Appendix 1A. Tables

Table 1-1. Shared Facilities and Equipment

System	Components Shared	Quantity Provided
Chemical & Volume Control System	Boric Acid Transfer Pump	4
	Boric Acid Tank	2
	Boric Acid Batching Tank	1
	Batching Tank Agitator	1
Boron Recycle System	Recycle Evap. Feed Demin.	2
	Recycle Evap. Feed Filters	2
	Recycle Holdup Tanks	2
	Recycle Evap. Feed Pumps	2
	Recycle Evap. Reagent Tank	1
	Recycle Evap. Cond. Return Unit Package	1
	Recycle Evaporator Package	1
	Recycle Evap. Cond. Demin.	1
	Recycle Evap. Cond. Filter	1
	Recycle Evap. Concentrates Filter	1
Ice Condenser Refrigeration System	Ice Condenser Glycol Mixing & Storage Tank	1
	Ice Condenser Glycol Mixing & Storage Pump	1
	Ice Condenser Glycol Pumps	6
	Ice Condenser Refrigeration Units	6
	Ice Machine Unit	3
	Ice Making Solution Mix Tank	1
	Ice Making Solution Feed Pump	1
	Ice Bin Condensing Unit	2
	Ice Annex Condensing Unit	1
	Ice Bin Space Air Handler Unit	1
	Ice Bin Wall Air Handler Unit	2
	Ice Annex Space Air Handler Unit	2
	Ice Condenser Blower Unit	1
	Ice Condenser Air Cooler	1

System	Components Shared	Quantity Provided
	Ice Condenser Air Chiller Condensing Units	2
	Ice Condenser Air Chillers	3
Line item deleted per 2001 update.		
Liquid Radwaste System, Waste Gas, and Nuclear Solid Waste Disposal Systems	Common waste systems are used for the two units. Each Containment structure has its own reactor coolant drain tank and Containment sumps serviced by two reactor coolant drain tanks and five sump pumps. All other waste equipment is sized to adequately serve the two units.	
Nuclear Service Water System	Standby Nuclear Service Water Pond	1
	Nuclear Service Water Pumphouse Pits & Intake Structures	2
	Supply and Return Lines	2
	Control Room Area Chiller Condensers	2
	Radiation Area Vent Unit	1
	Boron Recycle Evap. Pkg. Room Air Hand Unit	1
	Waste Evap. Pkg. Room Air Hand Unit	1
	Nuclear Service Water Pump Bearing Lube Inj. Strainer	2
Auxiliary Building Ventilation System	Supply Filter Unit	1
	Counting Room Radwaste Area Air Handling Units	3
	Counting Room Supply Unit	1
Groundwater Drainage System	Groundwater Sump Pump	6
Conventional L.P. Service Water System	Conventional Service Water Pump	3
	Conventional Service Water Strainer	2
Control Area Ventilation	Control Room Air Pressurizing Filter Trains	2
	Control Room Air Handling Unit	2

System	Components Shared	Quantity Provided
	Control Room Area Air Handling Units	2
Fire Protection System	Fire Pump	3
	Jockey Pump	3
	Fire Protection Pressurizer Tank	1
Equipment Decontamination System	Equip. Decon. Pump	1
	Equipment Decon. Tank	1
Recirculated Cooling Water System	Recirculated Cooling Water Pumps	3
	Recirculated Cooling Water HX	4
	Recirculated Cooling Water Storage Tank	1
Instrument Air System	Inlet Air Filters	3
	Centrifugal Air Compressors	3
	Air Receivers	3
	Dryers	2
	Prefilters	3
	Afterfilters	2
Conventional Sampling System	Conventional Sampling Final Cooling Pump	1
Radwaste Area Chilled	Radwaste Area Chiller	2
Water System	Radwaste Area Chilled Water Pump	2
Control Room Area Chilled Water System	Control Room Area Chillers	2
	Control Room Area Chilled Water Pumps	2
Nuclear Service Water Pump Structure Ventilation System	Pump Structure Ventilation Fans	4
Computer Room Area A/C System	Computer Room Area Air Handling Units	2
Computer Room Area	Computer Room Area Chillers	2
Chilled Water System	Computer Room Area Chilled Water Pumps	2

System	Components Shared	Quantity Provided
Service and Administration Building Ventilation Systems	Air Handling Units, chillers, pumps, boilers, etc. are provided as required to maintain conditions in the Service and Administration Buildings.	
Gas Bulk Storage Systems	Hydrogen, Nitrogen, Oxygen storage tanks, headers, regulators, and safety valves to provide cooling, blanketing, and purging gases to station systems.	
Auxiliary Boiler System	Aux Boiler	2
	Aux Boiler Feed Pumps	2
	Blow off Tank	1
	Chemical Feed Tank	1
	Feedwater Tank	1
	Chemical Feed Pumps	2
	Sample Coolers	2
Technical Support Center Ventilation System	TSC Filter Unit	1
	TSC Fan Unit	1
	TSC AHU	1
Station Air System	Station Air Filters	2
	Station Air Compressors	2
	Station Air Receivers	2
Breathing Air System	Pre-filters	2
	Inlet Filters	2
	Compressors	2
	Post-filter sets	2
	Receivers	2
Filtered Water System	Deleted per 2015 update	
	Filtered Water Booster Pumps	2
	Deleted per 2015 update	2
Makeup Demineralized Water System	Deleted per 2015 update	
	Demin Water Storage Tank Supply Pumps	2

System	Components Shared	Quantity Provided
	Demin Water Storage Tank	1
	Deleted per 2015 update	
	Makeup Demin Water Supply Pumps	2
Cooling Tower Water Treatment Syst.	Acid Tanks (Abandoned in Place)	2
	Deleted per 2018 Update	
	Dispersant Tanks (Abandoned in Place)	2
	Dispersant Pumps (Abandoned in Place)	3
	Biocide Tank	1
	Biocide Pumps	2
	Sodium Tanks	4
Standby Shutdown Facility D/G	Diesel Generator	1
	Fuel Oil Tank	1
	Fuel Oil Day Tank	1
	Recirc Pump	1
	Day Tank Pump	1

Table 1-2. Design Comparison. *Catawba Nuclear Station - Comparison with McGuire Nuclear Station and Watts Bar Nuclear Power Plant*

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED

CHAPTER NUMBER	*CHAPTER TITLE SYSTEM/COMPONENT*	*REFERENCES (FSAR)*	*SIGNIFICANT SIMILARITIES*	*SIGNIFICANT DIFFERENCES*
4.0	***Reactor***			
	Fuel	*Section 4.2.3*	*McGuire, Watts Bar*	*Catawba has Unit 1 some B&W fuel now.*
	Reactor Vessel Internals	*Section 4.2.2*	*McGuire, Watts Bar*	*None*
	Reactivity Control	*Section 4.2.4*	*McGuire, Watts Bar*	*McGuire Unit 1 control rods are Ag-In-Cd. Catawba and McGuire Unit 2 have B_4C.*
	Nuclear Design	*Section 4.3*	*McGuire, Watts Bar*	*Catawba has some B&W fuel now.*
	Thermal-Hydraulic	*Section 4.4*	*McGuire, Watts Bar*	*None*
5.0	***Reactor Coolant System***	*Section 5.1, 5.2*	*McGuire, Watts Bar except as noted*	*The following have been added or changed:* *1. Specific new stress limits,* *2. New requirements for fracture toughness testing,* *3. New means of determining heat-up and cooldown rates,* *4. New ANS Safety Classification,* *5. A change in the number of seismic occurrences and the number of cycles during each as postulated for fatigue evaluations.*
	Reactor Vessel[1]	*Section 5.3*	*McGuire, Watts Bar*	*None*

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED

CHAPTER NUMBER	*CHAPTER TITLE SYSTEM/COMPONENT*	*REFERENCES (FSAR)*	*SIGNIFICANT SIMILARITIES*	*SIGNIFICANT DIFFERENCES*
	Reactor Coolant Pumps[1]	*Section 5.4.1*	*McGuire, Watts Bar*	*None*
	(Unit 1)	*Section 5.4.2*	*McGuire*	*None*
	Steam Generators[1] *(Unit 2)*	*Section 5.4.2*	*Watts Bar*	*None*
	Piping[1]	*Section 5.4.3*	*McGuire, Watts Bar*	*None*
	Residual Heat Removal System	*Section 5.4.7*	*McGuire, Watts Bar except as noted*	*McGuire, Watts Bar have one RHR suction line from the Reactor Coolant System*
	Pressurizer[1]	*Section 5.4.10*	*McGuire, Watts Bar*	*None*
6.0	***Engineered Safety Features***			
	Containment	*Sections 3.8.2 and 6.2.1*	*McGuire, Watts Bar*	*None*
	Containment Spray System	*Section 6.2.2*	*McGuire, Watts Bar*	*None*
	Hydrogen Purge System	*Section 6.2.5*	*McGuire, Watts Bar*	*None*
	Hydrogen Recombiners	*Section 6.2.5*	*McGuire, Watts Bar*	*None*
	Emergency Core Cooling System	*Section 6.3*	*McGuire, Watts Bar except as noted*	*The following has been added or changed:* *1. New ANS Safety Classification.*
	Ice Condenser	*Section 6.7*	*McGuire, Watts Bar*	*None*

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED

CHAPTER NUMBER	***CHAPTER TITLE SYSTEM/COMPONENT***	***REFERENCES (FSAR)***	***SIGNIFICANT SIMILARITIES***	***SIGNIFICANT DIFFERENCES***
7.0	***Instrumentation and Controls***			
	Reactor Trip System	*Section 7.2*	*System functions are similar to McGuire, Watts Bar*	*None*
	Engineered Safety Features System	*Section 7.3*	*Systems functions are similar to McGuire*	*Watts Bar is similar except steamline break protection is S.I. on high steam line differential pressure or high steam flow coincident with low steam line pressure or lo lo Tavg.*
	Systems required for safe shutdown	*Section 7.4*	*System functions are similar to McGuire, Watts Bar*	*None*
	Safety Related Display Instrumentation	*Section 7.5*	*Parametric display is similar to that of McGuire, Watts Bar except as noted*	*Actual physical configuration may differ due to design philosophy*
	Other Instrumentation	*Section 7.6*	*Operational functions are similar to McGuire, Watts Bar*	*None*

