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April 13, 1984

2CAN948404

Mr. Darrell G. Eisenhut, Director
Division of Licensing
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
NUREG 0737 Supplement 1 -
Regulatory Guide 1.97

Gentlemen:

Section 6 of Supplement 1 to NUREG 0737, pertaining to Regulatory Guide 1.97, requires each licensee to submit a report describing how it meets the specific recommendations of Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant Environs Conditions During and Following an Accident." In our response to Supplement 1 dated April 15, 1983, AP&L committed to submit the ANO-2 Regulatory Guide 1.97 position document by April 15, 1984. The attached document contains this comprehensive report and includes the schedules for proposed instrument upgrades. In the development of this position document AP&L has expended in excess of $400,000. We expect the cost associated with implementing the proposed modifications identified in this position document to be in excess of $1.2 million. Assuming no extraordinary delays, all modifications should be implemented during the next three refueling outages.

It was the NRC's intent, as stated in the cover letter transmitting Supplement 1 to NUREG 0737, that Regulatory Guide 1.97 be used as a source of guidance as opposed to being interpreted as a strict regulation, for both the NRC and the licensee. AP&L supports this position, for it allows the needed flexibility for each licensee to comply with this plant specific issue.

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We believe the attached document fully addresses Section 6 to NUREG 0737 Supplement 1 for ANO-2. We will keep you informed of our progress in the implementations of our upgrades committed herein through the biannual updates on NUREG 0737 Supplement 1.

Very truly yours,

John R. Marshall

John R. Marshall
Manager, Licensing

JRM:DEJ:dr
Enclosures

ARKANSAS NUCLEAR ONE
UNIT 2
REGULATORY GUIDE 1.97 POSITION DOCUMENT

INTRODUCTION

Supplement 1 to NUREG-0737 was transmitted with Mr. D. G. Eisenhut's Generic Letter 82-33 dated December 17, 1982 (OCNA128226). This document required AP&L to develop a position regarding compliance with Regulatory Guide 1.97 and to submit this position to the NRC on a schedule consistent with that of an overall integrated program to meet all NUREG-0737 Supplement 1 requirements. Section 6.2 of Supplement 1 to NUREG-0737 recommended that the submittal include documentation, which could be in the form of a table, which addresses the following for each Type A, B, C, D and E variable shown in Regulatory Guide 1.97:

(a) instrument range
(b) environmental qualification
(c) seismic qualification
(d) quality assurance
(e) redundance and sensor(s) location(s)
(f) power supply
(g) location of display
(h) schedule for any new installation or upgrade

This document provides the requested information and is consistent in organization with Table 3 (PWR Variables) of Regulatory Guide 1.97, Revision 3, dated May 1983. Revision 3 was used as opposed to Revision 2 because it more accurately reflects the current NRC guidance on post-accident monitoring.

TABLE FORMAT

Table 1 (attached) lists the variables recommended by Regulatory Guide 1.97, Revision 3, and identifies the recommended range and category (i.e., Neutron Flux, 10^{-6} to 100% F.P., Cat. 1). The subsequent columns provide the AP&L response to the Regulatory Guide 1.97 recommendations including the AP&L assigned category, range, redundancy, power supply, type of control room display, availability on SPDS, schedule for upgrading if applicable, and comments. The comments provided include current instrumentation capabilities as well as planned upgraded capability.

The power supply column specifies the type of available power as follows:

1E - instrument is powered from a qualified 1E power source.
UPS - instrument is powered from a battery backed uninterruptable power source.
DG - instrument is powered from a source that is backed by the emergency diesel generators.
OP - instrument is powered from the normal offsite power source.

The SPDS column specifies whether the variable is available on the SPDS display. The SPDS display is located in both the Unit 1 and Unit 2 Control Rooms, the Technical Support Center and the Emergency Offsite Facility.

Another type of Control Room Display is the Gaseous Effluent Radiation Monitoring System (GERMS). The GERMS is a computerized dose projection system which combines effluent release data with real time meteorological data. GERMS terminals are located in the same facilities as the SPDS.

The schedule column specifies the expected latest date for completion of any planned upgrades. All equipment modifications necessary will be performed during refueling outages to allow safe installation. The schedules given identify the refueling outage when the work is planned to be completed. A schedule of 2R4 implies the upgrade will be completed by the end of the ANO-2 fourth refueling outage. The current schedule for the ANO-2 fourth refueling outage is June, 1985, for the fifth refueling outage is December, 1986 and the Unit 2 sixth refueling outage is August, 1988. These dates are approximations since the actual refueling outages are dependent on plant availability. The specified schedules are based on an integrated consideration of currently planned major plant modifications.

The comment column specifies the status of compliance (i.e., complies, will comply, complies with justification) and gives the reference for further information including justification of deviations and explanation of planned modifications.

DEFINITION OF VARIABLES

The variables identified in Table 1 are divided into five types in accordance with the Regulatory Guide 1.97. The definition for each type of variable is as follows:

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 ANO-2 Emergency Operating Procedures, the following variables were identified as Type A:

RCS Hot Leg Water Temperature
RCS Pressure
Containment Hydrogen Concentration
Steam Generator Level
Steam Generator Pressure

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.

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.

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

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.

EVALUATION CRITERIA

As recommended by Regulatory Guide 1.97, each variable type was evaluated based on the importance to safety of the measurement of the specific variable. The criteria are therefore separated into three categories for a graded approach as follows:

Category 1: provides the most stringent requirements and is intended for key variables. Type A, B and C key variables fall into this category.

Category 2: provides less stringent requirements and applies to instrumentation designated for indicating system operating status. Type D and E key variables fall into this category.

Category 3: provides requirements that will ensure that high quality off-the-shelf instrumentation is obtained and applies to backup and diagnostic instrumentation. This category is also used when the state-of-the-art will not support requirements for higher qualified instrumentation. All backup variables fall into this category.

The specific design and qualification criteria used to evaluate each variable, based on the category classification, are presented below:

CATEGORY 1:

Environmental Qualification - Currently installed instrumentation was evaluated to determine if, as a minimum, the equipment meets the requirements of IE Bulletin 79-01B and 10CFR50.49. This determination was based on either having actual environmental qualification documentation available or documentation on similar equipment available. For those instruments for which proper documentation does not currently exist, either documentation will be generated or the equipment will be replaced. If proper qualification cannot be documented or if new equipment is purchased to meet other Category 1 or 2 requirements, this equipment will be qualified in accordance with 10CFR50.49. Instrumentation whose qualification can not be documented will be replaced by 2R6. Documentation pertaining to environmental qualification will be maintained on file.

