NUREG-0737, Requirements for Emergency Response Capability (Generic Letter No. 82-33), dated December 17, 1982 required Florida Power Corporation (FPC) to submit a report describing how it meets the requirements of Regulatory Guide 1.97 (Rev. 2) including supporting technical justification or alternatives for any proposed deviations.

As stated in the cover letter to, and sections 6.1.B and 6.2 of Supplement 1 to NUREG 0737, FPC is using the referenced document as guidance. This allows FPC the flexibility to tailor the guidance given to the specific requirements of Crystal River 3 and to take exception to some of the requirements as long as deviations are shown and supporting justification or alternatives are provided.

This document provides the requested information and is organized to be consistent with Table 3 (PWR Variables) of R.G. 1.97, (Rev. 3). Revision 3 of the Regulatory Guide was used as opposed to Revision 2 to more accurately reflect the current NRC guidance on post-accident monitoring.

II. FORMAT

Each page of the Compliance Table is devoted to a single R.G. 1.97 variable and a comparison of its present status at CR3 to the guidance given in R.G. 1.97, Rev. 3.

On the Compliance Table, where certain requirements are not applicable to a particular variable due to its assigned category and therefore those requirements are not met, a response of "No, not required" will be found for that requirement. If CR3 meets the requirement, regardless of whether or not it's required by its assigned category, a response of "Yes, Complies" will be found.

For each variable, the following heading and contained information will be found on the Compliance Table.

A. VARIABLE

This is the name of the variable as found in R.G. 1.97. If a different nomenclature is utilized at CR-3, it will be contained in parenthesis.

B. TYPE AND CATEGORY

The variables identified are divided into 5 types in accordance with Regulatory Guide 1.97. The definition of each type is as follows:

1. Type A - Those variables which provide the primary information required to permit the control room operators to take specific manual actions for which no automatic control is provided, and that are required for a safety system to accomplish its safety function for design basis accident scenarios. Type A variables are not specified in Regulatory Guide 1.97. They are plant specific and must be selected based on a review of Emergency Operating Procedures to identify information essential for the direct accomplishment of specified safety functions. As a result of a review of the CR3 Emergency Operating Procedures, the following variables were identified as Type A:

   RCS Hot Leg Temperature
   RCS Pressure
   Borated Water Storage Tank Level
   Steam Generator Level
   Steam Generator Pressure

2. Type B - These variables provide information to indicate whether plant safety functions are being accomplished. Plant safety functions are defined as: reactivity control, core cooling, maintaining reactor coolant system integrity, and maintaining containment integrity.

3. Type C - These variables provide information to indicate the potential for breach or the actual breach of barriers to fission product release. The barriers are defined as: fuel cladding, primary coolant pressure boundary, and containment.

4. Type D - These variables provide information to indicate the operation of individual safety systems and other important systems. These variables help the operator make appropriate decisions in using the individual systems in mitigating the consequences of an accident.

5. Type E - These variables provide information for use in determining the magnitude of the release of radioactive materials and for use in assessing the consequences of such releases.

The variable type listed on the Compliance Table is in accordance with Table 3 of Regulatory Guide 1.97.

In accordance with Regulatory Guide 1.97 each variable is assigned to one of three separate categories that provide a graded approach to the requirements depending on the safety importance of the measurement of a specific variable.

Category 1 provides the most stringent requirements and is intended for key variables. Category 2 provides less stringent requirements and generally applies to instrumentation designated for indicating system operating status.
Category 3 is intended to provide requirements that will ensure that high-quality off-the-shelf instrumentation is obtained and applies to backup and diagnostic instrumentation. It is also used where the state of the art will not support requirements for higher qualified instrumentation.

The category listed for each variable in the Compliance Table is the category assigned by FPC. Generally, this is the same category as listed in Regulatory Guide 1.97. If however FPC has determined that a particular variable is not a key variable or other less stringent requirements better apply, then a note is added referencing to the FPC position, where justification is supplied for the category change.

C. RANGE

The ranges listed in the Compliance Table are the actual measurement range of the variable at CR3 and the range recommended by the Regulatory Guide. If the range varies from that stated in the Regulatory Guide, a note is added referencing to FPC's position where justification is supplied for the existing range. In those cases where the existing range varies from the Regulatory Guide and FPC intends to upgrade to the regulatory guidance, a note is added stating that the range will comply. In some instances, the Regulatory Guide states the range in terms of a percentage of the design. In these cases, the design basis is listed next to the range in parenthesis.

D. ENVIRONMENTAL QUALIFICATION

A response of "Yes, Complies" on the Compliance Table indicates that the currently installed equipment meets the requirements of IE Bulletin 79-01B and 10 CFR 50.49. This determination was based on either having actual environmental qualification documentation available or documentation on similar equipment available.

For Category 2 variables, FPC considers existing installed instrumentation located in a mild environment to be adequate for Regulatory Guide 1.97 Category 2 variables. FPC also considers portions of the Non-nuclear Instrumentation (NNI) adequate for Category 2 variables and has the following position:

For strings which include hardware located in a harsh environment, portions in the harsh environment (sensors, cabling, terminations) should be qualified for the accident temperature, pressure, humidity, radiation and chemical environment. Hardware located in a mild environment (cabling, terminations, processing modules, power supplies, indicators and recorders) is adequate as currently installed.

The basis for this position is as follows:

The Category 2 qualification requirements of Regulatory Guide 1.97, Rev. 3, include no specific provision for seismic qualification. We interpret this to mean that environmental qualification only is required. Since 10CFR50.49 does not require environmental qualification for equipment located in a mild environment, only those components listed in a harsh environment need be qualified.

The currently installed NNI equipment was not supplied as safety related equipment but is comparable in quality and reliability to existing safety related equipment. In fact, some of the NNI electronic modules are identical to those qualified and supplied for these safety related systems. Operating experience with the NNI indicates that this instrumentation can reasonably be expected to be operable for accident monitoring.

Category 2 instrumentation is not required to be seismically qualified, redundant, physically and electrically separated nor powered from a 1E source. The existing NNI hardware located in a mild environment is consistent with the Category 2 criteria and no substantial improvement in reliability or safety would be expected if this equipment were replaced with new, qualified hardware.

For those instruments which are not now installed or for which proper documentation does not currently exist but is required for compliance, either documentation will be generated or the equipment will be replaced. This is indicated on the Compliance Table by a response of "No, Will Comply".

Other responses are self explanatory.

E. SEISMIC QUALIFICATION

A response of "Yes, Complies" on the Compliance Table indicates that the entire instrument string is seismically qualified in accordance with Regulatory Guide 1.100. For equipment which is not presently installed or where only a portion of the instrument string is seismically qualified and must be upgraded, a response of "No, Will Comply" will appear on the Compliance Table. Other responses are self-explanatory.

F. QUALITY ASSURANCE

A response of "Yes, Complies" on the Compliance Table indicates that Quality assurance requirements meeting CR3's licensing commitments as documented in the FSAR Section 1.6 were applied to at least the safety-related portions of the instrument string. In instances where new equipment is being installed or existing equipment upgraded to the above requirement, a response of "No, Will Comply" will appear. All other responses are self-explanatory.

G. REDUNDANCY

A response of "Yes, Complies" indicates that redundant channels are available up to and including any isolation device and that the channels are both electrically independent and physically separate from each other, in accordance with IEEE Standard 279-1971, and meet single failure criteria.

A response of "No", indicates that even though more than one channel may be available as shown, they do not meet the above requirements.

"Will Comply" indicates that the existing channels will be upgraded to comply with the above requirements, or new equipment will be installed to those requirements.

H. POWER SOURCE

The power source for the instrument string listed on the Compliance Table is in compliance with the Regulatory Guide requirements unless otherwise noted.

I. DISPLAY

Under this heading on the Compliance Table is how the variable is indicated and/or recorded in the Control Room (CR). This is in compliance with the regulatory guidance unless otherwise indicated that it "Will Comply".

If the variable is available on demand in the Technical Support Center (TSC) or the Emergency Operating Facility (EOF) it will be so stated.

J. SCHEDULE

This area of the Compliance Table indicates when the upgrades (if required) will be complete. Refuel V was completed August 1985 and Refuel VI in January 1988.

K. POSITION

In this area of the Compliance Table will be Florida Power Corporation's position on a particular variable which will include any justifications which are required along with any comments or clarifying remarks which may be needed.

If the justification presented is justification developed by the Babcock & Wilcox Owners Group (BWOG) Regulatory Guide 1.97 Task Force, it will be so stated.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Neutron Flux
TYPE & CATEGORY:		B 1
RANGE:	CR-3	10^{-8} to 100%
	NRC	10^{-6} to 100%
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		Yes, complies 2 channels
POWER SOURCE:		1E, complies
DISPLAY:		Indicated and recorded in CR, on demand in TSC and EOF
SCHEDULE:		Installed
POSITION:		Complies

The installation of a two channel Gamma-Metric System was completed during Refuel VI which meets all the requirements of Reg. Guide 1.97.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Control Rod Position
TYPE & CATEGORY:		B 3
RANGE:	CR-3	0-100%, Full-in/Full-out, Avg group Lights Position
	NRC	Full-in or not Full-in
ENVIRONMENTAL QUALIFICATION:		No, not required
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		No, not required
REDUNDANCY:		No, not required 2 channels
POWER SOURCE:		Regulated instrument BUS VBDP-1 and VBDP-2
DISPLAY:		Indicated in CR Avg group position, on demand in TSC & EOF
SCHEDULE:		Installed
POSITION:		Complies

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		RCS Soluble Boron Content
TYPE & CATEGORY:		B 3
RANGE:	CR-3	0-6000 ppm
	NRC	0-6000 ppm
ENVIRONMENTAL QUALIFICATION:		No not required
SEISMIC QUALIFICATION:		No not required
QUALITY ASSURANCE:		No, not required
REDUNDANCY:		No, not required
POWER SOURCE:		1E/DG
DISPLAY:		In laboratory only, need not comply
SCHEDULE:		Installed
POSITION:		Complies

The following position is a justification developed by the BWOG Reg. Guide 1.97 Task Force.