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED

CHAPTER NUMBER	*CHAPTER TITLE SYSTEM/COMPONENT*	*REFERENCES (FSAR)*	*SIGNIFICANT SIMILARITIES*	*SIGNIFICANT DIFFERENCES*
	Control Systems	*Section 7.7*	*Operational functions are similar to McGuire, Watts Bar except as noted*	*Watts Bar has a 50 percent load rejection capability*
8.0	***Onsite Power Systems***	*Section 8.3*	*McGuire*	*Watts Bar design does not include generator circuit breakers*
9.0	***Auxiliary Systems***			
	New fuel storage	*Section 9.1.1*	*McGuire*	*Per unit storage:* *Catawba - 98* *McGuire - 96* *Watts Bar - 66*
	Spent fuel storage	*Section 9.1.2*	*McGuire*	*Watts Bar has shared pool. Per unit storage:* *Catawba - 1418* *McGuire - 1463* *Watts Bar - 656 (1312 total)*
	Spent Fuel Pool Cooling System	*Section 9.1.3*	*McGuire, Watts Bar*	*Watts Bar has shared system*
	Chemical and Volume Control System	*Section 9.3.4*	*McGuire, Watts Bar except as noted*	*Watts Bar design does not include the Boron Thermal Regeneration System* *The following has been added or changed* *1. New ANS Safety Classifications.*

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED

CHAPTER NUMBER	*CHAPTER TITLE SYSTEM/COMPONENT*	*REFERENCES (FSAR)*	*SIGNIFICANT SIMILARITIES*	*SIGNIFICANT DIFFERENCES*
10.0	***Water Chemistry***	*Section 10.3.5*	*McGuire, Watts Bar*	*None*
	Auxiliary Feedwater System	*Section 10.4.9*	*McGuire, Watts Bar*	*None*
11.0	***Radioactive Waste Management***			*The following have been added or changed:* *1. Certain new stress limits,* *2. New ANS Safety Classifications.*
	Sources Terms	*Section 11.1*	*McGuire, Watts Bar*	*Differences are based upon plant operational influences.*
	Liquid Waste Management System	*Section 11.2*	*Performance characteristics similar to McGuire, Watts Bar*	*Watts Bar has a dissimilar segregated liquid drain system.*
	Gaseous Waste Management System	*Section 11.3*	*McGuire*	*Watts Bar has a 60 day hold-up capability for fission gases and does not have a continuous purge of the Volume Control Tank*
	Solid Waste Management System	*Section 11.3*	*Functionally similar to McGuire, Watts Bar*	*None*

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED

CHAPTER NUMBER	*CHAPTER TITLE SYSTEM/COMPONENT*	*REFERENCES (FSAR)*	*SIGNIFICANT SIMILARITIES*	*SIGNIFICANT DIFFERENCES*
15.1	***Accident Analysis***	*Section 15.1.1.1*	*Similar to McGuire, Watts Bar except as noted*	*The Accident Analysis sections are based on Regulatory Guide 1.70, Revision 3.*

Note:

1. All components designed and manufactured to Code edition in effect.

Table 1-3. Significant Design Changes

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED

System	FSAR Section	Changes
Fuel	*4.0*	*Fuel is now "optimized" design rather than a standard 17 x 17*
Control rods	*4.2, 4.3*	*Boron carbide is employed as a poison rather than Silver-Indium-Cadmium*
Containment valve injection water	*6.2.4*	*This system was added to assure "zero leakage" from the double-seated gate valves used in the Containment Isolation System*
ECCS switchover	*6.3*	*The switchover from injection to recirculation mode has automated transfer from RWST to sump suction*
Diesel Generator	*8.3.1*	*Each Diesel Generator has been uprated from 6250 KW to 7000 KW*
AC Power	*8.3.1*	*1. Four half-size unit auxiliary transformers have replaced the two full capacity transformers in the auxiliary power system for each unit.* *2. Blackout loads that are not required during a LOCA have been removed from the 4160 V Essential Auxiliary Power System Switchgear. These blackout loads are powered from a separate system that is sequenced onto the diesel during a blackout.*
DC Power	*8.3.2*	*The 125 volt DC Vital Instrumentation and Control Power System has been changed from a shared system to two independent DC systems, one per unit.*
Spent fuel storage	*9.1.2*	*1. The Spent Fuel Storage Pool has been enlarged.* *2. Spacing on spent fuel storage racks has been decreased.*
Conventional waste water treatment	*9.2.4*	*This system replaces the waste water collection basin.*
Refueling water	*9.2.7*	*A missile-proof wall was added around the RWST*
Compressed air	*9.3.1*	*Compressed air systems were modified so that service air, instrument air, and breathing air all have their own compressors.*

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED

System	FSAR Section	Changes
Water chemistry control	*10.3.5*	*1. Steam generator chemistry changed from phosphate to volatile amine treatment.* *2. Condensate polishing demineralizers have been added and steam generator blowdown system has been modified.*
Radwaste storage	*12.1.2*	*Steam generator drain tanks can be used for outside radwaste storage.*
Shielding	*12.3.2*	*Shielding added in fuel transfer tube annulus and around powdex cells*

Table 1-4. Deleted per 2001 Update

Table 1-5. Information Provided on the Subcooling Monitor

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED	
Display	
Information Displayed	*Temperatures (Loop & Core) Pressure, Saturation Margins, % Power, Logic Variables (Pressure Sensor & Containment Condition), Alarms*
Display Type (Analog, Digital, Video Monitor)	*Video Monitor*
Continuous or on Demand	*DEMAND*
Single or Redundant Display	*SINGLE*
Location of Display	*CONTROL ROOM*
Alarms (include setpoints)	*Approaching >0% FP <0% FP* *Loss of 10°F 30°F* *Adequate Subcooling* *Loss of* *Adequate 0°F 0°F* *Subcooling*
Range of Display	*PROGRAMMABLE*
Qualifications (seismic, environmental, IEEE-279)	*N/A*
Calculator	
Type (process computer, dedicated digital or analog calc.)	*Science Applications International Corporation supplied, process monitoring computer system*
If process computer is used, specify availability. (%of time)	*New system, specified availability ≥99.8%*
Single or redundant calculators	*SINGLE*
Selection Logic (highest T., lowest press.)	*VALID TEMPERATURES VALID PRESSURE*
Qualifications (seismic, environmental, IEEE-279)	*N/A*
Calculational Technique (Steam Tables, Functional Fit, ranges)	*Functional Fit (0-700°F, 0-2500 psig)*
Input	
Temperature (RTD's or T/C's)	*T/C & RTD*
Temperature (number of sensors and locations)	*40 IN-CORE T/C;* *One wide range RTD per loop*
Range of temperature sensors	*T/C: 0-2300°F* *RTD: 0-700°F*

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED	
Uncertainty [1] of temperature signal	*<10.0°F T/C* *<10.0°F RTD*
Qualifications (seismic, environmental, IEEE-279)	*RTDs (seismic, environmental)* *T/Cs (seismic, environmental)*
Pressure (specify instrument used)	*RCS wide range press.* *RCS low range press.*
Pressure (number of sensors and locations)	*3-Reactor Coolant System*
Range of Pressure sensors	*(1) Low Range 0-800 PSIG* *(2) Wide Range 0-3000 PSIG*
Uncertainty [1] of pressure signals	*Low Range <15 psi (<125 psi) [2]* *Wide Range <63 psi (<213 psi) [2]*
Qualifications (seismic, environmental, IEEE-279)	*Wide range (seismic, environmental)* *Low range (none)*
Backup Capability	
Availability of Temp & Press	*INCORE T/C-CONTROL ROOM METER WITH SELECTOR SW, HOT AND COLD LEG TEMP. (RTDs)-CONTROL ROOM RECORDER PRESSURE-CONTROL ROOM METER AND 1 CHANNEL RECORDER*
Availability of Steam Tables etc.	*Copy available in Control Room*
Training of operators	*Yes*
Procedures	*Yes*

Notes:

1. *Uncertainties must address conditions of forced flow and natural circulation.*
2. *Assumed for saturation curve adjustment for degraded containment conditions (p>3 psig).*

Table 1-6. Reactor Vessel Level Instrumentation System

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED

		Reference	***Deviations***
1.	*Description of the proposed final system including:*		
	a. a final design description of additional instrumentation and displays;	*Items A, B*	*Functionally, None*
	b. detailed description of existing instrumentation systems.	*Items H, I*	*Functionally, None*
	c. Description of completed or planned modifications.	*Same as 1(a)*	----------
2.	*A design analysis and evaluation of Inventory trend instrumentation, and test data to support design in item 1.*	*Items A,B,C, D,E,F*	*Functionally, None*
3.	*Description of tests planned and results of tests completed for evaluation, qualification, and calibration of additional instrumentation.*	*Items C,D,E,F*	*None*
4.	*Provide a table or description covering the evaluation of conformance with NUREG-0737: 1.8.1.30, Attachment 1, and Appendix B (to be reviewed on a plant specific basis)*	*Items G, K*	*None*
5.	*Describe computer, software and display functions associated with ICC monitoring in the plant.*	*Items A, B*	*None*
6.	*Provide a proposed schedule for installation, testing, and calibration and implementation of any proposed new instrumentation or information displays.*	*Item L*	*None*
7.	*Describe guidelines for use of reactor coolant inventory tracking system, and analyses used to develop procedures.*	*Item J*	*None*
8.	*Operator instructions in emergency operating procedures for ICC and how these procedures will be modified when final monitoring system is implemented.*	*Item J, M*	*None*
9.	*Provide a schedule for additional submittals required.*	*N/A*	

Explicit confirmation of conformance to the Appendix B (NUREG-0737) items listed below for the Reactor Vessel Level Instrumentation System.

		Confirmation	***Deviations***
1.	*Environmental qualification*	*Item K*	*None*
2.	*Single failure analysis*	*Item G*	*None*
3.	*Class 1E power source*	*Yes*	*None*
4.	*Availability prior to an accident*	*One channel (Per Tech. Spec.)*	*None*

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED			
5.	*Quality Assurance*	*Yes, as described in Duke Power Co. Topical Report, Quality Assurance Program, Duke-1A*	*None*
6.	*Continous indications*	*Yes*	*None*
7.	*Recording of instrument outputs*	*Yes (Single train)*	*None*
8.	*Identification of instruments*	*Item A*	*None*
9.	*Isolation*	*Yes*	*None*

For the Westinghouse Differential Pressure (dp) system a detailed response to the plant specific items stated below is provided.

