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CAROLINA POWER & LIGHT COMPANY

SHEARON HARRIS NUCLEAR POWER PLANT

PLANT OPERATING MANUAL

VOLUME 6

PART 7

50-400
SHEARON HARRIS
LTR DTD 3/7/84
SUPERSEDED PER REVISION
TO INSERVICE INSPECTION
PROGRAM

PROCEDURE TYPE: Inservice Inspection Program (ISI)

NUMBER: ISI-203

TITLE: ASME Section XI Pump and Valve Program Plan

REVISION 1

APPROVED: Edward M Steudel 11-4-85

Signature Date

TITLE: MGR - TECH SUPPORT

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1.0 PURPOSE

This procedure describes the scope and testing requirements of the ASME Boiler and Pressure Vessel Code, Section XI pump and valve program at SHNPP. Compliance with this code is required by 10CFR50, Domestic Licensing of Production and Utilization Facilities.

2.0 REFERENCES

2.1 ASME Boiler and Pressure Vessel Code, Section XI, 1980 Edition through Winter 1981 addenda.

2.2 Code of Federal Regulations, Title 10, Part 50.55a(g).

2.3 SHNPP Technical Specifications, Section 4.0.5.

2.4 PLP-604, Inservice Inspection.

3.0 RESPONSIBILITIES

3.1 Technical Support Unit

The Technical Support Unit is responsible for overall administration of the program including:

3.1.1 Determination of the program scope.

3.1.2 Revision of the program as necessary based on plant design changes.

3.1.3 Preparation of reports as necessary.

3.1.4 Requesting relief from required testing for components that cannot be tested during plant operation.

3.1.5 Trending and review of test results.

3.2 Operations Unit

3.2.1 Preparation and performance of surveillance test procedures that implement the program requirements.

3.2.2 Evaluation of test results based on acceptance criteria determined by the Technical Support Unit.

3.3 Administrative Section

3.3.1 Maintaining test records consistent with the requirements of reference 2.1.

4.0 ABBREVIATIONS

4.1 ASME - American Society of Mechanical Engineers.

4.2 CFR - Code of Federal Regulations.

5.0 PROCEDURE

The following is a detailed description of the ASME Section XI pump and valve program as implemented at SHNPP. The format is consistent with NRC recommendations.

5.1 Explanation of Codes and Symbols Used In The SHNPP Inservice Test Program

This Section identifies the meaning of all codes and symbols used in the pump and valve test programs presented in Sections 5.2 and 5.3. The tables in this section can be removed from the procedure to assist in reviewing and understanding the information provided in the program.

TABLE 5.1.1 SYSTEMS TESTED

System	Flow Diagram
Main Steam Supply	2165-S-542
Feedwater	2165-S-544
Auxiliary Feedwater	2165-S-544
Condensate	2165-S-545
Service Water	2165-S-547
Containment Spray	2165-S-550
Steam Generator Blowdown	2165-S-551
Process Sampling	2165-S-552
Diesel Fuel Oil Transfer and Storage	2165-S-563
Containment Atmosphere Radiation Monitoring	2165-S-605
Diesel Generator	2165-S-633, 633S01
Miscellaneous Drains	2165-S-685
Demineralized Water	2165-S-799
Service Air	2165-S-800
Instrument Air	2165-S-801
Fuel Pool Cooling	2165-S-805
Emergency Screen Wash	2165-S-808
Fire Protection	2165-S-888
ESW Bearing Lubrication	2165-S-936
Essential Services Chilled Water	2165-S-998, 998S02, 998S03, 998S04,999, 999S02,999S03, 999S04

TABLE 5.1.1 SYSTEMS TESTED (CONT'D)

System	Flow Diagram
Reactor Coolant	2165-S-1301
Chemical & Volume Control	2165-S-1303,
	1303S01, 1303S02
	1304, 1305,
	1306,1307
Safety Injection	2165-S-1308,
	1309, 1310
Containment - Waste Processing	2165-S-1313
Component Cooling Water	2165-S-1319,
	1320, 1321, 1322,
	1322S01
Residual Heat Removal	2165-S-1324
Containment HVAC	2168-G-517
Auxiliary Building HVAC	2168-G-517 S03
Control Room HVAC	2168-G-517 S04
Switchgear and Protection Room HVAC	2168-G-517 S05
Fuel Handling Building HVAC	2168-G-533