Seismic Qualification - Currently installed instrumentation was evaluated against the seismic qualification criteria used as a basis for the plant operating license. These criteria are described in the ANO-2 FSAR, Section 3.10. The ANO-2 seismic criteria are synonymous with the requirements for Class 1 equipment as defined in IEEE Standard 344-1971. Exceptions to the standard are noted in FSAR Section 3.10. New instrumentation will be installed in accordance with the criteria specified in the FSAR.

Redundancy and Sensor Location - A response of "Yes" in the redundancy column 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 and from non-safety equipment in accordance with IEEE Standard 279-1971. This standard was used as the basis for the ANO-2 operating license and meets the intent but not all the strict requirements for physical separation of redundant channels as defined in Regulatory Guide 1.75. Where applicable, the general sensor location is listed.

Power Supply - All Category 1 instruments are supplied with power from a Class 1E power supply. The ANO-2 Class 1E power system is designed to meet the requirements of IEEE 279-1971, IEEE 308-1971, 10CFR50 including Appendices A and B, and Regulatory Guide 1.6.

Quality Assurance - All instrumentation was, and will continue to be purchased and installed in accordance with the provisions of the NRC approved AP&L Quality Assurance Program described in the ANO-2 FSAR, Chapter 17.

Control Room Display and Recording - Continuous real-time display of at least one channel is provided in the Control Room. Recording of the instrument readout information is provided for at least one of the redundant channels, although this recording may be "Non-Q". Variables which input to the SPDS may be displayed and/or trended on demand. Where it has been determined that direct and immediate trend or transient information is essential for operator information or action, a continuous dedicated recorder is provided with redundant backup recording and trending available on SPDS and redundant dedicated indicators in the control room that can be utilized for trend information if necessary.

CATEGORY 2:

Environmental Qualification - Same as Category 1

Seismic Qualification - No specific provision

Redundancy - Not required

Power Supply - Powered by DG or UPS, both considered to be highly reliable

Quality Assurance - Same as Category 1

Control Room Display - "On-demand" or continuous display is provided in the control room. No direct or immediate trend or transient information was determined to be essential for operator information or action.

CATEGORY 3:

Environmental Qualification - Not required

Seismic Qualification - Not required

Redundancy - Not required

Power Supply - Powered by any available source of power

Quality Assurance - Same as Category 1

Control Room Display - Same as Category 2

TABLE 1

AP&L RESPONSE TO RG1.97

ANO-2

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
TYPE "A" VARIABLES								
RCS Hot Leg Water Temp	1	125°-625°F	Yes (2 Channels)	1E	2 Indicators	Yes (1 channel)	---	Complies; see Table 2, Note 1.
		165°-750°F	Yes (4 Channels-2/hot leg)	1E	CRT (SPDS)	Yes	---	
		525°-675°F	Yes (4 Channels-2/hot leg)	1E	2 Indicators (Each selectable to 1 of 2 hot legs)	Yes	---	
		525°-625°F	Yes (2 Channels)	1E	1 Dual Pen Recorder	No	---	
RCS Pressure	1	0-3000 psia	Yes (2 Channels)	1E	2 Indicators 1 Recorder	Yes	---	Complies; see Table 2, Note 2.
Containment Hydrogen Concentration	1	0-10% Vol	Yes (2 Channels)	1E	2 Indicators 1 Recorder	Yes	---	Complies
Steam Generator Level	1	19-1/8" above tube sheet to separators	Yes (2 Channels/SG)	1E	2 Dual Indicators (1SG Channel/Indicator) 1 Dual Pen Recorder (1SG Channel/Pen)	Yes	2R5	Will comply; see Table 2, Note 3.
Steam Generator Pressure	1	0-1200 psia (-15-1185 psig)	Yes (2 Channels/SG)	1E	4 Indicators (1/Channel/SG)	Yes	---	Complies; see Table 2, Note 4.

TABLE 1

AP&L RESPONSE TO RG1.97

ANO-2

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
TYPE "B" VARIABLES								
Neutron Flux 10^{-6}% to 100% F.P. (Cat. 1)	1	10^{-6}% to 100% F.P.	Yes (2 Channels)	1E	2 Indicators 1 Recorder	1 Channel	---	Complies
Control Rod Position Full In or Not Full In (Cat. 3)	3	Full In or Not Full In	N/A	UPS	CRT (SPDS)	Yes	---	Complies
RCS Soluble Boron Conc. 0-6000 PPM (Cat. 3)	3	---	N/A	N/A	N/A	N/A	---	Complies; see Table 2, Note 5.
RCS Cold Leg Water Temp 50^{o} to 700^{o}F (Cat. 1) 50^{o} to 400^{o}F (Cat. 3)	3	165^{o}-750^{o}F	4 Channels (1/Cold Leg)	1E/UPS	CRT (SPDS)	Yes	---	Complies; see Table 2, Note 6.
RCS Hot Leg Water Temp 50^{o} to 700^{o}F (Cat. 1)	---	---	---	---	---	---	---	See previous listing on Page 1.
RCS Pressure 4000 psig (for CE Plants) (Cat. 1)	---	---	---	---	---	---	---	See previous listing on Page 1.

TABLE 1

AP&L RESPONSE TO RG1.97

AND-2

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
Core Exit Temp. 200°F to 2300°F (Cat. 3)	1	---	---	---	---	---	---	Will comply; see Table 2, Note 7.
Coolant Inventory; Bottom of Hot Leg to Top of Vessel (Cat. 1)	1	---	---	---	---	---	---	Will comply; see Table 2, Note 8.
Degrees of Subcooling; 200°F subcooling to 35°F superheat (Cat. 2)	2	0-200°F	Yes (2 Channels)	1E	2 Indicators 1 Recorder	Yes	---	Complies; see Table 2, Note 9.
RCS Pressure 4000 psig (for CE Plants) (Cat. 1)	---	---	---	---	---	---	---	See previous listing on Page 1.
Containment Sump Water Level Narrow Range (Sump) (Cat. 2)	2	0-56"	N/A	1E	1 Indicator	Yes	---	Complies
Wide Range (Plant Specific) (Cat. 1)	1	0-144"	Yes (2 Channels)	1E	2 Indicators 1 Recorder	Yes	---	Complies

TABLE 1

APSL RESPONSE TO RG1.97

AND-2

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
Containment Pressure 0 to Design Pressure (Cat. 1) -5 psig to Design Pressure (Cat. 1)	1	0-210 psia (-15-195 psig) Design=69 psia (54 psig)	Yes (2 Channels)	1E	2 Indicators 1 Recorder	Yes	---	Complies
Containment Isolation Valve Position Closed/Not Closed (Cat. 1)	1	Closed/Not Closed	Yes	1E	Lights (2/Valve)	No	2R4	Will comply; see Table 2, Note 10.