The manual sampling and laboratory analysis is sufficient to meet the intent of Regulatory Guide 1.97, Rev. 03. This is based on the fact that the loss of negative reactivity due to xenon decay is sufficiently slow that the control room operator need not know instantaneously or continuously what the boron concentration is in the RCS. Also, Section II.B.3 of NUREG-0737 requires that capability exists to sample and analyze the reactor coolant in a post-accident environment.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		RCS Hot Leg Water Temperature
TYPE & CATEGORY:		A,B 1
RANGE:	CR-3	120° to 920°F, see Position
	NRC	50° to 700°F
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		Yes, complies 2 channels
POWER SOURCE:		1E/DG
DISPLAY:		Indicated and recorded in CR On demand in TSC & EOF
SCHEDULE:		Installed
POSITION:		Complies

RCS Hot Leg Water Temperature is a key variable for monitoring the core cooling safety function. It is used with RCS pressure to monitor the status of the RCS with respect to saturation and subcooled margin limits. It is used with Core Exit Temperature to verify natural circulation and to identify loss of natural circulation. It can also be used with Steam Generator Pressure to verify coupling between the RCS and the Secondary System.

The RCS hot leg temperature range does not envelope the lower end of the Reg. Guide 1.97 recommended range, however the existing range is acceptable based on the following:

1. At temperatures less than 280°F, the plant will be in the Decay Heat Removal mode and this temperature is not required.

2. Cold Shutdown is defined in the Technical Specification as less than 200°F.

3. RCS cold leg temperature range will indicate down to 50°F.

Instrument upgrades to meet requirements of Reg. Guide 1.97 were completed during Refuel VI.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		RCS Cold Leg Water Temperature
TYPE & CATEGORY:		B 3, see Position
RANGE:	CR-3	50° to 650°F, see Position
	NRC	50° to 700°F
ENVIRONMENTAL QUALIFICATION:		No, need not comply
SEISMIC QUALIFICATION:		No, need not comply
QUALITY ASSURANCE:		No, need not comply
REDUNDANCY:		No, need not comply 2 channels
POWER SOURCE:		1E/DG
DISPLAY:		Indicated and recorded in CR On demand in TSC & EOF
SCHEDULE:		Installed

POSITION:

The following position is a justification developed by the BWOG Reg. Guide 1.97 Task Force.

Reg. Guide 1.97 lists cold leg water temperature as a Category 1 (key) variable and core exit temperature as a Category 3 (backup) variable for the core cooling function. Cold leg temperature indication may not in all cases provide valid information on the status of core cooling. Since it is located in the RCS loops and not the reactor vessel, there must be either forced or natural circulation flow through the steam generators for indications to be representative of actual core conditions. Also, due to the proximity of the cold leg RTD's to the HPI nozzles, HPI flow may significantly affect the cold leg temperature indication particularly in the absence of forced RCS flow. Incore temperature monitors provide a more direct indication of core cooling independent of whether or not there exists coolant flow through the loops.

The key variables for monitoring the core cooling plant safety function are RCS Hot Leg Water Temperature, Core Exit Temperature, and Steam Generator Pressure (see Discussion section for RCS Hot Leg Water Temperature). RCS Cold Leg Water Temperature is a backup temperature monitor to the RCS Hot Leg Water Temperature and Core Exit Temperature.

For these reasons, core exit temperature and RCS Hot Leg are the key variables for monitoring core cooling and are qualified to Category 1 requirements while RCS cold leg temperature serves as a backup variable and is qualified to Category 3 requirements accordingly.

The CR-3 range of 50 to 650°F is based on providing the capability of the RCS Cold Leg Water Temperature instrumentation to measure a value greater than the saturation temperature for the steam generators, which is approximately 500°F (based on 1050 psig design pressure). 650°F for the high end of the range provides 15% excess measurement capability and is approximately 110% of the design temperature of 600°F. The low end of the range, 50°F, allows for measurement of the variable during conditions where the DHRS or LPI system is not in use or available and the steam generators are removing decay heat.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		RCS Pressure
TYPE & CATEGORY:		A,B,C 1
RANGE:	CR-3	0-3000 psig
	NRC	0-3000 psig
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		Yes, complies 2 channels
POWER SOURCE:		1E/DG
DISPLAY:		Indicated and recorded in CR On demand in EOF & TSC
SCHEDULE:		Installed
POSITION:		Complies

Portion of the instrument loop from the ES test cabinet to the control board were upgraded to C' , 1E requirements during Refuel VI.

RCS pressure transmitters were replaced during Refuel V. New transmitters meet RG 1.89 requirements (1E and environmental qualification).

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Coolant Inventory (Reactor Vessel Level)
TYPE & CATEGORY:		B 1
RANGE:	CR-3	Bottom of hot leg to top of hot leg Bottom of hot leg to top of vessel
	NRC	Bottom of hot leg to top of vessel
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		Yes, complies 2 channels
POWER SOURCE:		1-E
DISPLAY:		Indicated and recorded in CR
SCHEDULE:		Installed
POSITION:		Complies

Ref: The NRC's evaluation of CR-3's response to NUREG-0737, Item II.F.2, Docket No. 50-302, dated 9/6/83.

Reactor vessel level and hot leg level, including reactor coolant pump monitors to detect voids in coolant was implemented during Refuel V to satisfy NUREG-0737, Item II.F.2.

Reactor Coolant Inventory Tracking System -- (RCITS) provides a continuous indication of reactor vessel inventory trending when the pumps are tripped. When the pumps are running, the void fraction indicators provide inventory level trend measurement.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Degrees of Subcooling
TYPE & CATEGORY:		B 2
RANGE:	CR-3	± 658°F
	NRC	200°F subcool to 35°F superheat
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		No, not required (1 channel per loop)
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated in CR
SCHEDULE:		Installed
POSITION:		Complies

Two subcooling margin monitors are located on the PSA section of the main control board. These instruments continuously display saturation temperature for each loop. In addition to displaying saturation temperature, each instrument can display RC pressure and core exit temperature on demand. Two separate groups of 6 CET's each have been selected to provide representative temperatures from each core quadrant and the control region. The temperature displayed on demand is the highest of the six CET's in each group and displays over a range of 0°F to 1,023°F, well above saturation temperatures.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Containment Sump Water Level (Narrow Range)
TYPE & CATEGORY:		B,C 2
RANGE:	CR-3	0-10 ft.
	NRC	Sump
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		Yes complies 2 channels
POWER SOURCE:		UPS/DG with 1E standby
DISPLAY:		Indicated and recorded in EFIC room On demand in TSC & EOF
SCHEDULE:		Installed
POSITION:		Complies

Ref: Safety Evaluation Report, Docket No. 50-302 dated January 13, 1984

Due to lack of space in the Control Room, the indicators and recorder are located in the Emergency Feedwater Initiation and Control (EFIC) Room. The NRC in the above referenced SER found that this location adequately satisfies the requirements of NUREG-0737, Item II.F.1.5.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Containment Sump Water Level (Flood Level)
TYPE & CATEGORY:		B,C 1
RANGE:	CR-3	0-10 ft. above sump
	NRC	Plant specific.
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		Yes, complies 2 channels
POWER SOURCE:		1E
DISPLAY:		Indicated and recorded in EFIC room (On demand in EOF & TSC) (Later - See Schedule)
SCHEDULE:		Installation of "ON DEMAND" display will be complete by September 30, 1988.

POSITION:

Ref: Safety Evaluation Report, Docket No. 50-302 dated January 13, 1984

Due to lack of space in the Control Room, the indicators and recorder are located in the Emergency Feedwater Initiation and Control (EFIC) Room. The NRC in the above referenced SER found that this location adequately satisfies the requirements of NUREG-0737, Item II.F.1.5.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:	Containment Isolation Valve Position (Manual Valves)
TYPE & CATEGORY:	B 1
RANGE:	No indication, need not comply
ENVIRONMENTAL QUALIFICATION:	N/A
SEISMIC QUALIFICATION:	N/A
QUALITY ASSURANCE:	N/A
REDUNDANCY:	N/A
POWER SOURCE:	N/A
DISPLAY:	N/A
SCHEDULE:	N/A

POSITION:

Locked/closed valves or blind flanges may be used in lieu of automatic valves. Ref. SRP-6.2.4-6F and NUREG-0737 Pg. 3-91.

Automatic valves are only mentioned for position indication. Ref. SRP-6.2.4-6J. Therefore, indication not required for locked/closed manual valves.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Containment Isolation Valve Position (Automatic Valves)
TYPE & CATEGORY:		B 1
RANGE:	CR-3	Open-closed lights
	NRC	Closed-not closed
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		No, need not comply, see Position
POWER SOURCE:		IE/UPS
DISPLAY:		Indicated in CR, see Position
SCHEDULE:		Installed
POSITION:		Complies

Redundancy is not necessary on a per valve basis since redundant barriers are provided for all fluid penetrations.

Areas of noncompliance were upgraded to comply during Refuel VI.

Position indication is provided in the Control Room via a light matrix. This method should be acceptable for monitoring valve positions rather than recording.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Core Exit Temperature
TYPE & CATEGORY:		B,C 1
RANGE:	CR-3	0-2500°F
	NRC	200° to 2300°F
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		Yes, see position
POWER SOURCE:		UPS/DG
DISPLAY:		16 CETS - Recorded in CR 52 CETS - Indicated and recorded on demand in CR 12 CETS - On demand in TSC & EOF at range 0-2000°F
SCHEDULE:		Installed
POSITION:		Complies

Ref: The NRC's evaluation of CR-3 is response to NUREG-0737, Item II.F.2, Docket No. 50-302, dated 9/6/83.