		Response
A.	*Westinghouse dp System*	
1.	*Describe the effect of instrument uncertainties on the measurement of level.*	*Item B*
2.	*Are the differential pressure transducers located outside containment?*	*Yes*
3.	*Are hydraulic isolators and sensors included in the impulse lines?*	*Yes*

REFERENCE ITEM A	*SUMMARY REPORT* *Westinghouse Reactor Vessel Level Instrumentation System for Monitoring Inadequate Core Cooling December, 1980.* *Submittal Letter T. M. Anderson (W) to Darrell G. Eisenhut (NRC) NS-TMA-2358 of December 23, 1980.*
REFERENCE ITEM B	*25 RESPONSES TO NRC REQUEST FOR ADDITIONAL INFORMATION* *On the Westinghouse R.V.L.I.S. Summary Report*
REFERENCE ITEM C	*SUPPLEMENTARY INFORMATION* *Submittal Letter E. P. Rahe (W) to L. E. Phillips (NRC) NS-EPR-2579 of March 19, 1982.*

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED	
REFERENCE ITEM D	*W EVALUATION OF TESTS* *S-UT-3, S-UT-6, S-UT-7, S-NC-2, S-NC-3, S-NC-8 Submittal Letter E. P. Rahe (W) to L. E. Phillips (NRC) NS-EPR-2526 of December 9, 1981.*
REFERENCE ITEM E	*W EVALUATION OF TEST S-UT-8* *Submittal Letter E. P. Rahe (W) to L. E. Phillips (NRC) NS-EPR-2542 of January 13, 1982.*
REFERENCE ITEM F	*W EVALUATION OF TEST S-1B-1 AND FUNCTIONAL TEST* *Submittal Letter E. P. Rahe (W) to L. E. Phillips (NRC) SED-SA-0081 of June 28, 1982.*
REFERENCE ITEM G	*RESPONSE TO REQUEST TO WOG FOR ADDITIONAL INFORMATION* *Submittal Letter E. P. Rahe (W) to Dennis M. Crutchfield (NRC) NS-EPR-2597 of May 14, 1982.*
REFERENCE ITEM H	*RCS WIDE RANGE PRESSURE INSTRUMENTATION* *Submittal Letter of E. P. Rahe (W) to R. C. Deyoung (NRC) NS-DPR-2586 of April 21, 1982.*
REFERENCE ITEM I	*RELEVANT DRAWINGS OF EXISTING INSTRUMENTATION SYSTEMS* *8757D55 Revision 4 W Process Block Diagrams. (See Sheet for W. R. RCS T_{HOT})* *1098E74 Sh 1 Rev 8 W RCS Flow Diagram FSAR Fig. 5.1-3 RCS Flow Diagram.* *Note that W Process Block Diagram which shows W. R. RCS Pressure is not recommended as suitable interfacing instrumentation. Refer to Item H.*
REFERENCE ITEM J	*Critical safety function status trees for core cooling and system inventory volumes 1, 2, and 3 Emergency Response Guidelines (ERG) Developed by Westinghouse Owner's Group (WOG) Sections FR-C.1 and C.2, FR-I.3, FR-P.I.* *Refer also E20.26 (which is a new section to be added, for natural circulation cooldown regarding depressurization in the upper head. Although this shows the use of the RVLIS instrumentation, it is not specifically for inadequate core cooling (ICC) monitoring.* *Volume 1 and 2 was under cover of OG-64, 11/30/81 O. Kingsley (WOG) to D. Eisehut (NRC)*

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED

Volume 3 was under cover of OG-83, 1/4/83, O. Kingsley (WOG) to D. Eisenhut (NRC)

All member utilities received copies under cover of letters:

WOG-81-235, 12/2/81

WOG-83-100, 1/4/83

REFERENCE ITEM K	*ENVIRONMENTAL QUALIFICATION* *(Note Various Equipment Data Qualification Packages) - i.e., EQDP - for RVLIS instrumentation are submittals as supplements to the Environmental Qualification topicals WCAP-8587, non-proprietary (which provides summary EQDP-s) and WCAP-8687, proprietary (which provides detailed EQDP's).* *EDQP References are as follows:*

	1. ESE-2	*D/P Transmitters Outside Containment*
	2. ESE-42	*Strap-on RTDs*
	3. ESE-48	*High Volume Pressure Sensor*
	4. ESE-49	*Differential Pressure Indicator Switches*
	5. ESE-50C	*RVLIS-86 Microprocessor*
	6. ESE-53	*Plant Safety Monitoring System Electronics*

REFERENCE ITEM L	*IMPLEMENTATION SCHEDULE* *The RVLIS is fully operational on both units.*
REFERENCE ITEM M	*ICC OPERATING PROCEDURES* *Duke Power has upgraded the Catawba emergency operating procedures based upon the Emergency Response Guidelines (ERG) developed by the Westinghouse Owners Group. The RVLIS has been incorporated into procedures according to these guidelines.*

Table 1-7. Criteria for Auxiliary Feedwater System Design Basis Conditions

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED

Condition or Transient	Classification[1]	Criteria[1]	Additional Design Criteria
Loss of Normal Feedwater	*Condition II*	*Peak RCS pressure not to exceed design pressure. No consequential fuel failures.*	
Loss of Non-Emergency Power to Station Auxiliaries	*Condition II*	*(Same as LMFW)*	*Pressurizer does not become water solid.*
Feedline Rupture uncover.	*Condition IV*	*10 CFR 100 dose limits.* *RCS design pressure not exceeded.*	*Core does not*
Loss of all A/C Power	*N/A*	*Note 2*	*Pressurizer does not become water solid assuming turbine driven pump.*
Loss of Coolant	*Condition III*	*10 CFR 100 dose limits* *10 CFR 50 PCT limits*	
	Condition IV	*10 CFR 100 does limits* *10 CFR 50 PCT limits*	
Cooldown	*N/A*		*100°F/hr 557°F to 350°F*

***Notes**:*

1. *REF: ANSI N18.2 (This information provided for those transients performed in the FSAR)*
2. *Although this transient establishes the basis for AFW pump powered by diverse power source, this is not evaluated relative to typical criteria since multiple failures must be assumed to postulate this transient.*

Table 1-8. Summary of Assumptions Used in AFWs Design Verification Analyses

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED

	Transient	Loss of Feedwater/ Loss of Offsite Power	Cooldown	Main Feedline Break	Main Steamline Break (containment)
a.	*Max reactor power*	*102% of Nominal rating (102% of 3411 MWt)*	*3651 MWt*	*102% of Nominal Nominal (102% of 3411 MWt)*	*0, 30, 102% of rated (percent of 3425 MWt)*
b.	*Time delay from event to Rx trip*	*63 sec*	*2 sec*	*25 sec*	*variable*
c.	*AFWS actuation signal/time delay for AFWS flow*	*lo-lo SG level 1 minute*	*NA*	*lo-lo SG level 1 minute*	*Assumed immediately 0 sec (no delay)*
d.	*SG water level at time of reactor trip*	*0% span 55,125 lbm*	*NA*	*10% span, 43,650 lbm*	*NA*
e.	*Initial SG inventory*	*107,206 lbm/SG*	*65,205 lbm/SG at 544.6°F*	*97,420 lbm/ruptured SG 71,880 lbm/intact SG*	*Consistent with power*
	Rate of change before & after AFWS actuation	*See fig. 1-32*	*NA*	*See figures 1-33, 1-34*	*NA*
	Decay heat	*ANS + 26%*	*ANS + 20%*	*ANS + 26%*	*ANS + 20%*
f.	*AFW pump design pressure*	*1225 psia*	*1225 psia*	*1225 psia*	*1225 psia*

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED

	Transient	Loss of Feedwater/ Loss of Offsite Power	Cooldown	Main Feedline Break	Main Steamline Break (containment)
g.	*Minimum # of SGs which must receive AFW flow*	*Divided equally among 2 SG*	*N/B*	*Loop 1 - 0%* *Loop 2 - 0%* *Loop 3 - 50.0%* *Loop 4 - 50.0%* *(Loop 1 is the broken loop)*	*N/A*
h.	*Reactor coolant pump status*	*Tripped at reactor trip*	*Tripped*	*Operating and tripped at reactor trip.*	*All operating*
i.	*Maximum AFW temperature*	*138°F*	*134°F*	*138°F*	*134°F*
j.	*Operator action*	*None*	*NA*	*SI terminated 30 minutes after reactor trip*	*10 minutes*
k.	*MFW purge volume/ SG and temperature*	*41.5 ft^3/440°*	*150 ft^3/440°*	*41.5 $ft^3$440 ft°F*	*500 ft^3/loop (for dryout time)*
l.	*Normal blowdown*	*None assumed*	*None assumed*	*None assumed*	*None assumed*
m.	*Sensible heat*	*Table 1-9*	*Table 1-9*	*Table 1-9*	*NA*
n.	*Time at standby*	*2 hr/4 hr*	*2 hr/4 hr*	*2 hr/4 hr*	*NA*

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED

	Transient	Loss of Feedwater/ Loss of Offsite Power	Cooldown	Main Feedline Break	Main Steamline Break (containment)
o.	*AFW flow rate*	*490 gpm - constant*	*Variable*	*490 gpm - constant*	*1468 gpm (constant) to broken SG*

Table 1-9. Summary of Sensible Heat Source

HISTORICAL INFORMATION NOT REQUIRED TO BE REVISED

Primary Water Sources (initially at ESD power temperature and inventory)

1. *RSC fluid*
2. *Pressurizer fluid (liquid and vapor)*

Primary Metal Sources (initially at ESD power temperature)

1. *Reactor coolant piping, pumps and reactor vessel*
2. *Pressurizer*
3. *Steam generator tube metal and tube sheet*
4. *Steam generator metal below tube sheet*
5. *Reactor vessel internals*

Secondary Water Sources (initially at ESD power temperature and inventory)

1. *Steam generator fluid (liquid and vapor)*
2. *Main feedwater purge fluid between steam generator and AFWS piping.*

Secondary Metal Sources (initially at ESD power temperature)