TABLE 1

AP&L RESPONSE TO RG1.97

AND-2

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
TYPE "C" VARIABLES								
Core Exit Temp 200^{o} to $2300^{o}F$ (Cat. 1)	—	—	—	—	—	—	—	See previous listing on page 3.
Radioactivity Concentration or Radiation Level in Circulating Primary Coolant 1/2 Tech Spec Limit to 100 Times Tech Spec Limit (Cat. 1)	3	10^{-4}uCi/gm to 10 Ci/gm	N/A	OP	CRT (GERMS Computer)	No	—	Complies; see Table 2, Note 11.
Analysis of Primary Coolant (Gamma Spectrum) 10uCi/ml to 10 Ci/ml or TID-14844 Source Term in Coolant Volume (Cat. 3)	3	10^{-4}uCi/ml to 10Ci/ml	N/A	OP	CRT (GERMS Computer)	No	—	Complies
RCS Pressure 4000 psig (for CE Plants) (Cat. 1)	—	—	—	—	—	—	—	See previous listing on Page 1.
Containment Pressure -5 psig to Design Pressure (Cat. 1)	—	—	—	—	—	—	—	See previous listing on Page 4.

TABLE 1

AP&L RESPONSE TO RG1.97

ANO-2

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
Containment Sump Water Level Narrow Range (Sump) (Cat. 2) Wide Range (Plant Specific) (Cat. 1)	---	---	---	---	---	---	---	See previous listing on Page 3.
Containment Area Radiation Monitors 1R/hr to 10^4R/hr (Cat. 3)	1	1R/hr to 10^7R/hr Gamma	Yes	1E	2 Indicators 1 Recorder	Yes	2R4	Will comply; see Table 2, Note 12.
Effluent Radioactivity-Noble Gas Effluent from Condenser Air Removal System Exhaust 10^{-6}uCi/cc to 10^{-2}uCi/cc (Cat. 3)	3	10^{-6}uCi/cc to 10^{-2}uCi/cc based on KR-85	N/A	DG	1 Indicator 1 Recorder	Yes	---	Complies; see Table 2, Note 13.
RCS Pressure 4000 psig (for CE Plants) (Cat. 1)	---	---	---	---	---	---	---	See previous listing on Page 1.
Containment Hydrogen Concentration 0-10% Volume Capable of Operating from -5 psig up to Maximum Design Pressure (Cat. 1)	---	---	---	---	---	---	---	See previous listing on Page 1.

TABLE 1

AP&L RESPONSE TO RG1.97

ANO-2

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
Containment Pressure -5 psig to 3 Times Design Pressure (Cat. 1)	—	—	—	—	—	—	—	See previous listing on Page 4.
Containment Effluent Radioactivity-Noble Gases from Identified Release Points 10^{-6}uCi/cc to 10^{-2}uCi/cc (Cat. 2)	3	$1.1E^{-7}$uCi/cc to $1.3E^{-3}$uCi/cc 0-110% Vent Design Flow	N/A	OP	CRT (GERMS Computer)	No	—	Complies; see Table 2, Note 14.
Effluent Radioactivity-Noble Gases from Bldgs 10^{-6}uCi/cc to 10^{-2}uCi/cc (Cat. 2)	3	$1.1E^{-7}$uCi/cc to $1.3E^{-3}$uCi/cc 0-110% Vent Design Flow	N/A	OP	CRT (GERMS Computer)	No	—	Complies; see Table 2, Note 14.

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
TYPE "D" VARIABLES								
RHR System Flow 0-110% Design Flow (Cat. 2)	2	0-8000 GPM (Design= 3100 GPM)	N/A	DG	1 Indicator	Yes	—	Complies
RHR Heat Exchanger Outlet Temp 32^{O}-350^{O}F (Cat. 2)	2	0-400^{O}F	N/A	DG	2 Indicators (1/Containment Spray Line)	Yes	—	Complies
Safety Injection Tank (Accumulator) Level Bottom to Top (Cat. 2)	2	8.75%-91.25% (Bottom to Top)	N/A	DG	4 Indicators (1/Tank)	Yes	2R5	Will Comply;see Table 2,Note 15.
Safety Injection Tank Pressure; 0-750 psig (Cat. 2)	3	0-700 psig	N/A	DG	4 Indicators (1/Tank)	Yes	—	Complies; see Table 2, Note 16.
Safety Injection Tank (Accumulator) Isol. Valve Position Closed/Not Closed (Cat. 2)	2	Closed/ Not Closed	N/A	1E	8 Lights (2/Valve)	No	—	Complies

TABLE 1

AP&L RESPONSE TO RG1.97

ANO-2

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
Boric Acid Charging Flow 0-110% Design Flow (Cat. 2)	2	0-150 GPM Design=132 GPM	N/A	DG	1 Indicator	Yes	---	Complies
Flow in HPI System 0-110% Design Flow (Cat. 2)	2	0-875 GPM (Design= 320 GPM)	N/A	DG	2 Indicators (1/HPI Loop)	Yes	---	Complies
Flow in LPI System 0-110% Design Flow (Cat. 2)	2	0-8000 GPM (Design= 5100 GPM)	N/A	DG	1 Indicator	Yes	---	Complies
Refueling Water Storage Tank Level Top to Bottom (Cat. 2)	1	5.25-94.75% (Bottom to Top)	Yes (4 Channels)	1E	4 Indicators 1 Recorder	Yes	---	Complies
RCP Status Motor Current (Cat. 1)	3	0-600 amps	N/A	OP	4 Meters (1/Pump)	Yes (Planned)	---	Complies
Primary System Safety Relief Valve Positions (Including PORVs and Code Valves) or Flow Through or Pressure in Relief Valve Lines Closed/Not Closed (Cat. 2)	2	Closed/ Not Closed	N/A	DG	2 Indicators (1/Safety Valve)	Yes	---	Complies