TABLE 5.1.2 SYMBOLS USED TO DESIGNATE VALVE TYPE

Symbol	Valve Type
BA	Ball
BF	Butterfly
CK	Check
DA	Diaphragm
GA	Gate
GL	Globe
ND	Needle
PG	Plug
RG	Regulating
RL	Relief
SK	Spring Check
3W	Three Way

TABLE 5.1.3 SYMBOLS USED TO DESIGNATE VALVE ACTUATOR TYPE

Symbol	Actuator Types
AO	Air Operator
M	Manual Operator
MO	Motor Operator
-	Self Actuated
SO	Solenoid Operator
EH	Electro-Hydraulic Operator
PO	Piston Operator
EH/N	Electro - Hydraulic and Nitrogen Operator

TABLE 5.1.4 SYMBOLS USED TO DESIGNATE NORMAL VALVE POSITION

Symbol	Valve Position
O	Open
C	Closed
LO	Locked Open
LC	Locked Closed
TH	Throttled
LT	Locked Throttled
-	Valve position determined by other system parameters as in the case of any check valve or regulating valve.

TABLE 5.1.5 CODES USED IN THE TEST FREQUENCY COLUMN

The codes used in this column indicate the plant operational status that must be achieved before a particular valve can be safely tested. For simplicity, the following codes are used:

Test Frequency	Plant Operational Status
1	Normal Operation. Valves in this category will be quarterly tested during normal operation without any adverse effects on operations or safety.
2	Cold Shutdown. Testing of valves in this category cannot be performed quarterly during normal operation and must be deferred until cold shutdown in order to avoid possible adverse operational or safety situations.
3	Refueling. Testing valves in this category cannot be performed quarterly during normal operation nor performed during cold shutdown and must be deferred until the plant is in a refueling mode in order to avoid possible adverse operational or safety situations.

TABLE 5.1.5 CODES USED IN THE TEST FREQUENCY COLUMN (CONT'D)

4	Valves in this category are relief valves which will be tested in accordance with IWV-3510. At each refueling, a portion of the total number of relief valves will be tested as prescribed by IWV-3510.
5	At least once every two years.

TABLE 5.1.6 CODES FOR VALVE TESTING

FS	Full stroke valve for operability in accordance with Section XI, Article IWV-3411.
FL	Exercise valve with fail-safe actuators to observe proper operation of failure mechanisms in accordance with Section XI, Article IWV-3415.
TS	During the full stroke test, measure the full stroke time of a power-operated valve. The valve stroke time will conform to the requirements specified in Technical Specifications.
TM	During the full stroke test, measure the full stroke time of a power-operated valve. The valve stroke time will be established after initial baseline testing and will be analyzed in accordance with Section XI, Article IWV-3410.
RL	Test safety and relief valve set points in accordance with Section XI, Article IWV-3510.
PI	Remote valve position indicators shall be observed to verify that valve operation is accurately indicated.

TABLE 5.1.6 CODES FOR VALVE TESTING (CONT'D)

LK Perform valve leak rate test in accordance with Section XI, Article IWV-3420.

FF Verification that a check valve will pass flow in the forward direction.

BS Verification that a check valve will properly back seat to block flow in the reverse direction.

5.2 Inservice Pump Test Program

Summary of Information Provided

Each pump test table provides the following information:

- The system designation for the pump
- Individual pump by number
- The simplified Flow Diagram on which the pump is located and its coordinate
- Speed[1]
- Inlet Pressure[1]
- Differential Pressure[1]
- Flow Rate[1]
- Vibration Amplitude[1]

[1]These parameters are each addressed with an entry consisting simply of a "Yes" or a "No," indicating whether or not that parameter will be monitored quarterly during the 120-month duration of the program.