1. *All steam generator metal above tube sheet, excluding tubes.*

HISTORICAL INFORMATION IN ITALICS BELOW NOT REQUIRED TO BE REVISED

Table 1-10. Regulatory Guide 1.97, Rev. 2 Review. *Format for Comparison Table*

B-15, C-15	*Variable:*	*This is the variable as listed in Table 2 of RG 1.97, Rev. 2. (The Duke variable name may be shown parenthetically.)* *This gives the Table 2 of RG 1.97, Rev. 2 variable type and sequence number. Variable types are given in Section* ***1.8.1.29.1****.*
	Range:	*This is the Table 2 RG 1.97, Rev. 2 listed range.*
	Category:	*This is the Table 2 of RG 1.97, Rev. 2 listed category.*
	Existing Design:	*This is a description of the present Catawba design for the instrumentation*
	Compliance:	*This is a statement concerning compliance to Duke's interpretation of the recommendations of RG 1.97, Rev. 2 and NRC's acceptance of any deviations.*
	Display:	*The lists the Control Room indications available to the operator.*
	Position:	*This is a statement regarding the instruments' adequacy for the intended monitoring function.*

Table 1-11. Regulatory Guide 1.97, Rev. 2 Review

A-1, B-7, B-11, C-4, C-9	Variable:	RCS Pressure
	Range:	0 to 3000 psig
	Category:	1
	Existing Design:	Catawba has two redundant, QA Condition 1 channels of Wide Range RCS pressure instrumentation. Each transmitter feeds a different channel of PCS and is powered by that channel's associated Class 1E bus. The indicated range is 0 to 3000 psig. Redundant/diverse indication is provided by control grade RCS pressure instrumentation provided for the auxiliary shutdown panels and the standby shutdown facility, as well as the QA Condition 1 pressurizer pressure instrumentation. Environmental qualification is described in the FSAR. Section 3.11 and the NUREG 0588 submittal. Section qualification is described in FSAR Section 3.10.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2, as clarified in Section 1.8.1.29.1.
	Display:	Two Control Room indicators Two channels on the computer Two channels recorded
	Position:	The installed instrumentation is adequate for the intended monitoring function.
A-2. B-8, C-1	Variable:	Core Exit Temperature
	Range:	0°F to 2300°F
	Category:	1

	Existing Design:	The QA Condition 1 Core-Exit Thermocouple System for accident monitoring consists of at least two trains of 20 thermocouples each. The primary display is a Class 1E indicator in the Control Room. Inputs to the plant computer are through qualified Class 1E isolation devices. Power for the Class 1E portion of the system is from Class 1E bussess, and power for the non-safety portion will be a highly reliable battery backed control bus. Redundancy/diversity is provided by the Hot and Cold Leg RCS temperature instrumentation. Environmental qualification for the Class 1E portion is per FSAR Section 3.11 and the NUREG-0588 submittal. Seismic qualification is described in FSAR Section 3.10. The existing incore thermocouples are assumed to be environmentally and seismically qualified as allowed by NUREG 0737 II.F.2 Attachment 1. The plant computer and primary display are installed in a mild environment. Range of the primary display is 0°F to 2300°F. These instruments are referenced in Section 1.8.1 and Table 1-5.
	Compliance:	This instrument is in compliance with Duke's interpretation of RG 1.97, Rev 2 as clarified in Section 1.8.1.29.1.
	Display:	Primary display is a Class 1E indicator in the Control Room. Backup display is the plant computer video monitor in the Control Room.
	Position:	The installed instrumentation is adequate for intended monitoring function.
A-3 B-5	Variable:	RCS Hot Leg Water Temperature
	Range:	50°F to 750°F
	Category:	1

	Existing Design:	Each of the four reactor coolant loops employ a QA Condition 1 Hot Leg Water Temperature measurement (T_h). Two of the T_h instruments feed into one PCS channel and are powered from the associated Class 1E bus. The other two T_h instruments feed into a redundant PCS channel and are powered from the associated Class 1E buss. The indicated range of 0°F to 700°F. The environmental qualification of this instrumentation is described in FSAR Section 3.11 and the NUREG 0588 submittal. The seismic qualification is described in FSAR Section 3.10. Redundancy/diversity is provided by monitoring T_h on all four loops along with monitoring of T_c on all four loops and monitoring of incore thermocouples. These instruments are also referenced in Section 1.8.1 and FSAR Table 7-11.
	Compliance:	The existing design does not comply with the recommendation of RG 1.97, Rev. 2 because the range doesnot conform to RG 1.97, Rev. 2 rnage of 50°F to 750°F.
	Display:	Two Control Room indicators Four channels on the computer Four channels recorded
	Position:	The installed instrumentation is adequate for intended monitoring function. No range change is required as the installed range is adequate for a Westinghouse NSSS System. Also note, the present range meets the recommendation of RG 1.97, Rev.3.
A-4, B-4, B-6	Variable:	RCS Cold Leg Water Temperature
	Range:	50°F to 750°F
	Category:	1
	Existing Design:	Each of the four reactor coolant loops employ a QA Condition 1 Cold Leg Water Temperature measurement (T_c). All four T_c's feed into the same qualified channel of the PCS and are powered from the associated Class 1E bus. The indicated range is 0°F to 700°F. Environmental qualification is described in FSAR Section 3.11 and the NUREG 0588 submittal. Seismic qualification is described in FSAR Section 3.10. Additional redundancy/diversity is provided by the Hot Leg Water Temperature (T_h) instruments, the incore thermocouples, and steam pressure indication. These instruments are also referenced in Section 1.8.1 and FSAR Table 7-11.

	Compliance:	The existing design is not in full compliance with RG 1.97, Rev. 2 in the following areas: the instrumentation is not totally redundant, and the range does not conform to RG 1.97, Rev. 2 recommendations.
	Display:	Two Control indicators Four channels on the computer Four channels recorded
	Position:	Redundancy/diversity is provided by the Hot Leg RTDs, the incore thermocouples and steam pressure instrumentation. No range change is required as the installed range is adequate for Westinghouse NSSS Systems. Also note, the present range meets the recommendation of RG 1.97, Rev. 3. Therefore, Duke considers the installed instrumentation adequate for the intended monitoring function.
A-5, D-11	Variable:	Pressurizer Level
	Range:	Bottom to Top
	Category:	1
	Existing Design:	This station has three redundant, QA Condition 1 channels of pressurizer level instrumentation. Each transmitter feeds a different channel of the PCS and is powered from that channel's associated Class 1E bus. The indicated range 0% to 100% corresponding to an approximate volume of 5% to 95%. Environmental qualification is described in FSAR Section 3.11 and the NUREG 0588 submittal. Seismic qualification is described in FSAR Section 3.10. These instruments are also referenced in FSAR Table 7-11.
	Compliance:	The range of the instrumentation is slightly less than the recommendation of RG 1.97, Rev. 2.
	Display:	Three Control Room indicators (one per channel) Three channels on the computer Two channels recorded
	Position:	The installed rangeof theinstrumentation is consistent with Westinghouse NSSS requirements and Duke considers this instrumentation to be adequate for the intended monitoring function.
A-6, B-10	Variable:	Degrees of Subcooling
	Range:	200°F Subcooling to 35°F Superheat
	Category:	2

	Existing Design:	This variable is a computer calculated value using various inputs from the Primary System. A graphic display over the required range gives the operator a representation of primary system conditions compared to various curves of importance (saturation, NDT, etc.). The computer is powered by highly reliable battery backed control power. The computer processing and video monitor display are located in a mild environment. Primary inputs to this graphic display are provided from QA Condition 1 instruments which have been isolated for input to the computer. Additional inputs of lesser qualification are used, when available and within valid ranges, to provide additional accuracy. A procedure to manually calculate subcooling margin, using QA Condition 1 instruments for information, exists as a backup to the graphic display. This variable is also referenced in Section 1.8.1 and Table 1-5.
	Compliance:	The instrumentation is in complance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	Control Room – Computer graphic on demand.
	Position:	Due to the mild environment maintained in the Computer Room, the projected high availability of the computer and the backup procedure to calculate this variable, Duke Power considers that the installed instrumentation is adequate for the intended monitoring function.
A-7	Variable	Steam Generator Narrow Range Level
	Range:	Plant Specific
	Category:	1

	Existing Design:	The station has four redundant, QA Condition 1 channels of Steam Generator Narrow Range Level per Steam Generator. Instrumentation is powered by Class 1E busses. The indicated range is 0 to 100% corresponding to approximately 333 inches above the tube-sheet to the separators (unit #1 – 606 inches above the top of the tube sheet to the top of the primary separators) (or, approximately 58 to 100% (unit #1 – 70 to 100% of the wide range scale). The taps on the Unit 2 steam generator are not the same as Unit 1 because the Unit 2 steam generator is a different manufacturer and model. Both units operate with a programmed level based on reactor power. Environmental qualification is described in FSAR Section **3.11** and the NUREG 0588 submittal. Seismic qualification is described in FSAR Section **3.10**.
	Compliance:	The instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section **1.8.1.29.1**.
	Display:	All channels are indicated in the Control Room (16 indicators) All channels on the computer (16 points) Four channels recorded
	Position:	The installed instrumentation is adequate for the intended monitoring function.
A-8, D-17	Variable:	Steam Line Pressure
	Range:	Atmospheric pressure to 20% above lowest safety valve setting.
	Category:	1
	Existing Design:	Each steam generator has three redundant, QA Condition 1 channels of steam generator pressure instrumentation. Each transmitter feeds a different channel of the PCS and is powered from that channel's associated Class 1E bus. The indicated range is 0 to 1300 psig corresponding to 10% above the lowest safety valve setting and 6% above the highest safety valve setting. The instrumentation is locatedin a mild environment. Seismic qualification is described in FSAR Section **3.10**. These instruments are also referenced in Table **7-11**.
	Compliance:	The range is not in compliance with the recommendation of RG 1.97 Rev. 2.
	Display: Per Steam Generator;	Three Control Room indicators (one per channel) Three channels on the computer One channel recorded

	Position:	Maximum system pressure during the worst postulated loss of heat sink accident is 1304 psig. Thus the range of the installed instrumentation is adequate for the the Catawba design and Duke considers this instrumentaton to be adequate for the intended monitoring function.
A-9, D-8	Variable:	Refueling Water Storage Tank Level
	Range:	Top to Bottom
	Category:	1
	Existing Design:	The instrumentation for this variable provides continuous display of refueling water storage tank level. Four separate, QA Condition 1 channels provide redundant indication. The indicated range is 0 to 100% corresponding to 20 inches above the tank baseplate to the overflow line. The four independent loops are powered from Class 1E busses. The instrumentation is located in a mild environment. Seismic qualification is described in FSAR **3.10**.
	Compliance:	The instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section **1.8.1.29.1**.
	Display:	Four Control Room indicators Four channels on the computer Two channels recorded
	Position:	The installed instrumentation is adequate for the intended monitoring function.
B-1	Variable:	Neutron Flux
	Range:	10^{-8}% to 100% Full Power
	Category:	1
	Existing Design:	Catawba has two redundant, QA Condition 1 channels of full range neutron flux. The range of 10^{-8}% to 100% full power is indicated. The instrumentationis powered from Class 1E busses. Environmental qualification is described FSAR Section **3.11** and the NUREG 0588 submittal. Seismic qualification is described FSAR Section **3.10**. Additional Neutron Flux instrumentation is described in FSAR Table **7-11**.
	Compliance:	The instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section **1.8.1.29.1**.