TABLE 1

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ANO-2

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
Pressurizer Level Top to Bottom (Cat. 1)	1	3%-95% (Top to Bottom)	Yes (2 Channels)	1E	2 Indicators (Redundant)	Yes	2R6	Will comply; see Table 2, Note 17.
Pressurizer Heater Status Electric Current (Cat. 2)	2	Electric Current	N/A	DG	CRT (SPDS)	Yes	2R5	Will comply; see Table 2, Note 18.
Quench Tank Level Top to Bottom (Cat. 3)	3	5-95% (Top to Bottom)	N/A	DG	1 Indicator	Yes	---	Complies
Quench Tank Temp 50-750°F (Cat. 3)	3	0-300°F	N/A	DG	1 Indicator	Yes	2R4	Complies; see Table 2, Note 19.
Quench Tank Pressure 0 to Design Pressure (Cat. 3)	3	0-100 psig Design=100 psig	N/A	DG	1 Indicator	Yes	---	Complies
Steam Generator Level from Tube Sheet to Separators (Cat. 1)	--	---	---	---	---	---	---	See previous listing on Page 1.
Steam Generator Pressure from Atmospheric Pressure to 20% Above the Lowest Safety Valve Setting (Cat. 2)	--	---	---	---	---	---	---	See previous listing on Page 1.

TABLE 1

AP&L RESPONSE TO RG1.97

ANO-2

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
Safety/Relief Valve Positions or Main Steam Flow Closed/Not Closed (Cat. 2)	2	Closed/ Not Closed	N/A	DG	2 Lights/ Valve	Yes	2R5	Will comply; see Table 2, Note 20.
Main Feedwater Flow 0-110% Design Flow (Cat. 3)	3	0-7.2 X 10^6 lb/hr (0-110% Design)	N/A	DG	1 Dual Pen Recorder (1 Pen/MF Pump)	Yes	2R5	Will comply; see Table 2, Note 21.
Auxiliary Feedwater Flow 0-110% Design Flow (Cat. 2)	1	0-750 GPM (Design= 575 GPM)	Yes (4 Channels) (1/Leg)	1E	4 Indicators (1/Channel)	Yes	---	Complies
Condensate Storage Tank Level Plant Specific (Cat. 1)	3	0-100%	N/A	DG	1 Dual Pen Recorder (1 Pen/Tank)	No	---	Complies; see Table 2, Note 22
Containment Spray Flow 0-110% Design Flow (Cat. 2)	2	0-3500 GPM (Design= 2200 GPM)	N/A	DC	2 Indicators (1/Containment Spray Line)	Yes	---	Complies
Heat Removal by the Containment Fan Heat Removal System Plant Specific (Cat. 2)	2	On-Off	N/A	1E	Lights (1/Fan Breaker)	No	---	Complies; see Table 2, Note 23.

TABLE 1

AP&L RESPONSE TO RG1.97

ANO-2

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
Containment Atmosphere Temp 40-400°F (Cat. 2)	3	0°-300°F	N/A	OP/UPS	CRT (SPDS)	Yes	---	Complies; see Table 2, Note 24
Containment Sump Water Temp 50-250°F (Cat. 2)	---	---	---	---	---	---	---	See Table 2, Note 25.
Makeup Flow-In 0-110% Design Flow (Cat. 2)	2	0-150 GPM Design= 132 GPM	N/A	DG	1 Indicator	Yes	---	Complies
Letdown Flow-Out 0-110% Design Flow (Cat. 2)	2	0-150 GPM (Design= 132 GPM)	N/A	DG	1 Indicator	Yes	---	Complies
Volume Control Tank (VCT) Level Top to Bottom (Cat. 2)	2	Top to Bottom	N/A	DG	1 Indicator	Yes	---	Complies
Component Cooling Water Temp to ESF System 40-200°F (Cat. 2)	---	---	---	---	---	---	---	See Table 2, Note 26.

TABLE 1

AP&L RESPONSE TO RG1.97

ANO-2

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
Component Cooling Water Flow to ESF System 0-110% Design Flow (Cat. 2)	2	0-200 psig Closed/ Not Closed	N/A	1E	2 Indicators 2 Lights/Valve	No	---	Complies; see Table 2, Note 27.
High Level Radioactive Liquid Tank Level Top to Bottom (Cat. 3)	3	13.3-86.7% (Top to Bottom)	N/A	DG	4 Indicators (1/Tank)	No	---	Complies
Radioactive Gas Holdup Tank Pressure 0-150% Design Pressure (Cat. 3)	--	---	---	---	---	---	---	See Table 2, Note 28.
Emergency Ventilation Damper Position Closed/Not Closed (Cat. 2)	2	Closed/ Not Closed	N/A	DG	2 Lights (1/Both CR Isol. Redundant Damper)	No	---	Complies
Status of Standby Power and Other Energy Sources Important to Safety (Electric, Hydraulic, Pneumatic) voltages, currents, pressures; Plant Specific (Cat. 2)	2	Voltages; Breaker Positions; etc.	N/A	Various	CRT (SPDS)	Yes	2R5	Will comply; see Table 2, Note 29.

TABLE 1

AP&L RESPONSE TO RG1.97

ANO-2

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
TYPE "E" VARIABLES								
Containment Area Radiation -High Range, 1R/hr to 10^{7}R/hr (Cat. 1)	—	—	—	—	—	—	—	See previous listing on Page 6.
Radiation Exposure Rate (inside bldgs or areas where access is required to service equipment important to safety) 10^{-1}R/hr to 10^{4}R/hr (Cat. 3)	3	10^{-2}R/hr to 10^{3}R/hr; 10^{-4}R/hr to 10^{1}R/hr; 10^{-3}R/hr to 10^{3}R/hr	N/A	DG	24 Indicators 1 Recorder	Yes	—	Complies; see Table 2, Note 30.
Noble Gases & Vent Flow Rate								
—Containment or purge effluent 10^{-6}uCi/cc to 10^{5}uCi/cc 0-110% Vent Design Flow (Cat. 2)	—	—	—	—	—	—	—	See previous listing on Page 7.
—Reactor Shield Bldg Annulus (if in design)	—	—	—	—	—	—	—	Not in design.