Core Exit Temperature measurement displ include a primary and backup display arrangement.

The primary display consists of 52 Core Exit Thermocouples (CET's) recorded on demand in the Control Room over a range of 0-2500°F. (Twelve (12) are also recorded on demand in the TSC and EOF over a range of 0-2000°F.)

The back up display consists of 16 separate temperature measurements from 16 CET's - 4 from each core quadrant. The system is part of the ICC detection system and is Class 1-E. Each of the 16 Core Exit Temperature measurements is continuously recorded in the CR on three separate recorders over a range of 0-2500°F.

Primary and backup displays are electrically independent, energized from independent power sources, and physically separated, up to and including the isolators. The primary display is not Class 1-E but is energized from a battery backed, high-reliability uninterruptible power supply, which is backed up by the deisel generator.

The upgrade of this variable was completed in accordance with NUREG 0737, Item II.F.2 during Refuel V and complies with the requirements of RG1.97 Rev. 3.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		RCS Radioactivity Concentration
TYPE & CATEGORY:		C 3, see position
RANGE:	CR-3	10^{-2} to 10^{-3} ci/gm
	NRC	1/2 tech spec limit to 100 times tech spec limit
ENVIRONMENTAL QUALIFICATION:		Need not comply, see position
SEISMIC QUALIFICATION:		Need not comply, see position
QUALITY ASSURANCE:		Need not comply, see position
REDUNDANCY:		Need not comply, see position
POWER SOURCE:		1E
DISPLAY:		Indicated and recorded in lab only
SCHEDULE:		Installed

POSITION:

The following position is a justification developed by the BWOG Reg. Guide 1.97 Task Force.

Currently, no instrumentation exists to adequately measure this variable on line. Existing instrumentation, letdown line radiation monitors, can be used to provide indication of fuel failure during normal operation. However, since the letdown line is isolated during serious accidents requiring containment isolation, it will not be available for long term measurement. Section II.B.3 of NUREG-0737 requires that capability exist at each plant to sample the RCS to assess the magnitude of fuel failures during post-accident conditions. As such, this measurement should be the primary determinant of fuel failure during normal operation and post-accident. The letdown line radiation monitor should be used as the initiator for sampling during normal operation because state-of-the-art equipment is unavailable and the primary means of monitoring this variable must therefore be by sampling and analysis. It is recommended that it be downgraded to Category 3.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Containment Hydrogen Concentration
TYPE & CATEGORY:		C 1
RANGE:	CR-3	0-10%
	NRC	0-10%
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		Yes, complies 2 channels
POWER SOURCE:		1E
DISPLAY:		Indicated and recorded in EFIC room
SCHEDULE:		Installed
POSITION:		Complies

Ref: Safety Evaluation Report, Docket No. 50-302 dated January 13, 1984

Due to lack of space in the Control Room, the Containment Hydrogen Monitoring System (CHMS) indicators and recorder are located in the Emergency Feedwater Initiation and Control (EFIC) Room. The NRC in the above referenced SER found that this location adequately satisfies the requirements of NUREG-0737, Item II.F.1.6.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Containment Pressure
TYPE & CATEGORY:		B,C 1
RANGE:	CR-3	-10 to 200 PSIG
	NRC	10 psia to 3 times design
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		Yes, complies 2 channels
POWER SOURCE:		1E
DISPLAY:		Indicated in CR and recorded in EFIC room On demand in TSC & EOF
SCHEDULE:		Installed
POSITION:		Complies

Ref: Safety Evaluation Report, Docket No. 50-302 dated January 13, 1984

Due to lack of space in the Control Room, the recorder is located in the Emergency Feedwater Initiation and Control (EFIC) Room. The NRC in the above referenced SER found that this location adequately satisfies the requirements of NUREG-0737, Item II.F.1.4.

The installation of qualified transmitters was completed during Refuel VI.

CRYSTAL RIVER 3

RF'ULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		RHR System Flow (Decay Heat)
TYPE & CATEGORY:		D 2
RANGE.	CR-3	0-5000 GPM (Design = 3000 GPM)
	NRC	0 to 110% Design
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		No, not required 2 channels
POWER SOURCE:		UPS/DG with 1E standby
DISPLAY:		Indicated in CR On demand in TSC & EOF
SCHEDUL		Installed
POSITION:		Complies

QA requirements meeting CR-3 licensing commitments were applied to safety related portions of this instrument string.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		RHR Heat Exchanger Outlet Temperature (Decay Heat)
TYPE & CATEGORY:		D 2
RANGE:	CR-3	0-300°F
	NRC	40° to 350°F
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		Not required 2 channels
POWER SOURCE:		UPS with 1E standby
DISPLAY:		Indicated in CR
SCHEDULE:		Installed
POSITION:		Complies

Equipment environmental qualification were upgraded to meet requirements of Reg. Guide 1.97 during Refuel VI.

QA requirements meeting CR-3 licensing commitments were applied to safety related portions of this instrument string.

Design temperature of the Decay Heat system and heat exchanger for CR-3 is 300°F.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Accumulator Tank Level (Core Flood Tank)
TYPE & CATEGORY:		D 2
RANGE:	CR-3	0-14 ft. above datum
	NRC	10 to 90% Vol.
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		No, not required 2 channels
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated in CR
SCHEDULE:		Installed
POSITION:		Complies

Range covers 100% of required liquid level. Volume not covered is for nitrogen blanket. Meets intent of RG 1.97.

QA requirements meeting CR-3 licensing commitments were applied to safety related portions of this instrument string.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Accumulator Tank Pressure (Core Flood Tank)
TYPE & CATEGORY:		D 3, see position
RANGE:	CR-3	0-800 PSIG
	NRC	0-750 PSIG
ENVIRONMENTAL QUALIFICATION:		No, need not comply
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		No, not required 2 channels
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated in CR
SCHEDULE:		Installed
POSITION:		Complies

QA requirements meeting CR-3 licensing commitments were applied to safety related portions of this instrument string.

The following position is a justification developed by the BWOG Reg. Guide 1.97 Task Force.

Core Flood Tank Pressure is a key variable for pre-accident status to assure that this passive safety system is prepared to serve its function. This pressure indication provides no essential information for operator action during or following an accident. The key variable necessary to determine whether the Core Flood Tanks have fulfilled their safety function is Core Flood Tank Level. Therefore, Core Flood Tank Pressure is a backup type variable and has been classified as a Category 3 instrument accordingly.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Accumulator Isolation Valve Position (Core Flood Tank)
TYPE & CATEGORY:		D 2
RANGE:	CR-3	Closed-open lights
	NRC	Closed or open
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		Not required 2 channels
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated in CR
SCHEDULE:		Installed
POSITION:		Complies

QA requirements meeting CR-3 licensing commitments were applied to safety related portions of this instrument string.

Areas of noncompliance were upgraded to comply during Refuel VI.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:	Boric Acid Charging Flow
TYPE & CATEGORY:	D 2
RANGE:	N/A
ENVIRONMENTAL QUALIFICATION:	N/A
SEISMIC QUALIFICATION:	N/A
QUALITY ASSURANCE:	N/A
REDUNDANCY:	N/A
POWER SOURCE:	N/A
DISPLAY:	N/A
SCHEDULE:	N/A

POSITION:

The following position is a justification developed by the BWOG Reg. Guide 1.97 Task Force.

The B&W - designed NSSS does not include a charging system as part of the Emergency Core Cooling System (ECCS). Flow paths from the ECCS to the RCS include high pressure injection (HPI) and low pressure injection (LPI) with the BWST or the RB Sump as the suction source, and the Core Flood Tank injection. HPI and LPI flow rates are monitored, and BWST, RB sump, and Core Flood Tank levels are monitored by RG 1.97 variables. Therefore, Boric Acid Charging Flow does not need to be monitored as a Type D variable to monitor the operation of the ECCS.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Flow in HPI System
TYPE & CATEGORY:		D 2
RANGE:	CR-3	0-500 GPM (Design = 300 GPM)
	NRC	0 to 110% Design
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		No, not required 2 channels
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated in CR On demand in TSC & EOF
SCHEDULE:		Installed
POSITION:		Complies

QA requirements meeting CR-3 licensing commitments were applied to safety related portions of this instrument string.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:	Flow in LPI System
TYPE & CATEGORY:	D 2
RANGE:	N/A
ENVIRONMENTAL QUALIFICATION:	N/A
SEISMIC QUALIFICATION:	N/A
QUALITY ASSURANCE:	N/A
REDUNDANCY:	N/A
POWER SOURCE:	N/A
DISPLAY:	N/A
SCHEDULE:	N/A

POSITION:

Same instrument as RHR system flow, see page 16.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Refueling Water Storage Tank Level (Borated Water Storage Tank)
TYPE & CATEGORY:		A,D 1
RANGE:	CR-3	0-50 feet
	NRC	Top to bottom
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		Yes, complies 2 channels
POWER SOURCE:		1E/DG
DISPLAY:		Indicated and recorded in CR On demand in TSC & EOF
SCHEDULE:		Installed
POSITION:		Complies

QA requirements meeting CR-3 licensing commitments were applied to safety related portions of this instrument string.

The variable is indicated on redundant, qualified, indicators, located on a seismically qualified panel board and one of the redundant channels is recorded.

Due to a lack of seismically qualified panel space the recorder is mounted on panel not seismically qualified.

The recorder itself is environmentally qualified and electrically isolated from the rest of the qualified instrument loop.

Upgrades were completed during Refuel VI.