	Display:	Two Control Room Indicators Two Channels on the Computer One Channel Recorded.
	Position:	The installed instrumentation is adequate for the intended monitoring function.
B-2	Variable:	Control Rod Position
	Range:	Full in or not full in
	Category:	3
	Existing Design:	Each control rod's position is indicated on a digital display. The indicated range is Full In to Full Out in 42 increments.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1
	Display:	A Control Room digital display indicating all control rods One multiplexed computer point
	Position:	The installed instrumentation is adequate for the intended monitoring function.
B-3	Variable:	RCS Soluble Boron Concentration
	Range:	0 to 6000 ppm
	Category:	3
		This variable is monitored by sampling and laboratory analysis. Sampling frequency is determined by plant conditions and operating procedures.
B-9	Variable:	Coolant Level in Reactor
	Range:	Core bottom to vessel top
	Category:	1

	Existing Design:	This system consists of two redundant QA Condition 1 channels powered from Class 1E busses. Each channel consists of 3 dp transmitters and a microprocessor to calculate true vessel level or relative void content of the primary coolant. Instrument taps will be located at the head vent, hot legs and the seal table for narrow and wide range level transmitters. RTDs on the impulse lines for these transmitters provide data to the microprocessor to compensate for temperature variations between these impulse lines in containment. This instrumentation will be used to detect the presence of a gas bubble or void in the reactor vessel, detect the approach to inadequate core cooling (ICC) and indicate void formation in the RCS during forced flow conditions. Environmental qualification is described in the FSAR, Section 3.11 and the NUREG 0588 submittal. Seismic qualification is described in the FSAR, Section 3.10. . This instrumentation is also referenced in Table 1-6.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	Two Control Room plasma displays, each with indication of: Upper head level (63.8 to 106.8%) Narrow range level (0 to 63.8%) Wide range level (0 to 120%) Two channels on the computer One channel recorded
	Position:	The installed instrumentation is adequate for the intended monitoring function.
B-12, C-6	Variable:	Containment Sump Water Level Narrow Range (Containment Floor and Equipment Sump)
	Range:	Narrow Range Level
	Category:	2
	Existing Design:	Four instruments monitor the containment sump water level from 4 to 17 inches. The instrumentation is powered from a highly reliable battery backed control bus. Qualified backup indication is provided by the Wide Range Sump Level Instrumentation. These instruments are also referenced in Section 1.8.1.

	Compliance:	This instrumentation is not in compliance with the RG 1.97, Rev. 2 recommendations for environmental qualification.
	Display:	Two indicators in the Control Room Two computer points
	Position:	Instrumentation is adequate for the intended monitoring function. The wide range sump level instruments provide backup for this function, and therefore full environmental qualification of narrow range level is not necessary.
B-12, C-6	Variable:	Containment Sump Water Level
	Range:	Wide Range (bottom of containment of 600,000 gal. level)
	Cateogory:	1
	Existing Design:	Two redundant, QA Condition 1 level transmitters measure containment sump water level from six inches above the bottom to more than seven feet above the 600,000 gal. Level. The indicated range is .5 to 20.5 feet. Also, two redundant, QA Condition 1 level switches are provided for both ECCS and Containment spray swap to sump. Redundancy is provided by the narrow range sump level instrumentation. The instruments are powered from Class 1E busses. Environmental qualification is described in FSAR, Section 3.11 and NUREG 0588 submittal. Seismic qualification is described in FSAR, Section 3.10.
	Compliance	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	Two Control Room indicators for wide range level indications, plus two Control Room annunciators for both ECCS and NS swap to sump Two channels on the computer Two channels recorded for wide range level
	Position:	The installed instrumentation is adequate for the intended monitoring function.
B-13, B-15, C-5, C-11	Variable:	Containment Pressure
	Range:	-5 to 60 psig

	Category:	1
	Existing Design:	This station has two sets of instrumentation for monitoring containment pressure. One set consists of four redundant, QA Condition 1 channels of instrumentation. The equipment is powered from Class 1E busses. Indicated range is –5 to 5 psig. The other set of instrumentation consists of two redundant QA Condition 1 channels. This equipment is also powered from Class 1E busses. Indicated range is –5 to 60 psig. For both sets of instrumentation, environmental qualification is described in FSAR Section 3.11 and the NUREG 0588 submittal. Seismic qualification is described in FSAR Section 3.10 These instruments are also referenced in Section 1.8.1 and FSAR Table 7-11.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	-5 to 5 psig indication, Four Control Room indicators Three channels on the computer Two channels recorded -5 to 60 psig indication, Two Control Room indicators Two channels on the computer Two channels recorded
	Position:	The installed instrumentation is adequate for the intended monitoring function.
B-14	Variable:	Containment Isolation Valve Position
	Range:	Closed – Not Closed
	Category:	1

	Existing Design:	All remotely operable, active containment isolation valves provided with control switches on the main control boards have actual valve position provided by QA Condition 1 limit or reed switches on the valves which operate both Closed-Not Closed and Open-Not Open control switch indicating lights. These valves and their control switch indicating lights are powered from Class 1E busses. Additionally indications are provided on monitoring lights and by the computer. Redundancy is not necessary on a per valve basis since redundant containment isolation valves are provided except on certain instruments lines. (Instrument lines are exempt based on Duke's interpretation of Regulatory Guide 1.11.) Environmental qualification of the limit and reed switches is described in FSAR Section 3.11 and NUREG 0588 response. Seismic qualification of the limit and reed switches is described in the FSAR Section 3.10.
	Compliance:	This instrumentationis in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1 except for the containment isolation valves on the instrument lines that supply compressed air to the outer door seals on each personnel air lock (two per unit). These have been identified as having demand position indication, not actual position indication.
	Display:	Control Room control switch indicating lights Monitor lights Computer points
	Position:	The position indication circuits for the containment isolation valves on the instrument lines that supply compressed air tot he outer door seals on each personel air lock will be modified to provide actual valve position. Otherwise, the installed instrumentation is adequate for the intended monitoring function.
C-2	Variable:	Radiation Level in Primary Coolant
	Range:	1/2 Tech spec limit to 100 times tech spec limit.
	Category:	1

	Existing Design:	Catawba has one channel of primary coolant radiation level instrumentation. This channel is powered from a highly reliable battery backed bus. The indicated range is 10^1 to 10^7 counts per minute corresponding to 10^{-2} to 10^3 μCi/ml Ba-133. This instrument is also referenced in FSAR Section 11.5.
	Compliance:	This monitor was not installed as a Category 1 (QA Condition 1) instrument. RG 1.97, Rev. 2 range is not met. Refer to the Duke position below.
	Display:	One Control Room indicator One channel recorded
	Position:	This monitor was not installed to quantify accident conditions and cannot be assured flow following an accident. Information for this variable is obtained by sampling and analysis which is considered adequate for the intended monitoring function.
C-3, E-18, E-19	Variable:	Analysis of Primary Coolant Accident Sampling Capability, Primary Coolant and Sump, Containment Air
	Range:	10 $\mu Ci/gm$ to 10 Ci/gm or TID 14844 source term in coolant volume Grab Sample
	Category:	3
	Existing Design:	The existing design of the sampling system for the primary coolant, the containment sump (sample taken from RHR pump discharge) and containment air allows samples to be taken for laboratory analysis. Capabilities for making the recommended measurements are provided. Information concerning the laboratory analysis. Capabilities for making the recommended measurements are provided. Information concerning the laboratory equipment available for radiological analysis is contained in FSAR Section 12.5.2. Additional information concerning this parameter is in Section 1.8.1.
	Compliance:	This instrumentation isin compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	Not Applicable.
	Position:	Available equipment is adequate for the intended analyses.
C-7,	Variable:	Containment Area Radiation – High Range

E-1	Range:	1 to 10^7 R/hr
	Category:	1
	Existing Design:	Catawba has two redundant QA Condition 1 channels of containments high range radiation instrumentation. Each channel is powered from a Class 1E Bus. The indicated range is 1 to 10^8 R/hr. Diversity is provided by portable instrumentation or sampling and analysis. Environmental qualification is described in FSAR Section 3.11 and the NUREG 0588 Submittal. Seismic qualification is described in FSAR Section 3.10. These instruments are also referenced in Section 1.8.1 and Section 11.5.
	Compliance:	Duke considers this instrumentation to be in compliance with the recommendations of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	Two Control Room indicators (one per channel) Two channels on the computer One channel recorded
	Position:	The installed instrumentation is adequate for the intended monitoring function.
C-8, E-6 C-12 C-14 E-3 E-4 E-5 E-9	Variable:	Condenser Air Ejector Effluent Radioactivity Containment Effluent Radioactivity Effluent Radioactivity (from building in contact with the containment) Containment Purge Effluent Radioactivity Annulus Effluent Radioactivity Auxiliary Building Effluent Radioactivity Other Identified Release Point Effluent Radioactivity
	Range:	Various – from 10^{-6} to 10^{-2} $\mu Ci/cc$ to 10^{-6} to 10^5 $\mu Ci/cc$
	Category	2
	Existing Design:	Airborne process radiation monitors exist for monitoring ventilation exhausts and the condenser air ejector exhaust (see FSAR, Section 11.5 and Table 11-20). However, in accordance with RG 1.97. Rev. 2 these monitors are not required for accident monitoring due to the fact that ventilation systems and the condenser air ejector exhausxt to the common unit vent. (See page 1-87 of this Table for the unit vent radiation monitor).