TABLE 1

AP&L RESPONSE TO RG1.97

ANO-2

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
—Auxiliary Bldg (including any bldg containing primary system gases, e.g., waste gas decay tank) 10^{-6}uCi/cc to 10^{3}uCi/cc 0-110% Vent Design Flow (Cat. 2)	—	—	—	—	—	—	—	See previous listing on Page 7.
—Condenser Air Removal System Exhaust 10^{-6}uCi/cc to 10^{3}uCi/cc 0-110% Vent Design Flow (Cat. 2)	3	$1.1E^{-7}$uCi/cc to $1.3E^{3}$uCi/cc 0-110% Vent Design Flow	N/A	OP	CRT (GERMS Computer)	No	—	Complies; see Table 2, Note 14.
—Common Plant Vent Discharging Any of the Above Releases (if containment purge is included) 10^{-6}uCi/cc to 10^{3}uCi/cc 0-110% Vent Design Flow (Cat. 2)	3	$1.1E^{-7}$uCi/cc to $1.3E^{3}$uCi/cc 0-110% Vent Design Flow	N/A	OP	CRT (GERMS Computer)	No	—	Complies; see Table 2, Note 14.
—Vent from Steam Generator Safety Relief Valves or Atmospheric Dump Valves 10^{-1}uCi/cc to 10^{3}uCi/cc (Cat. 2)	2	.066uCi/cc to $6.55E^{3}$uCi/cc (Xe-133 D.E.)	N/A	1E	2 Indicators	Yes	—	Complies; see Table 2, Note 31.

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
—All other identified release points 10^{-6}uCi/cc to 10^{2}uCi/cc (Cat. 2)	—	—	—	—	—	—	—	No other identified release points.
Particulates and Halogens								
—All identified plant release points (except steam generator safety relief valves or atmospheric steam dump valves and condenser air removal system exhaust). Sampling with on-site analysis capability; for particulates and halogens 10^{-3}uCi/cc to 10^{2}uCi/cc 0-110% Vent Design Flow (Cat. 3)	3	10^{-3}uCi/cc to 10^{2}uCi/cc 0-110% Vent Design Flow	N/A	OP	CRT (GERMS Computer)	No	—	Complies; see Table 2, Note 32.
Airborne Radiohalogens and Particulates (Portable Sampling with On-Site Analysis Capability) 10^{-9}uCi/cc to 10^{-3}uCi/cc (Cat. 3)	3	10^{-9}uCi/cc to 10^{-3}uCi/cc	N/A	N/A	N/A	N/A	—	Complies

TABLE 1

AP&L RESPONSE TO RG1.97

AND-2

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
Plant and Environs Radiation; 10^{-3} R/hr to 10^{4} R/hr, Photons; 10^{-3} RADS/HR to 10^{4} RADS/HR, Beta Radiations and Low-Energy Photons (Portable Instrumentation)	3	$10E^{-3}$ R/hr to $10E^{5}$ R/hr Photons; 10^{-3} RADS/hr to 50 RADS/hr	N/A	N/A	N/A	N/A	---	Complies; see Table 2, Note 33.
Plant and Environs Radioactivity (Portable instrumentation) (Isotopic Analysis) (Cat. 3)	3	Isotopic Analysis	N/A	N/A	N/A	N/A	---	Complies; see Table 2, Note 34.
Wind Direction 0-360°(± 5° accuracy with a deflection of 10°). Starting speed < 1 mph; damping ratio >0.4; distance constant less than or equal to 2 meters. (Cat. 3)	3	0-360° ± ½% Full Scale; Starting Speed - .75 mph; damping ratio - .6; distance constant - 1 m.	N/A	OP	1 Recorder CRT (GERMS Computer)	No	---	Complies
Wind Speed 0-50 mph (± .5 mph accuracy for wind speeds < 5 mph, 10% for speeds > 5 mph, with a starting threshold < 1 mph and a distance constant not to exceed 2 meters (Cat. 3)	3	0-100 mph accuracy greater of ± 1% or ± 0.15 mph; starting threshold - 0.6 mph; distance constant - 5 ft.	N/A	OP	1 Recorder CRT (GERMS Computer)	No	---	Complies

TABLE 1

AP&L RESPONSE TO RG1.97

ANO-2

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
Estimation of Atmospheric Stability Based on Vertical Temp Difference from Primary System -9°F to 18°F and +0.3°F accuracy per 164' Intervals or analogous range for alternative stability estimates. (Cat. 3)	3	-3° to 5°C Temp Difference 0-40°- Wind Direction Sigma	N/A	OP	1 Dual Pen Recorder CRT (GERMS Computer)	No	---	Complies; see Table 2, Note 35.
Primary Coolant and Sump (Grab Sample) (Cat. 3)	3	---	N/A	N/A	N/A	N/A	---	Complies; see Table 2, Note 36.
--Gross Activity 1 uCi/ml to 10 Ci/ml								
--Gamma Spectrum (isotopic analysis)								
--Boron concentration 0-6000 PPM								
--Chloride Content 0-20 PPM								
--Dissolved hydrogen or Total Gas 0-2000 cc/kg								
--Dissolved Oxygen 0-20 PPM								
--pH 1-13								

TABLE 1

AP&L RESPONSE TO RG1.97

ANO-2

VARIABLE RECOMMENDED PER RG1.97 (REV. 3)	CATEGORY	RANGE	REDUNDANCY	POWER SUPPLY	CR DISPLAY	SPDS	SCHEDULE	COMMENTS
Containment Air Grab Sample (Cat. 3)	3	---	N/A	N/A	N/A	N/A	---	Complies; see Table 2, Note 36.
--Hydrogen Content 0-10% Vol.								
--Oxygen Content 0-30% Vol.								
--Gamma Spectrum (Isotopic Analysis)								

TABLE 2

AP&L RESPONSE TO REGULATORY GUIDE 1.97
ANO-2

NOTE 1: The range recommended by Reg. Guide 1.97 for RCS Hot Leg Water Temperature is 50° to 700°F. The existing range available in the control room for continuous display from Category 1 instrumentation is 125° to 675°F. The lower range of 125°F is sufficient for operator information since the cooldown of the RCS while using the steam generators is limited to approximately 300°F. At that point, further cooldown to below 200°F is accomplished by utilizing the shutdown cooling heat exchangers which have inlet and outlet temperature instrumentation designed specifically for monitoring temperatures below 300°F. Therefore, the lower range of 125°F for RCS Hot Leg Water Temperature meets the intent of Reg. Guide 1.97.

The upper limit of 675°F is sufficient for operator information since the RCS saturation temperature at the safety valve setpoint is less than 670°F. If temperatures in the RCS Hot Leg exceed 670°F, the RCS has reached a superheat or overpressure condition such that the Category 1 Core Exit Temperature instrumentation (0°to 2300°F) should be utilized to monitor core cooling status, not the hot leg temperature instrumentation. Also, as a backup, ANO-2 has four fully qualified hot leg RTD's which measure a range of 165° to 750°F that can be read out in the control room by use of computer points. Therefore, the upper range of 675°F (continuous display) and 750°F (computer display) for RCS Hot Leg Water Temperature meets the intent of Reg. Guide 1.97.