B&W's Criteria for BWST sets three criteria which must be met by the BWST. The first criterion is related to fuel handling and transfer operations and is not applicable for accident events. The second criterion requires that sufficient volume be contained in the BWST to provide sufficient time for injection operation prior to switchover to an alternate source. This is a criterion which must be satisfied during normal plant operation to ensure availability of the BWST during an accident. This volume is less than that required to meet the first criterion. The third criterion is the important one for use during and after an accident. This criterion requires that the BWST level be such that adequate NPSH for all ECCS pumps be available.

To meet the desired intent of the regulatory guide that accident monitoring instrumentation also be used, to the extent practicable, during normal operations, the existing BWST level instrumentation has sufficiently wide range to monitor the level required in the BWST. At Crystal River 3, the tank level is monitored from 0 to 50 feet. A low alarm is provided a 4 feet and switchover is required at 2.5 feet. Thus, the operator is provided with adequate level indication at all times.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Reactor Coolant Pump Status
TYPE & CATEGORY:		D 3
RANGE:	CR-3	0-125% load
	NRC	Motor current
ENVIRONMENTAL QUALIFICATION:		No, not required
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		No, not required
REDUNDANCY:		No, not required 1 per pump
POWER SOURCE:		OP, complies
DISPLAY:		Pump running lights in CR 0-125% load indicted for each pump in CR Indicator for total circuit amps is on switchgear On demand in TSC & EOF
POSITION:		Complies

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Primary System Safety Relief Valve Position or Flow Through or Pressure in Relief Lines
TYPE & CATEGORY:		D 2
RANGE:	CR-3	Acoustic system
	NRC	Closed - not closed
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		No, not required 2 channels
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated in CR On demand in TSC & EOF
SCHEDULE:		Installed
POSITION:		Complies

Accelerameters are seismically mounted.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Pressurizer Level
TYPE & CATEGORY:		D 1
RANGE:	CR-3	0-320 inches, see position
	NRC	Top to bottom
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDACY:		Yes, complies 2 channels
POWER SOURCE:		1E/DG
DISPLAY:		Indicated and recorded in CR On demand in TSC & EOF
SCHEDULE:		Installed
POSITION:		Complies

The following position is a justification developed by the BWOG Reg. Guide 1.97 Task Force.

The pressurizer level was sized based on the following. The water volume is chosen such that the reactor coolant system can experience a reactor trip from full power without uncovering the level sensors in the lower shell and to maintain system pressure above the HPI system actuation set-point. The steam volume is chosen such that the reactor coolant system can experience a turbine trip without covering the level sensors in the upper shell. The range of 0-320" H_2O was based on this criteria and setpoints for automatic or manual actions are based on this range.

The pressurizer is approximately 512 inches tall. The 0 inch reference for the pressurizer level instrument range is 43 inches above the lower datum line (approx. 96 inches from the bottom), 16 inches below the upper set of heaters, and approximately at the level of the second set of heaters. The upper pressurizer level top (320 inches above the 0 inch reference) is 43 inches below the upper datum (approx. 92 inches from the top), and approximately 37 inches from the spray head.

The Accident Analysis chapters of several B&W Owners Group Utility Final Safety Analysis Reports (SAR), as well as Part II, Volume 2 of the B&W Owners Group Abnormal Transient Operating Guidelines (ATOG) were reviewed to obtain pressurizer level responses to anticipated transients and accidents.

For anticipated transients such as decreasing feedwater temperature, excessive main feedwater flow, loss of main feedwater flow, decreasing steam flow, small steam leaks, loss of external load, loss of off-site power, loss of condenser vacuum and small steam generator tube leaks, the existing ranges for the pressurizer level are sufficient such that indicated level should remain on-scale.

For severe transients (accidents) such as steam line break, steam generator tube rupture and many small break LOCA's, the pressurizer will void. Following ESFAS actuation of the HPI system, actions can be taken as necessary to stabilize the plant. Those actions are based on subcooling margin and RCS pressure, not pressurizer level. For the case of a total loss of feedwater, the pressurizer will go solid unless either main or emergency feed water is restored to the steam generators within about 15 minutes. Actions taken are dependent on when feedwater is restored, subcooling margin and RCS pressure, not pressurizer level.

In general, for severe transients or accidents, the pressurizer will either void or go solid. A voided pressurizer will cause indicated level to go off-scale low followed by a rapid decrease in RCS pressure to saturation. A solid pressurizer will cause indicated level to go off-scale high accompanied by high RCS pressure, possible large and rapid changes in RCS pressure, PORV and pressurizer safety valve actuation. All of these indications are available in the control room.

Based on this information, the existing ranges of pressurizer level indication are sufficient for anticipated transients. For severe transients or accidents, indicated pressurizer level will go off-scale high or low due to the pressurizer going solid or voiding and, as a result, top to bottom instruments would provide no significant additional information. In these cases, subcooling margin, RCS pressure, PORV status and pressurizer safety valve status are monitored to determine actions to be taken.

The installation of upgrade to comply with the requirements of Reg. Guide 1.97 were completed during Refuel VI.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Pressurizer Heater Status
TYPE & CATEGORY:		D 2
RANGE:	CR-3	Electric Current, see Position
	NRC	Electric Current
ENVIRONMENTAL QUALIFICATION:		No, will comply
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		No, will comply
REDUNDANCY:		No, not required
POWER SOURCE:		No, will comply
DISPLAY:		Indicate in CR, will comply
SCHEDULE:		Upgrades will be complete by end of Refuel VII
POSITION:		Will comply

FPC will install environmentally qualified electric current flow instrumentation to monitor the status of the pressurizer heaters by end of Refuel VII, beginning in the Fall of 1989.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Quench Tank Level (Reactor Coolant Drain Tank)
TYPE & CATEGORY:		D 3
RANGE:	CR-3	6 inches from bottom to top
	NRC	Top to bottom
ENVIRONMENTAL QUALIFICATION:		No, not required
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		No, not required
REDUNDANCY:		No, not required
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated in CR On demand in TSC & EOF
SCHEDULE:		Installed
POSITION:		Complies

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Quench Tank Temperature (Reactor Coolant Drain Tank)
TYPE & CATEGORY:		D 3
RANGE:	CR-3	0 to 400°F
	NRC	50° to 750°F
ENVIRONMENTAL QUALIFICATION:		No, not required
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		No, not required
REDUNDANCY:		No, not required
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated in CR On demand in TSC & EOF
SCHEDULE:		Installed
POSITION:		Complies

The following position is a justification developed by the BWOG Reg. Guide 1.97 Task Force.

The Quench Tank, known as the Reactor Coolant Drain Tank (RCDT) is equipped with a rupture disc which blows at 110 psig (saturation temperature = 345°F).

A range change to 0-400°F and the installation of an indicator in the Control Room was completed during Refuel VI.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Quench Tank Pressure (Reactor Coolant Drain Tank)
TYPE & CATEGORY:		D 3
RANGE:	CR-3	0-100 PSIG (Design = 100 PSIG)
	NRC	0 to design
ENVIRONMENTAL QUALIFICATION:		No, not required
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		No, not required
REDUNDANCY:		No, not required
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated in CR On demand in TSC & EOF
SCHEDULE:		Installed
POSITION:		Complies

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Steam Generator Level
TYPE & CATEGORY:		A,D 1
RANGE:	CR-3	0 to 150 and 100 to 394 inches, see Position
	NRC	Tube sheet to separators
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		Yes, complies 4 channels
POWER SOURCE:		1E/DG
DISPLAY:		Indicated and recorded in CR On demand in TSC & EOF
SCHEDULE:		Installed
POSITION:		Complies

CR-3, having a B&W NSSS, utilizes Once Through Steam Generators (OTSG) which produce superheated steam and therefore are not equipped with moisture separtors in the steam generator. CR-3 installed the Emergency Feedwater Initiation & Control (EFIC) system, which was completed in Refuel V. This system provides Class 1E, redundant, level indication in the CR. The lower range (start-up) measures 0 to 150 inches and the upper range (operating) measures 100 to 394 inches.

The lower level sensing tap (0 inches) is approximately 6 inches above the lower tube sheet and the upper level sensing tap (394 inches) is at approximately the level of the aspirating ports.

Areas of noncompliance were upgraded to comply and installation was completed during Refuel VI.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Steam Generator Pressure
TYPE & CATEGORY:		A,D 1
RANGE:	CR-3	0-1200 PSIG, see Position
	NRC	Atmosphere to 20% > Lowest Safety Vlv Setting (1260 PSIG)
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		Yes, complies 4 channels
POWER SOURCE:		1E/DG
DISPLAY:		Indicated and recorded in CR On demand in TSC & EOF
SCHEDULE:		Installed
POSITION:		Complies - see Position

The steam generator pressure range of 0-1200 psig is acceptable because the safety valve setpoints range from a low of 1050 psig $\pm$ 10 psig to 1100 psig $\pm$ 10 psig, which are close to 20% above the low setpoint recommendation. The high safety valve setpoint is about 100 psig below the high end of the instrument scale.

The highest safety valve setting is typically 1100 psig. The steam relief capacity is 20-25% above the expected steam flow rate. Excess relief capacity is maintained when safety valves are inoperable. The FSAR analysis indicates a maximum steam pressure of about 1100 psig for operating plants. Based on these facts, it is FPC's position that the existing range of 0-1200 psig is sufficient.

Other areas of noncompliance were upgraded to comply during Refuel VI.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Main Steam Safety Relief Valve Position
TYPE & CATEGORY:		D 2
RANGE:	CR-3	Closed - not closed
	NRC	Closed - not closed
ENVIRONMENTAL QUALIFICATION:		Yes, will comply
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		Yes, will comply
REDUNDANCY:		No, not required
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated in Control Room
SCHEDULE:		Upgrade will be completed by end of Refuel VII
POSITION:		Will comply

Equipment will be installed to indicate Main Steam Safety Relief Valve Position. Installation is scheduled for completion by the end of Refuel VII, beginning in the Fall of 1989.