	Compliance:	Not Applicable.
	Display:	Not Applicable.
	Position:	Individual radiation monitors are not needed for compliance to the recommendations of RG 1.97, Rev. 2 due to effluents exhausting to the common unit vent.
C-10	Variable:	Containment Hydrogen Concentration
	Range:	0 to 30% Hydrogen
	Category:	3 *
	Existing Design:	Two redundant channels of QA Condition 1 instrumentation monitor containment hydrogen concentration. The indicated range is from 0 to 30% concentraton. Both channels are powered from Class 1E Busses. These instruments are not required to be qualified for Post Accident Operating Conditions. Seismic qualification is described in FSAR Section 3.10. Diversity and backup is provided by manual sampling capabilities. These instruments are also referenced in Section 1.8.1.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1. *
	Display:	Two Control Room indicators Two channels recorded Two computer points
	Position:	The installed instrumentation is adequate for the intended monitoring function.
C-13, E-2	Variable:	Area Radiation
	Range:	10^{-1} R/hr to 10^{4} R/hr
	Category:	2

* With the elimination of the design basis LOCA hydrogen release per 10CFR50.44, the hydrogen monitors were downgraded to RG 1.97 Category 3 instrumentation (Reference Unit 1 License Amendment 219 and Unit 2 License Amendment 214)

	Existing Design:	Catawba has an extensive Area Radiation Monitoring System installed for personnel protection. Channel detector locations were selected based on areas normally having free access and low radiation dose rates with the potential of becoming high radiation areas. Range selections were based on normal background radiation levels to allow reasonable monitoring and alarm settings for keeping personnel exposures ALARA. All of these channels, with the exception of the monitors adjacent to the Reactor Coolant filters, have an indicated range of 10^{-1} to 10^{4} mR/hr. The indicated range of the Reactor Coolant filter area monitors is 10^{-1} to 10^{4} R/hr. Redundant indication is provided by portable instrumentation. The channels are powered from a highly reliable battery backed control bus. The instrumentation is rated to withstand the temperatures for normal and accident conditions. However, maximum radiation dose withstand information is not presently available for the detectors. See FSAR Section 12.3 for additonal information concerning the Area Radiation Monitoring System.
	Compliance:	The range of most of the instrumentation, the environmental qualification and th absence of recording is not in compliance with the recommendations of RG 1.97, Rev. 2.
	Display:	One Control Room indicator per channel.
	Position:	The installed range of the instrumentation is preferred for the intended function of personnel protection. The functions of detection of releases, release assessment and surveillance are performed through Health Physics Procedures with supplemental information provided by the effluent process Radiation Monitoring System. The qualification is within the guidance provided for Category 3 instrumentation which Duke considers adequate for the intended monitoring function. Also note, this is in compliance with the recommendations of R.G. 1.97 Rev. 3. Recording is not required for the intended monitoring function.
D-1, D-7	Variable:	Flow in Low Pressure Injection System (RHR System Flow)
	Range:	0 to 110% Design Flow
	Category:	2

	Existing Design:	The existing design provides a separate display for each of the two RHR trains. The power is provided by highly reliable battery backed busses. Indicated range is 0 to 4500 GPM with a design flow of 3000 GPM. This instrumentation is installed in a mild environment.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	Two Control Room indicators Two channels on the computer
	Position:	The installed instrumentation is adequate for the intended monitoring function.
D-2	Variable:	RHR Heat Exchanger Outlet Temperature
	Range:	32°F - 350°F
	Category:	2
	Existing Design:	Each train of the Catawba Residual Heat Removal System contains instrumentation to monitor RHR return temperature. The range for this instrumentation is 50°F to 400°F and the power supply is a highly reliable battery backed control bus. The RHR instrumentation is located in a mild temperature environment and is rated to withstand post accident recirculation phase radiation.
	Compliance:	The Duke range is 50°F - 400°F, whereas the recommended range is 32°F - 350°F.
	Display:	Two channels recorded in the Control Room Two channels on the computer
	Position:	The Duke range for this instrumentation is suited to the operating and accident temperature expected in the Residual Heat Removal System and is therefore considered acceptable. The installed instrumentation is adequate for its intended monitoring function.
D-3	Variable:	Accumulator Tank Pressure (Cold Leg Accumulator)
	Range:	0 to 750 psig
	Category:	2

	Existing Design:	Catawba has two channels of accumulator tank pressure instrumentation on each of four accumulator tanks. Power for these channels is provided from two different highly reliable battery backed busses. The indicated range is 0 to 700 psig. The tanks are pressurized to approximately 630 psig under normal operating conditions. The rating of the instrument is not adequate to prove survivability for the in containment accident environment or post accident radiation exposure.
	Compliance:	The range of this instrumentation is not in compliance with the recommendations of RG 1.97, Rev. 2. The equipment is not rated to assure survivability for the in containment accident environment or post accident radiation exposure.
	Display:	Eight Control Room indicators (2 indicators per accumulator tank)
	Position:	The primary function of this instrumentation is to monitor the preaccident status of the accumulators to assure that this passive safety system is prepared to serve its safety function. This instrumentation plays no significant role in the subsequent management of an accident. Therefore, a design and qualification Category of 3 is adequate for this function. The installed system meets the Duke interpretation of Category 3 recommendations as clarified in Section 1.8.1.29.1. Duke Power considers the range and environmental/radiation capability adequate to meet the intended monitoring function.
D-3	Variable:	Accumulator Tank Level (Cold Leg Accumulator)
	Range:	10% to 90% volume
	Category:	2
	Existing Design:	Catawba has two channels of accumulator tank level instrumentation on each of the four accumulator tanks. Power for these channels is provided from two different highly reliable battery backed busses. The indicated range is 0% to 100%, which corresponds to approximately 64% to 79% of the accumulator tank volume.
	Compliance:	The range of this instrumentation is not in total compliance with the recommendations of RG 1.97, Rev. 2. The equipment is not rated to assure survivability for the in containment accident environment or post accident radiation exposure.

	Display:	Eight Control Room indicators (2 indicators per accumulator tank)
	Position:	The primary function of this instrumentation is to monitor the preaccident status of the accumulators to assure that this passive safety system is prepared to serve its safety function. This instrumentation plays no significant role in the subsequent management of an accident. Therefore, a design and qualification Category of 3 is adequate for this function. The installed system meets the Duke interpretation of Category 3 recommendations as clarified in Section 1.8.1.29.1. Duke Power considers the range and environmental/radiation capability adequate to meet the intended monitoring function.
D-4	Variable:	Cold Leg Accumulator Isolation Valve Position
	Range:	Closed or Open
	Category:	2
	Existing Design:	The cold leg accumulator isolation valves are provided with control switches on the main control boards. Actual valve position is provided by QA Condition 1 limit switches on the valves to operate both Closed-Not Closed, and Open-Not Open control switch indicating lights. These valves and their control switch ihndicating lights are powered than Class 1E buses. Additional indications are provided by monitor lights and by the computer. Environmental qualification of the limit switches is described in FSAR 3.11 and the NUREG 0588 submittal. Seismic qualification of the limit switches is described in FSAR Section 3.10.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	Control Room control switch indicating lights Computer points Monitor lights
	Position:	The installed instrumentation is adequate for the intended monitoring function.
D-5	Variable:	Boric Acid Charging Flow
	Range:	0 to 110% Design Flow

	Category:	2
	Existing Design:	The existing instrumntation provides continuous monitoring of centrifugal charging pump flow through the NI System directly into the reactor coolant cold legs. The loop range is 0-1000 gallons per minute with a design flow of approximately 700 GPM. This instrument loop is powered from a highly reliable battery backed control bus andis installed in a mild environment.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	One Control Room indicator. One computer point.
	Position:	The installed instrumentation is adequate for the intended monitoring function.
D-6	Variable:	Flow in HPI System (Safety Injection System Flow)
	Range:	0 to 110% Design Flow
	Category:	2
	Existing Design:	One set of instrumentation per train measures the flow from 0 – 800 GPM with a design flow of 425 GPM. Power is provided from highly reliable battery backed busses. This instrumentation is installed in a mild environment, with exception of 1NIFT5450. 1NIFT5450 is located in radiation only harsh environment.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	Two Control Room indicators (one per train)
	Position:	The installed instrumentation is adequate for the intended monitoring function.
D-9	Variable:	Reactor Coolant Pump Status
	Range:	Motor Current
	Category:	3

	Existing Design:	The indicated range for RCP motor current is from 0 to 800 amps. The instrumentation derives power from the monitored source.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.9.29.1.
	Display:	Four Control Room ammeters Four computer points
	Position	The installed instrumentation is adequate for the intended monitoring function.
D-10	Variable:	Primary System Safety Relief Valve Position (Power Operated Relief Vavles)
	Range:	Closed – Not Closed
	Category:	2
	Existing Design:	The Power Operated Relief Valves are provided with control switches on the main control boards. Actual valve position is provided by QA Control 1 limit switches on the valves to operate both Closed – Not Closed, and Open – Not Open control switch indicating lights. These valves and their cotrol swtich indicating lights are powered from Class 1E busses. Additional indications are provided by the computer. Environmental qualification of the limit switches is described in FSAR Section 3.11 and the NUREG 0588 submittal. Seismic qualification of the limit switches is described in FSAR Section 3.10. These instruments are also referenced in Section 1.8.1.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	Control Room control switch indicating lights, Computer points
	Position:	The installed instrumentation is adequate for the intended monitoring function.
D-10	Variable:	Primary System Safety Relief Valve Positions (Code Valves)
	Range:	Closed – Not Closed
	Category:	2