NOTE 2: The range recommended by Reg. Guide 1.97 for RCS pressure is 0 to 4000 psig. The existing range available in the control room is 0 to 3000 psig based on operator information needs to monitor normal and accident conditions. The value of 3000 psig is in excess of 120% of the RCS safety valve setting and the RCS design pressure. The apparent basis for the Reg. Guide 1.97 range of 0 to 4000 psig is for monitoring ATWS scenarios that are postulated based on highly improbable failures that could result in pressures greater than 3000 psig. The operator information needs for accident situations including ATWS do not necessitate monitoring pressures greater than 2500 psig. Additionally, the probability of experiencing an ATWS transient that results in pressures greater than 3000 psig is so low that new instrumentation or modification of existing instrumentation solely for post-transient diagnosis is not appropriate or justified. Therefore, no modifications to the existing RCS pressure instrumentation are necessary to comply with the intent of Reg. Guide 1.97.

NOTE 3: In addition to the 4 channel narrow range steam generator level instrumentation, ANO-2 currently has 1 non-qualified wide range level loop per steam generator. These loops will be replaced to provide 2 fully qualified wide range instrument loops per steam generator with a range of 19 1/8" above the tube sheet to separators, qualified indications (1/channel/SG), one channel from each SG recorded on a non-qualified dual recorder and all input to the SPDS computers. The lower range of 19 1/8" above the tube sheet meets the intent of Reg. Guide 1.97 since this level essentially equates to zero and operator action would not be affected by monitoring levels lower than the 19 1/8" level.

NOTE 4: ANO-2 has control room indication of main steam pressure at the turbine as well as at the steam generators. The steam generator outlet pressures are measured over the range from 0-1200 psia (-15 - 1185 psig). The NRC recommendation is for the range to be 20% above the lowest safety valve setting. Since the lowest safety valve is 1078 psig, the range would have to be in the order of 1295 psig to meet the NRC's recommendation. The following discussion is provided to justify that the existing range of 0-1200 psia (-15 - 1185 psig) is sufficient.

The accident analyses results presented in Chapter 15 of the ANO-2 FSAR indicate that for both the loss of external load transient and loss of all non-emergency AC power transient, the maximum steam pressure is 1135 psig (See FSAR Table 15.1.7-2 and Fig 15.1.9-3). The main steam lines are provided with safety relief valves, atmospheric dump valves and condenser dump valves to prevent over-pressurization of the lines as well as pressure control. ANO-2 has ~30% excess steam relief capacity when the plant is operating at 100% power and all main steam safety valves are operable. ANO-2 also has a technical specification which limits the maximum allowable plant power and its steam flow in the event not all safety valves are operable in order to maintain excess relief capacity. Therefore, based on the facts that the highest safety valve setting is 1132 psig, the steam relief capacity is ~30% above the expected steam flow rate, excess relief capacity is maintained when safety valves are inoperable, and the FSAR analysis indicates a maximum steam pressure of 1135 psig, the existing range of -15 - 1185 psig (0-1200 psia) is sufficient to meet the intent of R.G. 1.97.

NOTE 5: During normal operation boron concentration is measured by a boronometer in the letdown line or through radiochemistry analysis. Following a serious accident, however, the letdown line will be isolated (either procedurally to conserve reactor coolant and limit exposure to personnel in the auxiliary building or via a containment isolation signal) and the radiochemistry lab may become inaccessible due to radiation levels.

Therefore, in accordance with NUREG-0737, Item II.B.3, the Post Accident Sampling System (PASS) for ANO-2 was designed to provide boron concentration measurement capability. The range and design criteria for the PASS is consistent with guidance provided for Item II.B.3 which has been addressed by AP&L in previous submittals and discussions with the NRC.

NOTE 6: The range recommended by Reg. Guide 1.97 for RCS Cold Leg Water Temperature is 50° to 700°F. The existing range available in the control room for display is 165° to 750°F. The primary basis for monitoring cold leg temperature is as a backup to steam generator pressure which is utilized to assess the performance of RCS heat removal. As a result, the RCS Cold Leg Water Temperature is a Category 3 backup variable. The actual range of value to the operator is approximately 200° to 600°F based on steam generator saturation temperatures at the lower and higher pressure limits of the secondary system. Measurement of temperatures less than 200°F or higher than 600°F in the RCS cold leg does not provide dependable information about the core conditions (i.e., RCS heat removal) such that the Category 1 Core Exit Temperature instrumentation (0° to 2300°F) should be utilized. Since the range of available instrumentation more than satisfies the intent of Reg. Guide 1.97, no modifications to the cold leg temperature instrumentation are necesary to comply with the intent of Reg. Guide 1.97.

NOTE 7: ANO-2 will meet the requirements for measurement of Core Exit Temperature and Coolant Inventory as detailed in our response (2CAN048306) to the Inadequate Core Cooling Order for modification of Licenses. In summary, ANO-2 presently has 44 radially distributed core exit thermocouples (22 input to the plant computer and 22 input to the SPDS computer) with a range of 0-2300°F, and qualified up to the penetrations. The proposed modifications to the CET Monitoring System include:

(A) Transfer of the 22 inputs from the plant computer to the SPDS (primary display);

(B) Upgrading the qualification of the CET's connectors and cables to class 1E up to and including the isolation devices;

(C) Addition of CET signal processing equipment and isolators in the loop between sensors (1E) and SPDS (non-1E), and

(D) Addition of a qualified backup display in the control room for at least 16 of the CET's.

NOTE 8: Coolant Inventory will be monitored using a RADCAL Gamma thermometer. Two sensors will be axially located to provide optimum resolution in the areas of most concern. These will be 2 Class-1E channels up to and including the isolation devices. Both channels are input to a common display, the SPDS computers. Recording will be performed using the trending capabilities of the SPDS computers.

NOTE 9: During situations that may result in superheated conditions in the RCS, core exit thermocouples and hot leg RTD's will be monitored against RCS pressure to determine the degree of superheat or subcooling. Although not directly input to SPDS, the SPDS computers will plot on the CRT's core exit temperature versus pressure on a grid with the saturation curve so that the operator can tell at a glance the thermodynamic status of the reactor coolant. Therefore, a range of 0°F-200°F subcooled on the subcooled margin monitor is adequate to meet the intent of Reg. Guide 1.97.