The installation will include equipment to establish the duration and magnitude of steam releases from the secondary coolant system

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Main Feedwater Flow
TYPE & CATEGORY:		D 3
RANGE:	CR-3	0 to 6 x 10^6 lbs/hr. (Design = 5.3 x 10^6 lbs/hr)
	NRC	0 to 110% design
ENVIRONMENTAL QUALIFICATION:		No, not required
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		No, not required
REDUNDANCY:		No, not required 3 channels
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated and recorded in CR On demand in TSC & EOF
SCHEDULE:		Installed
POSITION:		Complies

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Auxiliary Feedwater Flow
TYPE & CATEGORY:		D 1
RANGE:	CR-3	0-1000 GPM (Design = 740 GPM)
	NRC	0 to 110% design
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		Yes, complies 4 channels
POWER SOURCE:		1E
DISPLAY:		Indicated and recorded on demand in CR On demand in TSC & EOF
SCHEDULE:		Installed
POSITION:		Complies

A redundant 4 channel system with all safety parts seismically qualified, and transmitters environmentally qualified were installed in conjunction with the EFIC modifications. Installation was completed during Refuel V.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Condensate Storage Tank Water Level (Emergency Feedwater Tank) - see Position
TYPE & CATEGORY:		D 1
RANGE:	CR-3	0-38 ft.
	NRC	Plant Specific
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		Yes, complies
POWER SOURCE:		1E
DISPLAY:		Indicated in CR
SCHEDULE:		Installed
POSITION:		Complies

A new tank called the Dedicated Emergency Feedwater Tank was installed during Refuel VI. The level instrumentation installed with the tank complies with RG 1.97 requirements.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Containment Spray Flow
TYPE & CATECORY:		D 2
RANGE:	CR-3	0-1800 GPM (Design - 1500 GPM)
	NRC	0 to 110% Design
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		Yes, complies 2 channels
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated in CR
SCHEDULE:		Installed
POSITION:		Complies

Areas of nonconformance were upgraded to comply during Refuel V.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:	Heat Removal by the Containment Fan Heat Removal System
TYPE & CATEGORY:	D 2
RANGE:	See position
ENVIRONMENTAL QUALIFICATION:	Yes, complies
SEISMIC QUALIFICATION:	Yes, complies
QUALITY ASSURANCE:	Yes, complies
REDUNDANCY:	No, not required
POWER SOURCE:	Regulated instrument BUS VBDP-2
DISPLAY:	"RB Fans Running". Indicated in CR; RBCU SW Flow - Recorded on demand in CR.
SCHEDULE:	Installed
POSITION:	Complies

The following position is a justification developed by the BWOG Reg. Guide 1.97 Task Force.

The plant has a design air flow rate from the Reactor Building fans during normal and accident or emergency conditions. The design flow rates are achieved by reducing the normal running speeds of the fan motors by about one-half during accidents where the heavier steam-air mixture might overload the motors at full speed. The fan cooling units are cooled by cooling water from the Nuclear Services Closed Cycle Cooling System (SW)

For the following reasons, the status of the fan breakers and cooling water flow rate are the measured variables. The primary indication that the Reactor Building is being cooled is the Reactor Building temperature. A first indication that the Reactor Building fans are performing their function is an indication of the status of the fan breakers to ensure that the fans are on and the delivery of cooling water flow to the cooling units. The flow variable was upgraded to comply with RG 1.97 Requirements during Refuel VI.

As backup information to ensure coupling between the fan and motor, each fan is equipped with vibration detectors which annunciate in the control room. Calibrated percent load meters for the motors are also located in the control room.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Containment Atmosphere Temperature
TYPE & CATEGORY:		D 2
RANGE:	CR-3	0-400°F
	NRC	40°F to 400°F
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		Not required 4 measurements
POWER SOURCE:		UPS/DG
DISPLAY:		Recorded in CR On demand in TSC & EOF
SCHEDULE:		Installed
POSITION:		Complies

Areas of noncompliance were upgraded to comply during Refuel VI.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Containment Sump Water Temperatue
TYPE & CATEGORY:		D 2
RANGE:	CR-3	Not measured, see position.
	NRC	50 to 250°F
ENVIRONMENTAL QUALIFICATION:		N/A
SEISMIC QUALIFICATION:		N/A
QUALITY ASSURANCE:		N/A
REDUNDANCY:		N/A
POWER SOURCE:		N/A
DISPLAY:		N/A
SCHEDULE:		N/A

POSITION:

The NRC R.G. 1.97 requires containment sump water temperature indication as a Type D variable for the purpose of monitoring the operation of containment cooling systems. No additional justification is provided.

It is expected that this information would be used following high energy line breaks in containment. While containment sump temperature trends may be indicative of high energy fluid leakages and containment cooling, it would be difficult to conceive of any correlation from monitored values to any useful measure of success.

Containment sump temperatures impact containment cooling only when the Reactor Building spray system is in operation with suction being taken from the sump. This would be expected to be used only after depletion of available supplies from the BWST.

a. Containment Cooling System Monitoring

Containment atmospheric temperature instrumentation provides the most direct indication of containment cooling system success. Contaminment atmospheric temperature instrumentation was upgraded during Refuel VI to meet RG 1.97 requirements.

The next most valuable indication of containment cooling is provided by instrumentation which monitors the operation of systems with a containment cooling function. This function is provided by the Reactor Building Spray System (BS) and the Reactor Building Air Handling System (AH). The Reactor Building Containment Fan Heat Removal Cooling Water Flow Instrumentation (SW) was upgraded to provide heat removal indication meeting the requirements of R.G. 1.97 during Refuel VI (see position Page 38).

Containment atmospheric temperature is recorded in the control room. The Reactor Building air handling fan motor breaker positions, indicating lights and percent full load ammeter indicators representative of air flow loading are monitored on the control board. Fan cooling water flow leakage is also monitored and alarmed.

Containment sump water temperature provides only a crude indication of containment cooling system success. Because of this and the availability of the instrumentation described above, sump water temperature instrumentation is not necessary for containment cooling system monitoring. Nevertheless, containment sump temperature can be determined when the LPI is in the recirculation mode, using temperature indicators meeting all other R.G. 1.97 requirements.

b. Equipment Temperature Limits

Protection of DH and BS from Excessive Sump Temperatures: These systems are designed for fluid temperatures in excess of the R.G. 1.97 required range for sump water temperature instrumentation (Ref. FSAR Table 6-3). No operator action is required in response to sump water temperature. Actual options available with excessive sump water temperatures would be limited to the reactor coolant system and containment cooldown prior to transferring to the recirculation mode of containment spray. This transfer is not required for over an hour after a LOCA, in which time the sump temperature is below 205°F.

c. NPSH Requirements

The minimum available NPSH for the Decay Heat Removal pumps is conservatively calculated with sufficient safety margin such that indication of sump temperature is not required in order to insure adequate NPSH and no automatic or manual actions are initiated based on this temperature.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Make-up Flow - In
TYPE & CATEGORY:		D 3, see Position
RANGE:	CR-3	0-200 GPM (Design = 115 GPM)
	NRC	0 to 110% Design
ENVIRONMENTAL QUALIFICATION:		No, not required
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		No, not required
REDUNDANCY:		No, not required
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated in CR
SCHEDULE:		Installed

POSITION:

The following position is a justification developed by the BWOG Reg. Guide 1.97 Task Force.

During design basis events such as LOCAs, the Makeup and Purification System (MU) is isolated. Makeup flow is a backup variable to the makeup line isolation valve position. During normal operation and certain design basis events such as small break LOCA, the MU System is used to supply borated makeup water into the RCS to balance letdown flow out of the RCS. It also adds makeup water in order to maintain pressurizer level at its setpoint. Thus, makeup flow is an important variable for monitoring the operation of the MU System. For the reasons provided in the Position section for the variable, Makeup Tank level (page 43), it is suggested that this variable can be a backup to Makeup Tank Level. As a backup Type D variable, it is appropriate that Makeup Flow be classified Category 3.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Letdown Flow - Out
TYPE & CATEGORY:		D 3, see position.
RANGE:	CR-3	0-160 GPM (Design = 140 GPM)
	NRC	0 to 110% Design
ENVIRONMENTAL QUALIFICATION:		No, not required
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		No, not required
REDUNDANCY:		No, not required
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated in CR On demand in TSC & EOF
SCHEDULE:		Installed

POSITION:

The following position is a justification developed by the BWOG Reg. Guide 1.97 Task Force.

During design basis events such as LOCAs, the MU System is isolated. Letdown flow is a backup variable to the letdown isolation valve position. During normal operation and certain design basis events such as small break LOCAs, the MU System is used to supply borated makeup water into the RCS to balance letdown flow out of the RCS. Thus, letdown flow is an important variable for monitoring the operation of the MU System. For the reasons provided in the Position section for the variable Makeup Tank level (page 43), it is suggested that this variable can be a backup to Makeup Tank level. As a backup Type D variable, it is appropriate that letdown flow be classified Category 3.

For Crystal River 3, normal letdown flow rate through the block orifice is 45 gpm with a maximum flow rate of 140 gpm with both letdown coolers in operation. Having this maximum flow rate of 140 gpm the range of letdown flow indicator is 0 to 160 gpm which adequately meets the regulatory guide recommendation of 0 to 110% design flow.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Volume Control Tank Level (Makeup Tank)
TYPE & CATEGORY:		D 2
RANGE:	CR-3	0-120 inches, meets intent, see position
	NRC	Top to bottom
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		Yes, complies
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		No, not required 2 channels
POWER SOURCE:		UPS
DISPLAY:		Recorded in CR On demand in TSC & EOF
SCHEDULE:		Installed

POSITION:

The following position is a justification developed by the BWOG Reg. Guide 1.97 Task Force.