	Existing Design	A QA Condition 1 Acoustic Detection System is provided to monitor the position of these valves. Indicator lights and a monitor light indicate valve (closed – not closed) position. The FSAR Secton 3.11 and the NUREG 0588 submittal contain information on the environmental qualification of the Acoustic Detection System. Seismic qualification is described in FSAR Section 3.10. The instrumentation is powered from a Class 1E bus. These instruments are also referenced in Section 1.8.1.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	Control Room indicating lights Monitor light
	Position:	The intalled instrumentation is adequate for theintended monitoring function.
D-12	Variable:	Pressurizer Heater Status
	Range:	Electric Current
	Category:	2
	Existing Design:	Each of the four pressurizer heater groups have instrumentation for monitoring current. The range is 0 to 600 amps. Power for the transducers is derived from the sources they monitor. The computer readout is powered by highly reliable btatery backed busses. This instrumentation is installed in a mild environment.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	On demand display by the plant computer. Control Room monitor light to indicate heater operation.
	Position:	The installed instrumentation is adequate for the intended monitoring function.
D-13	Variable	Quench Tank (Pressurizer Relief Tank) Level
	Range:	Top to Bottom
	Category:	3

	Existing Design:	The indicated range of Pressurizer Relief Tank Level is from 0 to 100% corresponding to tank volume of approximately 3% to 97%.
	Compliance:	The range is not in compliance with RG 1.97 recommendations.
	Display:	One Control Room indicator One computer point
	Position:	The range of the installed instrumentation is adequate for the intended monitoring function
D-14	Variable:	Quench Tank (Pressurizer Relief Tank) Temperature
	Range:	50°F to 750°F
	Category:	3
	Existing Design:	The indicated range of Pressurizer Relief Tank temperature is from 50°F to 350°F.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified by Section 1.8.1.29.1.
	Display:	One Control Room indicator One computer point
	Position:	The instrument range is sufficient to cover the range of saturation temperatures up to the tank rupture disc pressure of 100 psig. This range is adequate for the intended monitoring function.
D-15	Variable:	Quench Tank (Pressurizer Relief Tank) Pressure
	Range:	0 to design pressure
	Category:	3
	Existing Design:	The indicated range of the Pressurizer Relief Tank pressure is from 0 to 100 psig. The tank rupture disc pressure is 100 psig.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	One Control Room indicator One computer point
	Position:	The installed instrumentation is adequate for the intended monitoring function.

D-16	Variable:	Wide Range Steam Generator Level
	Range:	From tube-sheet to separators
	Category:	1
	Existing Design:	Catawba has four (one per steam generator) QA Condition 1 channels of wide range steam generator level instrumentation. Each transmitter feeds a different channel of the PCS and is powered from that channel's associated Class 1E bus. The indicated range is 0 to 100% corresponding to 6.6 (Unit 1) or seven (Unit 2) inches above the tube-sheet to the separators (top of primary separators - unit 1). Environmental qualification is described in FSAR Section 3.11 and the NUREG 0588 submittal. Seismic qualification is described in FSAR Section 3.10.
	Compliance:	The range of the instrumentation is slightly less than the recommendation of RG 1.97, Rev. 2.
	Display:	Four Control Room indicators (one per steam generator) Four channels on the computer Four channels recorded
	Position:	The installed range is adequate for measuring wide range steam generator level and Duke considers the installed instrumentation adequate for the intended monitoring function.
D-18	Variable:	Main Steam Flow (or, Safety Relief Valve Position)
	Range:	No range listed in RG 1.97, Rev. 2
	Category:	2
	Existing Design:	This station has two channels of main steam flow instrumentation on each of four steam generators. Power for these channels is provided from highly reliable battery backed busses. The indicated range is 0 to 120% with 100% flow corresponding to normal 100% power maximum flow. This instrumentation is rated to withstand the environmental conditions that would exist during accidents in which it is intended to operate.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.

	Display:	Eight Control Room indicators Eight computer points Eight channels recorded
	Position:	The installed instrumentation is adequate for the intended monitoring function.
D-19	Variable:	Main Feedwater Flow
	Range:	0 – 110% Design Flow
	Category:	3
	Existing Design:	Catawba has eight main feedwater flow channels, two channels per steam generator feedline. The indicated range for this variable is 0 to 120%. This corresponds to $4.556x10^6$ lbs/hr which is 120% of design flow for Unit 2. For Unit 1, 120% corresponds to $4.65X10^6$ lbs/hr.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	Eight Control Room indicators Eight channels on the computer Four channels recorded
	Position:	The installed instrumentation is adequate for the intended monitoring function.
D-20	Variable:	Auxiliary Feedwater Flow
	Range:	0 – 110% Design Flow
	Category	2
	Existing Design:	Catawba has four QA Condition 1 auxiliary feedwater flow transmitters, one per steam generator, monitoring flow from all auxiliary feedwater pumps to each steam generator. The indicated range is 0-600 GPM for a system design flow of 500 GPM. This instrumentation is powered from Class 1E busses. Environmental qualification is described in FSAR Section 3.11 and the NUREG 0588 submittal. Seismic qualification is described in FSAR Section 3.10.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.

	Display:	Four Control Room indicators Four computer points
	Position:	The installed instrumentation is adequate for the intended monitoring function.
D-21	Variable:	Auxiliary Feedwater Condensate Storage Tank Level, Or Auxiliary Feedwater Assured Source
	Range:	Plant Specific
	Category:	1

Existing Design:	Catawba's Auxiliary Feedwater System (CA) draws Condensate grade suction from the following three sources: CA Condensate Storage Tank Upper Surge Tanks Condenser Hotwell The safety related source for CA System suction is the Nuclear Service Water (RN) System. This system is QA Condition 1 and is the assured source of secondary side inventory. It is automatically aligned to the suction of the CA pumps by redundant QA Condition 1 pressure switches which monitor suction pressure. When 2/3 pressure switches in either redundant train detect low suction pressure, the CA System will align to the Nuclear Service Water System. Operator confirmation of the supply or availability of RN as the assured safety source of water to the CA pumps is provided by: QA Condition 1 indication of RN pump operational status. This instrumentation is seismically qualified and located in a mild environment. QA Condition 1 indication of the RN & CA suction supply source isolation valves. Valve operators, limit switches, indicating lights are seismically and environmentally qualified. QA Condition 1 indication of CA pumps flow to the steam generators. (See 1-71.) Additional Category 3 indication is available for further confirmation of transfer of the CA pump suction to the assured source. This indication includes: RN pump header discharge flow. CA pumps suction pressure. CA pumps discharge pressure. Individual CA pump discharge flows. These monitoring instruments are located in a mild environment.
Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.

	Display:	RN Pump Status: Two operational status indicating lights per pump One computer point per pump. One monitor light per pump. RN & CA Suction Supply Valves' Positions Two valve position indicating lights per valve. Two computer points per valve. CA Pumps Flow to the Steam Generators Four Control Room indiators (1 per S/G). Four computer points. This variable is also covered in D-20. RN Pump header discharge flow (Category 3) Two Control Room indicators (1 per pump) CA Pumps Suction Pressure (Category 3) Three Control Room indicators (1 per pump) CA Pumps Discharge Pressure Flows (Category 3) Three Control Room Indicators (1 per pump) Individual CA Pump Discharge Flows (Category 3) Three Control Room indicators (one per pump)
	Position:	The installed instrumentation is adequate for the intended monitoring function.
D-22	Variable:	Containment Spray Flow
	Range:	0 – 110% Design Flow
	Category:	2
	Existing Design:	The containment spray instrumentation provides an indicated range of 0 to 4000 gpm for containment spray flow. Minimum flow is approximately 3400 gpm per pump, and the power supply is a highly reliable battery backed control bus. One channel is provided for each of two containment spray pumps. The containment spray flow instrumentation is rated to withstand the environmental conditions that would exist during accidents in which it is intended to operate.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Secton 1.8.1.29.1.

	Display:	Two Control Room indicators (one per train)
	Position:	The installed instrumentation is adequate for the intended monitoring function.
D-23	Variable:	Heat Removal by the Containment Fan Heat Removal System
	This variable does not apply to Catawba Nuclear Station design.	
D-24	Variable:	Containment Atmosphere Temperature
	Range:	40°F to 400°F
	Category:	2
	Existing Design:	Four RTD's are provided to monitor upper containment temperature and eight RTD's monitor the lower containment temperature. Two of the upper containment RTD's provide computer indication in the range of 32 to 212°F and two of the lower containment RTD's provide computer indication in the range of 40 to 400°F. These instruments are powered by a highly reliable battery backed bus and are rated to withstand the environmental conditions that would exist during accidents in which they are intended to operate. Additionally, two other lower containment RTD's provide computer indication in the range of 40 to 400°F and are powered by a highly reliable battery backed bus. The remaining two upper containment RTD's provide control board and computer indications in the range of 40 to 200°F. The remaining four lower containment RTD's provide control board and computer indications in the range of 40 to 400°F. These instruments are powered from an auxiliary power bus.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	Six Control Room indicators (two upper and four lower containment). Twelve computer points (four upper and eight lower containment).
	Position:	The installed instrumentation is adequate for the intended monitoring function.