NOTE 10: Containment isolation valves listed in Table 6.2-26 of ANO-2's FSAR were evaluated. This evaluation excluded check valves and locked closed manual valves which are part of a passive boundary. Redundancy is satisfied by GDC 55, 56, or 57. With the exception of seven (7), all position switches are class 1E with "open-closed" indicating lights in the control room. These seven (7) switches will be upgraded to comply with Reg. Guide 1.97.

NOTE 11: During normal plant operations RCS radiation levels are measured by a radiation monitor in the letdown line and through radiochemistry analysis. These two techniques are used to quantify the activity in the primary coolant and to determine Technical Specification compliance. Following a serious accident, however, the letdown line will be isolated (either procedurally to conserve reactor coolant, and limit exposure to personnel in the auxiliary building or via a containment isolation signal) and the radiochemistry lab may become inaccessible due to radiation levels. Therefore, these normal methods are not suitable for post accident analysis. Section II.B.3 of NUREG-0737 requires that the capability exist at each nuclear plant to sample the RCS to assess the magnitude of fuel failures during post-accident conditions. As such, this method should be the primary means of determining clad breach.

The Post Accident Sampling System for ANO-2 was designed to comply with the requirements of NUREG 0737 item II.B.3. These requirements did not require that the system be safety grade. Therefore, PASS does not comply with the strict requirements specified for Category 1 equipment. Since PASS is designed in accordance with the requirements of NUREG-0737, Item II.B.3, and those requirements are consistent with the criteria of Reg. Guide 1.97 Category 3, the PASS variables have been specified as Category 3 by AP&L. The range covered by PASS is consistent with guidance provided for Item II.B.3 of NUREG 0737.

NOTE 12: The existing High Range Radiation Monitoring System meets all requirements of a Category 1 instrument loop, with the exception of having at least 1 channel recorded. Difficulties were encountered with the acquisition of a qualified isolator/amplifier for the signal range. Testing has recently been completed successfully. The isolator/amplifier, recorder, and input to SPDS will be installed by 2R4.

NOTE 13: ANO-2 currently has a radiation monitor that will meet the specified concentration range if the detector response is attributed to Kr-85, as allowed for in Footnote 9 of Reg. Guide 1.97.

Footnote 9 also specifies that the monitor response (output in uci/cc) should not vary more than a factor of two as the isotopic mixture of the measured gas varies from typical fresh to 10-day-old fission gas mixtures. The stated purpose of detecting steam generator tube rupture is adequately fulfilled by periodically observing the indicated gross activity in the condenser exhaust and watching for a step change. The baseline reading and the magnitude of the step change are not critical so long as the monitor has sufficient dynamic range. For this reason the isotopic mixture accuracy specification is not necessary. Since the average gamma energy of fission gases decreases by nearly a factor of two in ten days, it is unlikely that the monitor response would vary by less than a factor of two. However, the ANO-2 monitor meets the intent of Reg. Guide 1.97.

NOTE 14: The Gaseous Effluent Radiation Monitoring System (GERMS) for ANO-2 was designed to comply with the requirements of NUREG-0737, Item II.F.1. These requirements did not include providing a "highly reliable" power supply. Therefore, GERMS does not comply with the strict requirements specified for Category 2 variables of Reg. Guide 1.97. Since GERMS is designed in accordance with the requirements of NUREG-0737, Item II.F.1, and those requirements are consistent with the criteria of Reg. Guide 1.97 Category 3, the GERMS variables have been specified as Category 3 by AP&L. The range covered by GERMS is consistent with Reg. Guide 1.97 recommendations.

NOTE 15: ANO-2 presently has one wide range and two narrow range level measuring loops per tank. The wide range instrument loops will be upgraded to meet Category 2 requirements.

NOTE 16: Safety Injection Tank pressure is a key variable for pre-accident status to assure that this passive safety system is prepared to serve its safety function as dictated by the ANO-2 Technical Specifications. This pressure indication provides no essential information for operator action during or following an accident. The key variable necessary to determine whether the Safety Injection Tanks have fulfilled their safety function is Safety Injection Tank level. Therefore, Safety Injection Tank pressure is a backup type variable and has been classified as a Category 3 instrument accordingly. Furthermore, since the Safety Injection Tank pressure is restricted by Technical Specifications to less than 624 psig, the existing range of 0-700 psig is more than sufficient for this indication.

NOTE 17: ANO-2 currently has 2 class 1E channels of pressurizer level with indication in the control room; however, this is not a temperature compensated level. An existing pressurizer temperature RTD will be replaced with a qualified dual element RTD. Each element, after isolation, will feed the individual level loops. The level will then be compensated before going to the control room indication.

NOTE 18: The pressurizer heater banks do not currently have electric current indication in the control room. Transducers will be added to the proportional heater circuits and input to SPDS. This will allow "on-demand" indication of pressurizer heater current.

NOTE 19: Quench tank level and pressure are available for monitoring quench tank performance. The maximum expected quench tank temperature during design basis events is 280°F. As a result, the existing range of 0° to 300°F is in excess of that required for accident monitoring. Therefore, the existing temperature range of 0° to 300°F is adequate to meet the intent of Reg. Guide 1.97.

NOTE 20: Presently ANO-2 does not have a Safety Relief Valve position indication (SRVPI) system. Main steam flow is being monitored at the outlet of each steam generator. A new SRVPI system will be provided in compliance with R.G. 1.97 to monitor valve open and closed positions.

NOTE 21: ANO-2 currently has main feedwater flow transmitters that indicate a range of 0-6.5 x 10^6 lb./hr. which is equal to 0-100% of design flow. The range will be modified to provide 0-110% of design flow or 0-7.2 x 10^6 lb./hr.

NOTE 22: The condensate storage tank level indication has been specified as Category 3 in accordance with Reg. Guide 1.97 since it is not the essential source of auxiliary feedwater. The essential source is the service water system which is considered an "infinite" source of feedwater. As a result, level indication for the service water system is not provided since indication of the quantity of service water available (from the Dardanelle Reservoir and the Emergency Cooling Pond) is not dependent on level and is essentially infinite.

NOTE 23: ANO-2 currently has a Class 1E indication of the containment cooling fan motor breaker status. The key variable for monitoring containment cooler performance is containment pressure instrumentation which is a Category 1 variable. Utilizing containment pressure

instrumentation and cooling fan motor breaker status, the operator can determine the performance of the safety related containment cooling system. Additionally, as a backup variable, a local flow switch is provided that includes an annunciator in the control room which alarms when service water flow thru the cooler is low. Therefore, the existing instrumentation satisfies the intent of Reg. Guide 1.97 with no modifications necessary.