During normal operation and certain design basis accidents where the MU System is still operable, the Makeup Tank Level is the key variable used to provide indication that the MU System is operating properly. Makeup Tank Level information provides the first indication that a suction source for the Makeup pumps is available. Since the Makeup Tank is a surge volume for the RCS, Makeup Tank Level and Pressurizer Level indications can be used to qualitatively assess Makeup Flow into the RCS and Letdown Flow from the RCS.

Quantitative indication of Makeup Flow and Letdown Flow can be provided by flow instrumentation for these variables. However, in most instances, it is more important to know that Makeup and/or Letdown is established (qualitative) and not necessarily what those flow rates are (quantitative) in order to determine the operation of the MU System. Since Pressurizer Level instrumentation is Category 1 and the suggested Makeup Tank Level instrumentation be Category 2, then high quality instrumentation is available to

provide information on the status and operation of the MU System. Flow rate indication provided for Makeup Flow and Letdown Flow can be used as confirmatory, backup information to Makeup Tank Level and Pressurizer Level.

Meets intent of RG 1.97, 2-1/2" from bottom to 4" from top of vessel. Parts of safety system are seismic with QA. QA requirements meeting CR-3 licensing commitments were applied to safety related portions of this instrument string.

CRYSTAL RIVER

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Component Cooling Water Temperature to ESF Systems
TYPE & CATEGORY:		D 2
RANGE:	CR-3	0-200°F and 0-250°F, see Position
	NRC	40° to 200°F
ENVIRONMENTAL QUALIFICATION:		No, not required (mild environment)
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		No, see Position
REDUNDANCY:		No, not required
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated in CR
SCHEDULE:		Installed
POSITION:		Complies

The 0-200°F range is for the Decay Heat Closed Cycle Cooling Systems (DC) and the 0 to 250°F range is for the Nuclear Services Closed Cycle Cooling Systems (SW).

This equipment was originally purchased without Quality Assurance documentation. Future equipment will be purchased with the requirement to specify the applicable Quality Assurance practices.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Component Cooling Water Flow to ESF Systems (Level) see Position
TYPE & CATEGORY:		D 2
RANGE:	CR-3	(See Position) Surge Tank Levels: SW - 10 ft below to 4 ft above Normal WL. DC - From 11'3" below to 4 ft above Normal WL. System Pressures: SW - 0-200 PSIG DC - 0-60 PSIG
	NRC	0 to 110% Design Flow
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		Yes, complies
REDUNDANCY:		No, not required
POWER SOURCE:		Regulated Instrument BUS VBDP-2
DISPLAY:		Recorded on demand in CR
SCHEDULE:		Installed
POSITION:		Complies

There are presently no flow indications on the main control board for Decay Heat Closed Cycle Cooling (DC) and Nuclear Services Closed Cycle Cooling (SW) systems. Local flow indication for these systems is available. Indicated flow measurements in the control room are not deemed necessary because the DC and SW systems surge tank levels provide better information to the operator. The wide range of design flows to various ESF components would not necessarily be representative of overall system performance. Service water header pressures and remote actuated valve positions are available to the operator and along with the surge tanks levels, which provide a better overall indication of system status.

QA requirements meeting CR-3 licensing commitments were applied to safety related portions of this instrument string.

Compliance upgrades were completed during Refuel VI.

Peck(Comp)DN104-2

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		High-Level Radioactive Liquid Tank Level
TYPE & CATEGORY:		D 3
RANGE:	CR-3	0 to 100%
	NRC	Top to bottom
ENVIRONMENTAL QUALIFICATION:		No, not required
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		No, not required
REDUNDANCY:		No, not required
POWER SOURCE:		Instrument Air
DISPLAY:		Indication at local panel only, see Position
SCHEDULE:		Installed
POSITION:		Complies

Tanks covered by this variable are:

Concentrated Waste Tanks (2)
Concentrated Boric Acid Tanks (2)
Spent Resin Holdup Tank

The level indication for the concentrated waste tanks, concentrated boric acid tanks and the spent resin hold-up tank are indicated on the radioactive waste disposal control panel located in the Auxiliary Building. High level alarms at this panel will cause a common alarm to actuate on the main control board. The controls for the liquid waste disposal system are all located at the local panel; therefore indication on the main control board would not enhance operator control from the control room.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Radioactive Gas Hold-up Tank Pressure (Waste Decay Tanks)
TYPE & CATEGORY:		D 3
RANGE:	CR-3	0-150 PSIG (Design = 150 PSIG), see position
	NRC	0 to 150% Design
ENVIRONMENTAL QUALIFICATION:		No, not required
SEISMIC QUALIFICATION:		No, not required
QUALITY ASSURANCE:		No, not required
REDUNDANCY:		No, not required
POWER SOURCE:		Instrument air
DISPLAY:		Indication at local panel only, see Position
SCHEDULE:		Installed
POSITION:		Complies

The control and indications for the waste disposal system are located on the radioactive waste disposal panel in the Auxiliary Building. Indication of radioactive gas hold-up tank pressure is not a necessary control room variable for the post accident monitoring. In the event of an accident which results in significant failed fuel or significant radioactive gas release, the manual transfer of radioactive gases to the radioactive gas hold-up tanks would not be attempted since the Reactor Building would be utilized as the hold-up tank. There are no automatic transfer operations involving the radioactive gas hold-up tanks. Therefore, the monitoring in the control room of the radioactive gas hold-up tanks during post accident conditions is not necessary since these tanks are not utilized for accident mitigation.

The radioactive gas hold-up tanks are equipped with relief valves which are set at 125 psig. The range of the pressure indication is 120% above the relief valve setting.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:	Emergency Ventilation Damper Position Indication (See Position)	
TYPE & CATEGORY:	D 2	
RANGE:	CR-3	See position
	NRC	Open-Closed Status
ENVIRONMENTAL QUALIFICATION:	Yes, complies	
SEISMIC QUALIFICATION:	No, not required.	
QUALITY ASSURANCE:	Yes, complies	
REDUNDANCY:	No, not required.	
POWER SOURCE:	UPS/DG	
DISPLAY:	See position.	
SCHEDULE:	Installed	
POSITION:	Complies	

Dampers covered under this category are those used in ventilation systems for the following:

Emergency Diesel Generator
Control Complex
Decay Heat Pump Area
Spent Fuel Cooling Pump Area

The dampers in these systems are controlled from the fan start circuitry and do not have individual control switches. Redundant systems are provided so that a single failure will not defeat their safety function. Panel lights show when the fan circuitry is operating.

Back-up operational data is provided to operators by high quality commercial grade low flow and high temperature alarms. The control complex dampers also have open position lights.

The above data should be adequate to determine if an HV system is operational. Individual damper position would only be beneficial if isolation were required.

(cont. on Page 48A)

For those dampers in the control complex which are closed on either high radiation or engineered safeguards systems actuation, qualified closed position indication was added during Refuel VI.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:	Status of Standby Power					
TYPE & CATEGORY:	D 2					
RANGE:	CR-3	DG 3A,3B Volts;Amps	Inverter 3A to 3D Pwr Available Ind. Lt - R/G	4160V 3A,3B Volts	480V 3A,3B Volts	250/125V DC 3A, 3B Pwr Available Ind. Lts - R/G
	NRC	Plant Specific				
ENVIRONMENTAL QUALIFICATION:		Yes	-	Yes	No	-
SEISMIC QUALIFICATION:		No not required.				
QUALITY ASSURANCE:		No	-	No	No	-
REDUNDANCY:		Redundancy based on dual buses.				
POWER SOURCE:		UPS	-	UPS	UPS	-
DISPLAY:		Indicated	Indicated	Indicated	Indicated	Indicated
SCHEDULE:		Installed				
POSITION:		Complies				

Areas of non-compliance were upgraded to comply during Refuel VI.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Containment Area Radiation - High Range
TYPE & CATEGORY:		C, E 1
RANGE:	CR-3	1 to 10^8 R/Hr
	NRC	1 to 10^7 R/Hr
ENVIRONMENTAL QUALIFICATION:		Yes, complies.
SEISMIC QUALIFICATION:		Yes, complies.
QUALITY ASSURANCE:		Yes, complies.
REDUNDANCY:		Yes, complies. 2 channels
POWER SOURCE:		1E
DISPLAY:		Indicated and recorded in CR. (On demand in TSC & EOF) (Later - See Schedule)
SCHEDULE:		Installation of "ON DEMAND" display will be complete by September 30, 1988
POSITION:		Complies - except "ON DEMAND" display

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Radiation Exposure Rate inside buildings or areas where access is required to service equipment important to safety or which are in direct contact with primary containment where penetrations and hatches are located.
TYPE & CATEGORY:		E 3
RANGE:	CR-3	.01 to 10R/Hr, complies with position.
	NRC	.1 to 10,000 R/Hr
ENVIRONMENTAL QUALIFICATION:		No, not required.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, not required.
REDUNDANCY:		No, not required.
POWER SOURCE:		1E
DISPLAY:		Indicated and recorded in CR.
SCHEDULE:		Installed.
POSITION:		Complies

The following position is a justification developed by the BWOG Reg. Guide 1.97 Task Force.

NRC R.G. 1.97 Rev. 3 requires area radiation monitors inside buildings or areas where access is required to service equipment important to safety. The NRC identified purposes for this instrumentation are: "Detection of significant releases, release assessments, and long term surveillance." This is a Type E variable with the overall purpose of being monitored as required in determining the magnitude of the release of radioactive materials and continually assessing such releases. The required range for these monitors is 0.1 to 10^4 R/Hr.