D-25	Variable:	Containment Sump Water Temperature
	For the Catawba design, this variable is not utilized in the management of a design basis accident and therefore is not provided.	
D-26	Variable	NV Makeup Flow
	Range:	0 to 110% Design Flow
	Category:	2
	Existing Design:	The existing instrumentation for this variable provides continuous monitoring of reactor coolant charging flow. The loop range is 0 to 200 gallons per minute. Design flow is 75 GPM. This instrument loop is powered from a highly reliable battery-backed bus. The instrumentation is located in a mild temperature environment.
	Compliance:	The transmitter for this variable is not rated to withstand the anticipated maximum design basis accident radiation dose for the installed location.
	Display:	One Control Room indicator One computer point
	Position:	The installed instrumentation is adequate for intended monitoring function. For accidents in which harsh environments are a result, the system containing this instrumentation (letdown and charging portion of the NV) is not required in the mitigation of these accidents and is automatically isolated upon an ESF Actuation. The level of environmental qualification provided for the instrumentation in this system is consistent with the performance expectations of the system and meets the recommendations of Category 3 in Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
D-27	Variable:	NV Letdown Flow
	Range:	0 to 110% Design Flow
	Category:	2

	Existing Design:	The existing instrumentation for this variable provides continuous monitoring of reactor coolant letdown flow. The loop range is 0 to 200 gallons per minute with a design flow of approximately 75 GPM. This instrument loop is powered from a highly reliable battery-backed bus. The instrumentation is located in a mild temperature environment.
	Compliance:	The transmitter for this variable is not rated to withstand the anticipated maximum design basis accident radiation dose for the installed location.
	Display:	One Control Room indicator One computer point
	Position:	The installed instrumentation is adequate for intended monitoring function. For accidents in which harsh environments are a result, the system containing this instrumentation (letdown and charging portion of the NV) is not required in the mitigation of these accidents and is automatically isolated upon an ESF actuation. The level of environmental qualification provided for the instrumentation in this system is consistent with the performance expectations of the system and meets the recommendations of Category 3 in Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
D-28	Variable:	Volume Control Tank Level
	Range:	Top to Bottom
	Category:	2
	Existing Design:	The existing instrumentation for this variable provides continuous monitoring of volume control tank level. The loop range is 0 to 100% of tank level which covers the linear portion of the tank (approximately 17 to 82% of tank volume). This instrument loop is powered from a highly reliable battery backed bus. The instrumentation is located in a mild environment.
	Compliance:.	The range of the instrumentation is not in compliance with the RG 1.97, Rev. 2 recommendation
	Display:	One Control Room indicator One computer point

	Position:	The range of the installed instrumentation is adequate for the intended monitoring function. Minimum and maximum tank levels are maintained within the range of the instrument. Extending the range into the domed portions of this tank would result in nonlinear readings at each extreme of the scale.
D-29	Variable:	Component Cooling Water Temperature to ESF System
	Range:	32°F to 200°F
	Category:	2
	Existing Design:	The water temperature to the ESF Systems is monitored at the outlet of each train of the Component Cooling Water Heat Exchangers. The power for this instrument is a highly reliable battery backed bus. Range for the read-out is 0°F to 367°F. The instrumentation is installed in a mild environment.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	Two computer points (one per Component Cooling train)
	Position:	The installed instrumentation is adequate for intended monitoring function.
D-30	Variable:	Component Cooling Water Flow to ESF Systems
	Range:	0 – 110% Design Flow
	Category:	2
	Existing Design:	The installed QA Condition 1 instrumentation indicates flow in each of two redundant Component Cooling headers. Indicated range is 0 to 11,000 GPM for a system design flow of 10,000 GPM. The instrumentation is powered from Class 1E busses. Environmental qualification is described in FSAR Section 3.11 and the NUREG 0588 submittal. Seismic qualification is described in FSAR Section 3.10.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	Two Control Room indicators Two computer points

	Position:	The installed instrumentation is adequate for intended monitoring function.
D-31	Variable:	High Level Radioactive Liquid Tank Level
	Range:	Top to Bottom
	Category:	3
	Existing Design:	The indicated range for this variable is 0 to 100% for each of two tanks. The indication corresponds to the tank volume of approximately 2 to 90%.
	Compliance:	The range is not in compliance with the recommendation of RG 1.97, Rev. 2.
	Display:	Two computer points
	Position:	The tap to tap range of the installed instruments is adequate to provide tank level information.
D-32	Variable:	Radioactive Gas Holdup Tank Pressure
	Range:	0 to 150% Design Pressure
	Category:	3
	Existing Design:	Catawba utilizes six tanks for radioactive waste gas storage. The maximum operating pressure for these tanks is approximately 100 psig (per FSAR Section 11.3). The indicated range is 0 to 150 psig for each tank.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	Six computer points.
	Position:	The installed instrumentation is adequate for intended monitoring function.
D-33	Variable:	Emergency Ventilation Damper Position
	Range:	Open-Closed Status
	Category:	2

	Existing Design:	All active emergency ventilation dampers which are actuated under design-basis accident conditions and whose failure could result in a radioactive release to atmosphere have position indication or indication that the required emergency system alignment has been achieved in the Control Room. At least one channel per damper is provided, and this instrumentation is powered from Class 1E busses. Environmental qualification of the position indication limit switches is described in FSAR Section 3.11 and the NUREG-0588 submittal. Seismic qualification is described in FSAR Section 3.10.
	Compliance:	Some emergency ventilation dampers do not meet the range recommendations of RG 1.97, Rev. 2. Those dampers not in compliance have positive indication that the required emergency system alignment has been achieved but no individual Open-Closed status. Positive indication may be provided by system flows, pressures, etc.
	Display:	Control Room control switch indicating lights Analog indicators Monitor lights
	Position:	The installed instrumentation is adequate for intended monitoring function since the operator is always provided with positive indication that emergency dampers have achieved their safety mode alignment during and after an accident.
D-34	Variable:	Status of Standby Power and Other Energy Sources Important to Safety
	Range:	Voltages, currents, pressures
	Category:	2
	Existing Design:	All QA Condition 1 (Class 1E) or battery backed control busses have undervoltage alarms in the Control Room with local diagnostic capabilities to enable an expedient assessment of abnormal situations. In addition, the 125 VDC distribution centers have analog indicators of voltage level in the Control Room. All of the control Room alarms are on highly reliable battery backed busses. All of the sensing relays and alarm electronics are located in a mild environment.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.

	Display:	Control Room annunciators Control Room analog indicators Computer digital points
	Position:	The installed instrumentation is adequate for intended monitoring function.
E-7	Variable:	Common Plant Vent Radioactive Discharge
	Range:	10^{-6} $\mu Ci / cc$ to 10^{4} $\mu Ci / cc$
	Category:	2
	Existing Design:	Catawba has a high range, mid-range and low range hannel of unit vent radioactivity instrumentation. These channels are powered from a highly reliable battery backed bus. The indicated range is 1 to 10^{8} R/hr gross gamma for the high range and 10 to 10^{7} cpm and 10 to 10^{6} cpm corresponding to 10^{-6} to 5 x 10^{3} $\mu Ci / ml\ Kr-85$ for the low and mid-range monitors. This instrumentation is installed in a mild environment. Detection, release assessment, and long-term surveillance is assisted with unit vent flow instrumentation whose range is enveloped by at least 0 to 110% vent design flow. The unit vent normal flow rate is 0 to 130,000 scfm. The unit vent flow rate instrumentation monitoring range is 0 to 195,000 scfm. Remote flow rate indication is provided at the flow transmitters and on the plant computer. The flow instrumentation is located in a radiation mild environment.
	Compliance:	This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	Three control room indicators Three computer points Three channels recorded
	Position:	The installed instrumentation is adequate for intended monitoring function.
E-8	Variable:	Radiation Monitoring for the Vent from Steam Generator Safety Relief Valves or Atmosphere Dump Valves
	Range:	10^{-1} $\mu Ci / cc$ to 10^{3} $\mu Ci/cc$ Mass of Steam Released
	Category:	2

	Existing Design	Area radiation monitors are located adjacent to the main steam lines and upstream of the main steam isolation valves to detect secondary side radiation. Correlation curves allow conversion of the monitor readings in mR/hr to $\mu Ci / cc$. The indicated range is 1E-1 to 1E + 4mR/hr. Steam releases are calculated on the plant computer with the information being printed on the alarm typer. The instrumentation is powered from highly reliable battery backed control busses. This instrumentation is rated to withstand the environmental conditions that would exist during accidents in which it is intended to operate. A steam line break in the vicinity of this instrumentation may cause the environment to exceed the rated temperature, however, the instrument is not required to remain functional for this event.
	Compliance:	This instrumentation isin compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.1.
	Display:	Four Control Room indicators Four computer points Four channels recorded
	Position:	The installed instrumentation is adequate for intended monitoring function.
E-10 E-12 E-13 E-14	Variable:	Plant Airborne and Area Radiation (sampling with onsite analysis, portable instrumentation)
	Range:	Various ranges as listed in RG 1.97, Rev. 2
	Category:	3
	Existing Design:	Equipment and facilities exist at Catawba for making the measurements and analyses recommended by RG 1.97, Rev. 2. Information concerning these capabilities is in FSAR Section 12.5.
	Compliance:	Some instrumentation may have ranges which differ from the recommendations of RG 1.97, Rev. 2.
	Display:	Not Applicable.
	Position:	The instrumentation has been selected using the considerations shown in FSAR Section 12.5. Evaluation of the equipment has determined it to be adequate for the intended functions.
E-11	Variable:	Radiation Exposure Meters

	This variable is not required based on information given in Supplement 1 to NUREG 0737 Section 6.1-b and the Errata sheet to RG 1.97, Rev. 2 dated May, 1981.	

HISTORICAL INFORMATION IN ITALICS BELOW NOT REQUIRED TO BE REVISED

E-15	*Variable:*	*Wind Direction*
	Range:	*0° to 360°*
	Category:	*3*
	Existing Design:	*Catawba has two channels of wind direction instrumentation. The indicated range of each channel is 0° to 540°.*
	Compliance:	*This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.*
	Display:	*Two channels on the computer.* *Two channels recorded.*
	Position:	*This instrumentation was specified to have a sensitivity of 0.60 MPH and an instantaneous accuracy of ±5° which is considered adequate for the intended monitoring function.*
E-16	*Variable:*	*Wind Speed*
	Range:	*0 - 67 mph*
	Category:	*3*
	Existing Design:	*Catawba has two channels of wind speed instrumentation. The indicated range is 0 - 60 mph.*
	Compliance:	*Range is not in compliance with RG 1.97, Rev. 2 recommendations.*
	Display:	*Two channels on the computer.* *Two channels recorded*

	Position:	*This instrumentation was specified to have a sensitivity of 0.60 MPH, a precision of 0.5 MPH from 0.6 to 30 MPH and a time averaged accuracy of ±0.5 MPH, which is considered adequate for the intended monitoring function.* *The range of the installed instruments are adequate for Catawba site meteorological conditions. Also note, present range exceeds the recommendation of RG 1.97, Rev. 3.*
E-17	*Variable:*	*Atmospheric Stability*
	Range:	*-5° to 10°C*
	Category:	*3*
	Existing Design:	*The indicated range for atmospheric stability is -4° to 8°C for a 50 meter interval.*
	Compliance:	*This instrumentation is in compliance with Duke's interpretation of RG 1.97, Rev. 2 as clarified in Section 1.8.1.29.*
	Display:	*One computer point.* *One channel recorded*
	Position:	*This sensor was specified to have a minimum accuracy of ±0.1°C which is considered adequate for the intended monitoring function.*

Table 1-12. Deleted per 2001 Update