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PUMP TEST PROGRAM

SYSEM PUMP	PUMP NO.	DRAWING NO. 2165-	COORDINATES	SPEED N	INLET PRESSURE P_1	DIFFERENTIAL PRESSURE DP	FLOW RATE Q	VIBRATION AMPLITUDE V	REMARKS
				TEST PARAMETER MEASURED					
Auxiliary Feedwater	1A-SA	S-545	J-7	N/A	YES	YES	YES	YES	
	1B-SB		J-8	N/A	YES	YES	YES	YES	
	1X-SAB		J-9	YES	YES	YES	YES	YES	
Emergency Service Water	1A-SA	S-547	C-2	N/A	N/A	N/A	YES	YES	See Note 1
	1B-SB		C-3	N/A	N/A	N/A	YES	YES	See Note 1
SW Booster	1A-SA	S-547	H-5	N/A	YES	YES	YES	YES	
	1B-SB		H-15	N/A	YES	YES	YES	YES	
Containment Spray	1A-SA	S-550	F-8	N/A	YES	YES	YES	YES	
	1B-SB		L-8	N/A	YES	YES	YES	YES	
D/G Fuel Oil Transfer	1A-SA	S-563	F-2	N/A	YES	YES	N/A	YES	See Note 2
	1B-SB		F-7	N/A	YES	YES	N/A	YES	See Note 2
Emergency S.W. Intake Screen Wash	1A-SA	S-808	C-15	N/A	YES	YES	YES	YES	
	1B-SB		C-12	N/A	YES	YES	YES	YES	
Chilled Water Circulation (P4)	1A-SA	S-998S02	J-6	N/A	YES	YES	YES	YES	
	1B-SB	S-999S02	J-6	N/A	YES	YES	YES	YES	
Chiller Condenser Recirculation (P7)	1A-SA	S-998S02	D-9	N/A	YES	YES	YES	YES	
	1B-SB	S-999S02	D-9	N/A	YES	YES	YES	YES	
Charging (Safety Injection)	1A-SA	S-1305	H-9	N/A	YES	YES	YES	YES	
	1B-SB		K-9	N/A	YES	YES	YES	YES	
	1C-SAB		J-9	N/A	YES	YES	YES	YES	See Note 3

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PUMP TEST PROGRAM

SYSEM PUMP	PUMP NO.	DRAWING NO. 2165-	COORDINATES	TEST PARAMETER MEASURED SPEED N	INLET PRESSURE P_1	DIFFERENTIAL PRESSURE DP	FLOW RATE Q	VIBRATION AMPLITUDE V	REMARKS
Boric Acid Transfer	1A-SA	S-1307	E-8	N/A	YES	YES	YES	YES	
	1B-SB	S-1307	G-8	N/A	YES	YES	YES	YES	
Component Cooling Water	1A-SA	S-1319	F-7	N/A	YES	YES	YES	YES	
	1B-SB		L-7	N/A	YES	YES	YES	YES	
	1C-SAB		I-7	N/A	YES	YES	YES	YES	See Note 3
Residual Heat Removal	1A-SA	S-1324	L-11	N/A	YES	YES	YES	YES	
	1B-SB		I-11	N/A	YES	YES	YES	YES	
Fuel Pool Cooling	1&4A-SA	S-805	G-10	N/A	YES	YES	YES	YES	
	1&4B-SB		J-10	N/A	YES	YES	YES	YES	

PUMP TEST PROGRAM

NOTE NO.	PUMP	NOTE
1	Emergency Service Water 1A & 1B	In lieu of inlet pressure, the water level will be measured. Discharge pressure will be recorded in lieu of DP.
2	D/G Fuel Oil	The D/G Fuel Oil Transfer Pump flow will be demonstrated by the pump's ability to refill the Fuel Oil Day Tank on demand. This will be observed as part of normal testing.
3	Charging 1C-SAB Component Cooling 1C-SAB	Any one of the three component cooling or three charging pumps is an installed spare. One pump is normally running, the second pump is aligned as an automatic backup to the operating pump, and the third pump is electrically disconnected. In the event of failure of the operating pump, the second pump automatically starts and the installed spare is electrically connected and valved in as the reserve pump. The normally operating and reserve pump will be tested. The installed spare is required to be tested before it is declared operational.

Relief Request: R-1

Pumps: All

Class: 2, 3

Test Requirement: Bearing Temperature Measurement per Subsection IWP

Basis For Relief: Section XI of the ASME Boiler and Pressure Vessel Code presently requires that bearing temperature be recorded annually as part of the operational readiness assessment data. However, bearing temperature rise prior to a failure occurs only minutes before the failure. Therefore, any bearing failure predicted by recording yearly temperatures would be the result of a random event. the data retrieved from yearly tests would not warrant any increase in confidence of component reliability and should not be required, since in many cases, this requirement will cause the plant to install additional instrumentation. CP&L considers the yearly temperature requirement unreasonable because it does not increase the confidence in the reliability of the component.

Alternative Test: Vibration is a singularly reliable indication of pump mechanical condition. Vibration measurements will be taken quarterly in accordance with Subsection IWP.