R.G. 1.97 describes areas of concern as those where access is required to service safety related equipment. This implies that this instrumentation may be used for purposes other than those described above, i.e. for health physics purposes.

For purposes of determining the magnitude of releases, the area radiation exposure rate monitors are clearly of very minor importance. Determination

of release magnitude is done by other Type E variables associated with release paths. There is no useable correlation between area exposure rate monitors and amount of release.

Detection of significant releases by area radiation exposure rate monitoring is secondary to that provided by the release path monitoring. Nonetheless, area radiation levels inside the plant are monitored to verify compliance with 10CFR20. These instruments are considerably more sensitive (1000x) than required by R.G. 1.97 and are sufficient for supporting the detection of significant releases.

Determinations of accessibility of equipment for service or long term surveillance is the function of health physics personnel, generally using portable instrumentation. Monitoring of recordings of area radiation exposure rates from the Control Room is not a substitute for this health physics function. However, exposure rate monitoring equipment in areas outside containment have an upper range of 10 R/Hr., which is adequate for initial assessments of accessibility.

These ranges are based on background reading in the areas in which they are located. Should personnel entry be required in areas where these monitors have gone off scale or indicate a high radiation area a health physics escort would accompany personnel into these areas using portable instrumentation to assess radiation levels. The high range for portable instrumentation at CR-3 is 10^3 R/Hr. We do not anticipate, even under emergency conditions, sending personnel into radiation fields of this magnitude. We believe that this meets the intent of Regulatory Guide 1.97.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Containment or Purge Effluent, Noble Gas
TYPE & CATEGORY:		E, C, 2
RANGE:	CR-3	2×10^{-6} to 4.5×10^{7} uci/cc Xe133, 0 to 65,000 CFM (Design=50,000 CFM)
	NRC	10^{-6} to 10^{5} uci/cc, 0 to 110% Design
ENVIRONMENTAL QUALIFICATION:		Yes, complies.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, see position.
REDUNDANCY:		No, not required.
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated and Recorded in CR.
SCHEDULE:		Installed
POSITION:		Complies

The radiation monitoring equipment was originally purchased without Quality Assurance documentation. Future radiation monitoring equipment will be purchased with the requirement to specify the applicable Quality Assurance practices.

The range was corrected to comply with the requirements of NUREG 0737, Item II.F.1.1.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:	Reactor Shield Building Annulus
TYPE & CATEGORY:	E 2
RANGE:	N/A
ENVIRONMENTAL QUALIFICATION:	N/A
SEISMIC QUALIFICATION:	N/A
QUALITY ASSURANCE:	N/A
REDUNDANCY:	N/A
POWER SOURCE:	N/A
DISPLAY:	N/A
SCHEDULE:	N/A
POSITION:	Not in CR3 design.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Auxiliary Building, Noble Gas
TYPE & CATEGORY:		C,E 2
RANGE:	CR-3	2×10^{-6} to 4.5×10^{7} uci/cc Xe133, 0-200,000 CFM (Design=156,680 CFM)
	NRC	10^{-6} to 10^{3} uci/cc, 0 to 110% Design
ENVIRONMENTAL QUALIFICATION:		Yes, complies
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, see position.
REDUNDANCY:		No, not required.
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated and recorded in CR. Concentration available on demand in TSC & EOF.
SCHEDULE:		Installed.
POSITION:		Complies.

The radiation monitoring equipment was originally purchased without Quality Assurance documentation. Future radiation monitoring equipment will be purchased with the requirement to specify the applicable Quality Assurance practices.

The range was corrected to comply with the requirements of NUREG 0737, Item II.F.1.1.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Condenser Air Removal System Exhaust
TYPE & CATEGORY:		C,E 2
RANGE:	CR-3	10^{-6} to 10^{-2} uci/cc Kr(85), see Position
	NRC	10^{-6} to 10^{-2} uci/cc, 0 to 110% Design Flow
ENVIRONMENTAL QUALIFICATION:		Yes, complies.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, see position.
REDUNDANCY:		No, not required.
POWER SOURCE:		1E
DISPLAY:		Indicated and recorded in CR. On demand in TSC & EOF.
SCHEDULE:		Installed

POSITION:

The condenser air removal system exhausts through the Auxiliary Building (see page 54) in which the flow is monitored. The range of the monitor in the Auxiliary Building is 2×10^{-6} to 4.5×10^{7} uci/cc Xe133.

The radiation monitoring equipment was originally purchased without Quality Assurance documentation. Future radiation monitoring equipment will be purchased with the requirement to specify the applicable Quality Assurance practices.

The range was corrected to conform to the requirements of NUREG 0737, Item II.F.1.1.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:	Common Plant Vent
TYPE & CATEGORY:	E 2
RANGE:	NA
ENVIRONMENTAL QUALIFICATION:	NA
SEISMIC QUALIFICATION:	NA
QUALITY ASSURANCE:	NA
REDUNDANCY:	NA
POWER SOURCE:	NA
DISPLAY:	NA
SCHEDULE:	NA

POSITION:

Common plant vent from Auxiliary Building, see page 54.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Vent from Safety Valves or Atmospheric Dump Valves (Main Steam Line Radiation Monitor) - See position.
TYPE & CATEGORY:		E 2
RANGE:	CR-3	$8.7_1 \times 10^{-3}$ to 2.5×10^{7} uci/cc Xe-133
	NRC	10^{-1} to 10^{3} uci/cc (and duration of releases in seconds and mass of steam per unit time).
ENVIRONMENTAL QUALIFICATION:		Yes, see position.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		Yes, see position.
REDUNDANCY:		No, not required. 1 each atmospheric dump valve
POWER SOURCE:		1E/Battery Backed
DISPLAY:		Indicated in CR, recorded on demand
SCHEDULE:		Installed
POSITION:		Complies

The four 24" main steam headers contain a total of 16 relief valves and 2 atmospheric dump valves. Each atmospheric dump valve discharge is monitored for radiation by monitors with readouts in the Control Room. The system was calibrated in terms of uci/cc Xe-133 in order to comply with NREG-0737. The calibration change was completed mid 1986.

Refer to the position on item 33 (page 33) for a measure of steam release per unit time. Radioactive releases are manually calculated.

This variable is only used during a S.G. tube rupture type accident. The results of this accident do not create a harsh environment, therefore they meet the environmental qualifications for the normal environment.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:	All Other Identified Release Points
TYPE & CATEGORY:	E 2
RANGE:	N/A
ENVIRONMENTAL QUALIFICATION:	N/A
SEISMIC QUALIFICATION:	N/A
QUALITY ASSURANCE:	N/A
REDUNDANCY:	N/A
POWER SOURCE:	N/A
DISPLAY:	N/A
SCHEDULE:	N/A

POSITION:

No other release points, see pages 52 and 54.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		All Identified Plant Release Points Particulates and Halogens
TYPE & CATEGORY:		E 3
RANGE:	CR-3	Reactor Building 10^{-11} to 10^{-7} uci/cc, 0-65,000CFM (Design=50,000 CFM)
	CR-3	Aux. Building 10^{-11} to 10^{-7} uci/cc, 0-200,000CFM (Design=156,680 CFM)
	NRC	10^{-3} to 10^{2} uci/cc, 0 to 110% Design
ENVIRONMENTAL QUALIFICATION:		No, not required.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, not required.
REDUNDANCY:		No, not required.
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated and recorded in CR.
SCHEDULE:		Installed.
POSITION:		Complies

NRC required range of 10^{-3} to 10^{2} uci/cc can be covered by grab sample capability.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Airborne Radio Halogens and Particulates
TYPE & CATEGORY:		E 3
RANGE:	CR-3	10^{-9} to 10^{-3} uci/cc
	NRC	10^{-9} to 10^{-3} uci/cc
ENVIRONMENTAL QUALIFICATION:		No, not required.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, not required.
REDUNDANCY:		No, not required.
POWER SOURCE:		Vital Bus
DISPLAY:		No, not required in CR.
SCHEDULE:		Installed.
POSITION:		Complies

Various portable air samplers can be used to obtain the sample which is then taken to the Lab for counting. (Such as the Radevco H809 high volume air sampler.)

Also have portable particulate monitors Eberline AMS-2 and AMS-3 on hand. (5) and 13 mini-scalers (Eberline) MS-2. Scaler up to 500K CPM, AMS-2 up to 50K CPM AMS-3 up to 100K CPM.

Once the sample is at the Lab, we have multi-channel gamma-ray spectrometer systems to provide the capability of onsite analysis.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Plant and Environs Radiation, Portable Instrumentation
TYPE & CATEGORY:		E 3
RANGE:	CR-3	10^{-3} to 10^{3} R/Hr, complies with position.
	NRC	10^{-3} to 10^{4} R/Hr
ENVIRONMENTAL QUALIFICATION:		No, not required.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, not required.
REDUNDANCY:		No, not required.
POWER SOURCE:		Batteries
DISPLAY:		No, not required in CR.
SCHEDULE:		Installed

POSITION:

Existing portable instrumentation can detect dose rates from 10^{-3} R/Hr to 10^{3} R/Hr. In the plant we do not anticipate encountering radiation fields greater than those which can be measured by our current equipment except under severe accident conditions. Even under accident conditions we do not anticipate sending individuals into greater than 10 R/Hr fields. Therefore, we meet the intent of Regulatory Guide 1.97 with our current equipment.