NOTE 24: Containment atmospheric temperature is not a key variable for accident monitoring. The key variable for containment monitoring is containment pressure which is measured by Category 1 instrumentation. Containment atmospheric temperature is a backup variable for containment accident monitoring and as such is measured by Category 3 instrumentation with a range of 0^{o} to 300^{o}F. This range is justified based on ANO-2 safety analysis which demonstrates that the worst case peak containment temperature would be 288.5^{o}F. Therefore, the existing range of 0^{o} to 300^{o}F is in excess of that required for accident monitoring. Since the key variable for containment accident monitoring (i.e., containment pressure) is currently Category 1, the backup variable of containment temperature for ANO-2 is appropriately listed as Category 3 and meets the intent of Reg. Guide 1.97.

NOTE 25: ANO-2 FSAR accident analysis assumes saturated conditions for sump water during sump recirculation. With this conservative assumption, adequate NPSH exists for containment spray and safety injection pumps at all feasible sump water temperatures. Therefore, there is no need to monitor sump temperature to verify adequate NPSH for ECCS pumps or for any other accident monitoring requirements.

NOTE 26: The ANO-2 system for cooling the ESF components is the Service Water System. The inlet temperature of the service water by design is based on a maximum temperature of 129.5^{o}F from the emergency cooling pond. The average temperature of the pond (June through September) is 85^{o}F; furthermore, there is no control over the temperature of the service water. Therefore, there is no need to indicate the service water temperature in the control room since, by design, no useful information would be provided to the operator by such instrumentation.

NOTE 27: The ANO-2 system for cooling the ESF components is the Service Water System. The existing instrumentation for monitoring service water to the ESF components includes the following:

1) Service water system supply pressure with a range of 0-200 psig. This instrumentation confirms service water pump operation as well as system flow to ESF components and is Category 2. The curve depicting the relationship between pressure and flow will be available to the operator for determining total service water flow during accident conditions.

2) Service water system valve position indication in the control room and specific line-up procedures to assure ESF cooling during all modes of plant operation. The valve position indication is Category 2.

3) ESF equipment cooling unit differential pressure alarms in the control room. This instrumentation is installed on ESF pump coolers to alert the operator of loss of service water to specific components.

4) ESF heat exchanger local flow indicating switches on select components (E.g., containment cooling units and shutdown cooling heat exchanger) with alarms on low flow indication in the control room.

NOTE 28: Indication of radioactive gas holdup tank pressure is not a necessary control room variable for 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 holdup tanks would not be attempted since the containment building would be utilized as the holdup tank. There are no automatic transfer operations involving the radioactive gas holdup tanks. Therefore, the monitoring in the control room of the radioactive gas holdup tanks during post accident conditions is not necessary since these tanks are not utilized for accident mitigation.

NOTE 29: AP&L is in the process of defining the necessary parameters needed to assess the status of standby power. These required buss voltages, breaker status information, etc. will be added as inputs to the SPDS computers. A specific graphic display for the SPDS is being developed to give the operator the status of standby power at a glance.

NOTE 30: ANO-2 currently has an Area Radiation Monitoring System consisting of 24 Area Monitors, 4 with a range of 10^{-2}R/hr to 10^{3}R/hr and 20 with a range of 10^{-4}R/hr to 10^{1}R/hr. 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 ANO 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.

NOTE 31: As detailed in Note 17, a system is being considered for safety relief valve position indication. The range of the existing radiation monitor is insufficient to cover the specified range as Kr-85; however, when a calculated method is applied as suggested in footnote 13 of RG 1.97 (Rev. 3), the Xe-133 dose equivalent concentration of fission gases from 1% failed fuel which can be measured by the monitor does meet the RG 1.97 recommendation for minimum sensitivity. The emergency response of the current monitor (Eberline RMS-II/DA1-6) has not been tested above 1.25 MEV. It is, however, specified to be flat within $\pm$ 15% from 40 KEV to 1.25 MEV.

NOTE 32: Each Super Particulate Iodine Noble Gas (SPING) monitor which inputs to the Gaseous Effluent Radiation Monitoring System has the capability to measure halogen and particulate acitivity as it is accumulated on a sample media. The SPING microcomputer then calculates the gross radiohalogen and particulate sample concentration based on the rate of increase of activity on the filter media. If necessary, to further define the analysis or to extend the range, an isotopic analysis of the filter media can be performed by plant radiochemistry personnel. This technique provides a range at least equivalent to that which is recommended by the Regulatory Guide.

NOTE 33: Existing portable instrumentation can detect gamma dose rates from 10^{-3}R/hr to 10^{3}R/hr and beta dose rates from 10^{-3}Rad/hr to 50 Rad/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^{3}R/hr fields. Therefore, we meet the intent of Regulatory Guide 1.97 with our current equipment.

NOTE 34: Gamma spectroscopy can be performed using equipment in the HP department and the radiochemistry department at ANO, and in the Technical Analysis Laboratory in Little Rock. In addition, we have an ND-60 spectrometer in the ANO Emergency Offsite Facility which can be used for less defined analysis. It is not appropriate that this instrumentation be portable due to rough handling it would encounter in the field and the limited amount of time field teams have to assess the release. Therefore, we comply with the intent of RG 1.97.

NOTE 35: Atmospheric stability at ANO is derived from the temperature differential indicated between 34 and 180 feet. The -3 to 5^{o}C temperature range covers the seven Pasquill stability classes vs Delta-T as derived from Regulatory Guide 1.23 and specified in the ANO-2 FSAR. Expansion of the range would provide no additional useful information. In addition to temperature differential, atmospheric stability can also be calculated for all seven classes using wind direction sigma. Therefore, we meet the intent of Regulatory Guide 1.97.

NOTE 36: Post accident sampling of the RCS and the containment air will be accomplished utilizing the Post Accident Sampling System (PASS). The PASS was installed to meet the requirements of NUREG-0737 item II.B.3. The range and accuracy capability of the PASS is being resolved at this time through further acceptance testing of the Orion equipment. AP&L is in contact with the NRC Division of Licensing to assure compliance with item II.B.3. Based on the fact that we are in compliance with item II.B.3 of NUREG-0737, we meet the intent of Regulatory Guide 1.97.