5.3 Inservice Valve Test Program

SHNPP VALVE TEST PROGRAM

SYSTEM: Main Steam (MS)

VALVE NO. 1MS-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	VALVE CATEGORY B	VALVE CATEGORY C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
43	2	C-3			X		8	RL	--	--	4	RL		
44	2	G-3			X		8	RL	--	--	4	RL		
45	2	J-3			X		8	RL	--	--	4	RL		
46	2	C-4			X		8	RL	--	--	4	RL		
47	2	G-4			X		8	RL	--	--	4	RL		
48	2	J-4			X		8	RL	--	--	4	RL		
49	2	C-5			X		8	RL	--	--	4	RL		
50	2	G-5			X		8	RL	--	--	4	RL		
51	2	J-5			X		8	RL	--	--	4	RL		
52	2	C-6			X		8	RL	--	--	4	RL		
53	2	G-6			X		8	RL	--	--	4	RL		
54	2	J-6			X		8	RL	--	--	4	RL		
55	2	C-7			X		8	RL	--	--	4	RL		
56	2	G-7			X		8	RL	--	--	4	RL		
57	2	J-7			X		8	RL	--	--	4	RL		
25	2	D-2			X		1	GA	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		

VALVE NO. 1MS-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
27	2	G-2		X			1	GA	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
29	2	K-2		X			1	GA	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
80	2	D-8		X			34	GL	PO	O	2	FS		
											2	FL	R-2	
											2	TS		
											5	PI		
82	2	G-8		X			34	GL	PO	O	2	FS		
											2	FL	R-2	
											2	TS		
											5	PI		
84	2	K-8		X			34	GL	PO	O	2	FS		
											2	FL	R-2	
											2	TS		
											5	PI		
81	2	D-8		X			3	GA	AO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		
83	2	G-8		X			3	GA	AO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		
85	2	K-8		X			3	GA	AO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		
231	2	E-8		X			2	GL	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Main Steam (MS)

Dwg. No. (Rev.) 2165-S-0542(1)

VALVE NO. 1MS-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
266	2	H-8		X			2	GL	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
301	2	L-8		X			2	GL	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
70	2	H-7		X			6	GA	MO	C	1	FS		
											1	TM		
											5	PI		
72	2	K-7		X			6	GA	MO	C	1	FS		
											1	TM		
											5	PI		
73	3	K-7			X		6	CK	--	--	1	FF		
											2	BS	R-30	
71	3	H-7			X		6	CK	--	--	1	FF		
											2	BS	R-30	
354	3	N-5		X			2	GL	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
336	3	M-3		X			2	GL	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Main Steam (MS) Dwg. No. (Rev.) 2165-S-0542(1)

VALVE NO. 1MS-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
58	2	G-8	X				8	GA	EH/N	C	2	FS	R-25	
											2	FL		
											2	TM		
											5	PI		
60	2	F-8	X				8	GA	EH/N	C	2	FS	R-25	
											2	FL		
											2	TM		
											5	PI		
62	2	J-8	X				8	GA	EH/N	C	2	FS	R-25	
											2	FL		
											2	TM		
											5	PI		

SYSTEM: Feedwater (FW)

Dwg. No. (Rev.) 2165-S-0544(1)

VALVE NO. 1FW-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
159	2	B-7		X			16	GA	EH/N	O	2	FS		
											2	FL	R-3	
											2	TS		
											5	PI		
277	2	E-4		X			16	GA	EH/N	O	2	FS		
											2	FL	R-3	
											2	TS		
											5	PI		
217	2	D-4		X			16	GA	EH/N	O	2	FS		
											2	FL	R-3	
											2	TS		
											5	PI		
307	2	C-6		X			3	GA	AO	C	2	FS	R-11	
											2	FL		
											2	TS		
											5	PI		
319	2	F-3		X			3	GA	AO	C	2	FS	R-11	
											2	FL		
											2	TS		
											5	PI		
313	2	D-4		X			3	GA	AO	C	2	FS	R-11	
											2	FL		
											2	TS		
											5	PI		
165	2	B-5		X			1	GA	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Feedwater (FW)

VALVE NO. 1FW-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
163	2	B-6		X			1	GA	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
279	2	E-3		X			1	GA	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
281	2	E-3		X			1	GA	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
223	2	C-3		X			1	GA	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
221	2	C-4		X			1	GA	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
133	3	B-10		X			16	GA	AO	O	2	FS	R-28	
											2	FL		
											2	TM		
											5	PI		
191	3	C-10		X			16	GA	AO	O	2	FS	R-28	
											2	FL		
											2	TM		
											5	PI		