Existing instruments or equivalent replacements:

Xetex Model 302A - GM Tube - 0-999 R/Hr
Eberline Teletector - GM Turbe - 0-1000 R/Hr
Eberline PIC-6A - Ion Chamber - 1 mr/Hr to 1000 R/Hr
Radector III - Ion Chamber - .1 mr/Hr to 1K R/Hr

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Plant and Environs Radioactivity
TYPE & CATEGORY:		E 3
RANGE:	CR-3 NRC	Multi-channel Gamma-Ray Spectrometer Isotopic Analysis.
ENVIRONMENTAL QUALIFICATION:		No, not required.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, not required.
REDUNDANCY:		No, not required.
POWER SOURCE:		N/A
DISPLAY:		No, not required in CR.
SCHEDULE:		Installed.
POSITION:		Complies. Additionally, 2-two channel gamma ray spectrometers, which are portable, are available (Eberline SAM-2), as is a multi-channel analyzer with computer which is contracted for with the Department of Health and Rehabilitation Services. This unit is on a truck, and mobile.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Wind Direction
TYPE & CATEGORY:		E 3
RANGE:	CR-3	0-360°
	NRC	0-360°
ENVIRONMENTAL QUALIFICATION:		No, not required.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, not required.
REDUNDANCY:		No, not required.
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated and recorded in CR.
SCHEDULE:		Installed.
POSITION:		Complies.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Wind Speed
TYPE & CATEGORY:		E 3
RANGE:	CR-3	0-50 M/Sec.
	NRC	0-22 M/Sec.
ENVIRONMENTAL QUALIFICATION:		No, not required.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, not required.
REDUNDANCY:		No, not required.
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated and recorded in CR.
SCHEDULE:		Installed.
POSITION:		Complies.

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Estimation of Atmospheric Stability
TYPE & CATEGORY:		E 3
RANGE:	CR-3	-5°F to +10°F, see Position
	NRC	-5°C to +10°C
ENVIRONMENTAL QUALIFICATION:		No, not required.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, not required.
REDUNDANCY:		No, not required.
POWER SOURCE:		UPS/DG
DISPLAY:		Indicated and recorded in CR.
SCHEDULE:		Installed.

POSITION:

In accordance with Regulatory Guide 1.23, Table 1, the measurement of temperature difference for estimating atmospheric stability requires a range from -1.9°C to +4.0°C for the 100 meter height. The height distance between temperature measuring points at CR-3 is 142 ft. At this distance the RG1.23 equivalent range of required temperature to estimate stability in degrees farenheit is -1.48°F to 3.12°F. Since the actual CR-3 range of -5°F to +10°F completely bounds the -1.48°F to 3.12°F range, it is totally sufficient for providing an estimate of atmospheric stability.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Primary Coolant and Sump (Grab Sample) - Gross Activity
TYPE & CATEGORY:		E 3
RANGE:	CR-3	1 uci/ml to 10 ci/ml
	NRC	1 uci/ml to 10 ci/ml
ENVIRONMENTAL QUALIFICATION:		No, not required.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, not required.
REDUNDANCY:		No, not required.
POWER SOURCE:		N/A
DISPLAY:		No, not required in CR.
SCHEDULE:		Installed.
POSITION:		Complies.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Primary Coolant and Sump (Grab Sample) - Gamma Spectrum
TYPE & CATEGORY:		C, E 3
RANGE:	CR-3	Isotopic Analysis
	NRC	Isotopic Analysis
ENVIRONMENTAL QUALIFICATION:		No, not required.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, not required.
REDUNDANCY:		No, not required.
POWER SOURCE:		N/A
DISPLAY:		No, not required in CR.
SCHEDULE:		Installed.
POSITION:		Complies.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Primary Coolant and Sump (Grab Sample) - Boron Content
TYPE & CATEGORY:		E 3
RANGE:	CR-3	0-6000 ppm
	NRC	0-6000 ppm
ENVIRONMENTAL QUALIFICATION:		No, not required.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, not required.
REDUNDANCY:		No, not required.
POWER SOURCE:		N/A
DISPLAY:		No, not required in CR.
SCHEDULE:		Installed.
POSITION:		Complies.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Primary Coolant and Sump (Grab Sample) - Chloride Content
TYPE & CATEGORY:		E 3
RANGE:	CR-3	0-20 ppm
	NRC	0-20 ppm
ENVIRONMENTAL QUALIFICATION:		No, not required.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, not required.
REDUNDANCY:		No, not required.
POWER SOURCE:		N/A
DISPLAY:		No, not required in CR.
SCHEDULE:		Installed.
POSITION:		Complies.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Primary Coolant and Sump (Grab Sample) - Dissolved Hydrogen or Total Gas
TYPE & CATEGORY:		E 3
RANGE:	CR-3	0-2000 CC (STP)/kg
	NRC	0-2000 CC (STP)/kg
ENVIRONMENTAL QUALIFICATION:		No, not required.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, not required.
REDUNDANCY:		No, not required.
POWER SOURCE:		N/A
DISPLAY:		No, not required in CR.
SCHEDULE:		Installed.
POSITION:		Complies.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Primary Coolant and Sump (Grab Sample) - Dissolved Oxygen
TYPE & CATEGORY:		E 3
RANGE:	CR-3	Not measured, see position.
	NRC	0-20 ppm
ENVIRONMENTAL QUALIFICATION:		N/A
SEISMIC QUALIFICATION:		N/A
QUALITY ASSURANCE:		N/A
REDUNDANCY:		N/A
POWER SOURCE:		N/A
DISPLAY:		N/A
SCHEDULE:		N/A

POSITION:

Ref: NRC criteria guidelines on NUREG-0737, Item II.B.3, Post Accident Sampling System, dated July 12, 1982

Criterion 4 of the reference stated that the measurement of oxygen is recommended but is not mandatory.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIAPLE:		Primary Coolant and Sump (Grab Sample) - pH
TYPE & CATEGORY:		E 3
RANGE:	CR-3	1 to 13
	NRC	1 to 13
ENVIRONMENTAL QUALIFICATION:		No, not required.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, not required.
REDUNDANCY:		No, not required.
POWER SOURCE:		N/A
DISPLAY:		No, not required in CR.
SCHEDULE:		Installed.
POSITION:		Complies.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Containment Air (Grab Sample) - Hydrogen Content
TYPE & CATEGORY:		E 3
RANGE:	CR-3	0 - 10%
	NRC	0 - 10%
ENVIRONMENTAL QUALIFICATION:		No, not required.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, not required.
REDUNDANCY:		No, not required.
POWER SOURCE:		N/A
DISPLAY:		No, not required in CR.
SCHEDULE:		Installed.
POSITION:		Complies.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Containment Air (Grab Sample) - Oxygen Content
TYPE & CATEGORY:		E 3
RANGE:	CR-3	Not measured, see position.
	NRC	0 - 30%
ENVIRONMENTAL QUALIFICATION:		N/A
SEISMIC QUALIFICATION:		N/A
QUALITY ASSURANCE:		N/A
REDUNDANCY:		N/A
POWER SOURCE:		N/A
DISPLAY:		N/A
SCHEDULE:		N/A

POSITION:

The NRC R.G. 1.97 required that Containment Oxygen be measured from 0 to 30% by volume. The category of the variable is 3 and the type is E. A Type E variable is one that is "monitored as required for use in determining the magnitude of the release of radioactive materials, and for continuously assessing such releases." For a Type E variable, Category 3 items are considered as backup variables.

In discussions with the NRC, it was determined that the NRC expects the operator to compare the oxygen percentage with the hydrogen percentage to determine if the hydrogen formed is being caused by radiolysis or by metal-water reaction, which would be indicative of core damage.

Percentage of oxygen in the containment atmosphere is classified as a Type E variable. The definition of a Type E variable is that it is to be "monitored as required for use in determining the magnitude of the release of radioactive materials, and for continuously assessing such releases. However, the percentage of oxygen in the containment atmosphere does not provide the necessary information to determine the magnitude of releases of radioactive materials. At best, it provides a very indirect means of arriving at an order of magnitude estimate. There are other systems in place that can be used for this purpose. Some of these would be Containment Area Radiation, Radioactivity Concentration or Radiation Level in the

Primary Coolant, Analysis of the Primary Coolant, Gross Activity and Gamma Spectrum of the Primary Coolant and Containment Sump, and Gamma Spectrum of the Containment atmosphere. All of these systems provide a more direct means of determining the magnitude of the release and in addition most are Category 1 variables which means they are qualified to the same extent as a safety-related system.

The only other purpose of this variable then would be to allow the operator to determine what physical process is occurring that is forming the hydrogen in the Containment. Radiolysis occurs at all times, and is a slow process. It causes oxygen and hydrogen to be formed from water, so the percentages of both would increase providing no other processes were happening.

However, during a LOCA, a large amount of steam would be generated along with various other gases and the percentage of both hydrogen and oxygen would tend to be in a very dynamic state, rendering a reasonable decision based on that information virtually impossible.

A decrease in the percentage of oxygen along with an increase in hydrogen would be indicative of a metal-water reaction which in turn indicates core damage. Again, however, much better qualified instrumentation is available that provides a direct indication of core damage, rather than an indirect indication of core damage. Some of these systems are: Hot and Cold Leg Water temperatures, Core Exit temperature, Coolant inventory, Degrees of Subcooling, and the systems mentioned for determining the magnitude of the release. Additionally, the problems with a dynamic situation in the containment would also hold true in this case.

The requirement for providing the means of measuring Containment Oxygen content is necessary because existing instrumentation provides more direct indication and are better qualified to perform the function of the required variable.

CRYSTAL RIVER 3

REGULATORY GUIDE 1.97
COMPLIANCE TABLE

VARIABLE:		Containment Air (Grab Sample) - Gamma Spectrum
TYPE & CATEGORY:		E 3
RANGE:	CR-3	Isotopic Analysis
	NRC	Isotopic Analysis
ENVIRONMENTAL QUALIFICATION:		No, not required.
SEISMIC QUALIFICATION:		No, not required.
QUALITY ASSURANCE:		No, not required.
REDUNDANCY:		No, not required.
POWER SOURCE:		N/A
DISPLAY:		No, not required in CR.
SCHEDULE:		Installed.
POSITION:		Complies.