SYSTEM: Feedwater (FW) Dwg. No. (Rev.) 2165-S-0544(1)

VALVE NO. 1FW-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
249	3	E-10		X			16	GA	AO	O	2 2 2 5	FS FL TM PI	R-28	
140	3	B-10		X			3	GA	AO	C	2 2 2 5	FS FL TM PI	R-28	
198	3	D-10		X			3	GA	AO	C	2 2 2 5	FS FL TM PI	R-28	
256	3	E-10		X			3	GA	AO	C	2 2 2 5	FS FL TM PI	R-28	
158	2	B-7			X		16	CK	--	--	2	BS	R-31	
216	2	D-7			X		16	CK	--	--	2	BS	R-31	
276	2	E-4			X		16	CK	--	--	2	BS	R-31	

SYSTEM: Auxiliary Feedwater (AF)

Dwg. No. (Rev.) 2165-S-0544(1)

VALVE NO. 1AF-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
4	3	N-7			X		2	CK	--	--	1	FF		
23	3	N-9			X		2	CK	--	--	1	FF		
110	3	N-11			X		2	CK	--	--	1	FF		
16	3	L-6			X		4	CK	--	--	1	FF		
											1	BS		
31	3	L-8			X		4	CK	--	--	1	FF		
											1	BS		
117	3	L-10			X		6	CK	--	--	1	FF		
											1	BS		
49	3	J-6		X			4	GL	EH	0	1	FS		
											1	FL		
											1	TM		
											5	PI		
50	3	J-7		X			4	GL	EH	0	1	FS		
											1	FL		
											1	TM		
											5	PI		
51	3	J-8		X			4	GL	EH	0	1	FS		
											1	FL		
											1	TM		
											5	PI		
129	3	J-9		X			4	GL	EH	0	1	FS		
											1	FL		
											1	TM		
											5	PI		

SYSTEM: Auxiliary Feedwater (AF)

VALVE NO. 1AF-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
131	3	J-11		X			4	GL	EH	O	1 1 1 5	FS FL TM PI		
130	3	J-10		X			4	GL	EH	O	1 1 1 5	FS FL TM PI		
54	3	F-6			X		4	CK	--	--	1 1	FF BS		
73	3	H-7			X		4	CK	--	--	1 1	FF BS		
92	3	I-8			X		4	CK	--	--	1 1	FF BS		
136	3	F-6			X		4	CK	--	--	1 1	FF BS		
148	3	H-7			X		4	CK	--	--	1 1	FF BS		
142	3	H-8			X		4	CK	--	--	1 1	FF BS		
55	2	F-6		X			4	GA	MO	O	1 1 5	FS TM PI		
74	2	G-7		X			4	GA	MO	O	1 1 5	FS TM PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Auxiliary Feedwater (AF) Dwg. No. (Rev.) 2165-S-0544(1)

VALVE NO. 1AF-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
93	2	H-8		X			4	GA	MO	O	1	FS		
											1	TM		
											5	PI		
137	2	F-6		X			4	GA	MO	O	1	FS		
											1	TM		
											5	PI		
149	2	G-7		X			4	GA	MO	O	1	FS		
											1	TM		
											5	PI		
143	2	H-8		X			4	GA	MO	O	1	FS		
											1	TM		
											5	PI		
64	2	C-6		X			6	GA	PO	O	2	FS	R-24	
											2	FL		
											2	TS		
											5	PI		
102	2	F-4		X			6	GA	PO	O	2	FS	R-24	
											2	FL		
											2	TS		
											5	PI		
81	2	E-7		X			6	GA	PO	O	2	FS	R-24	
											2	FL		
											2	TS		
											5	PI		
155	2	B-3		X			1	GA	AO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Auxiliary Feedwater (AF) Dwg. No. (Rev.) 2165-S-0544(1)

VALVE NO. 1AF-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
153	2	B-4		X			1	GA	AO	C	1 1 1 5	FS FL TS PI		
159	2	G-3		X			1	GA	AO	C	1 1 1 5	FS FL TS PI		
157	2	G-3		X			1	GA	AO	C	1 1 1 5	FS FL TS PI		
163	2	K-3		X			1	GA	AO	C	1 1 1 5	FS FL TS PI		
161	2	K-3		X			1	GA	AO	C	1 1 1 5	FS FL TS PI		
68	2	C-2			X		6	CK	--	--	1	FF		
106	2	G-2			X		6	CK	--	--	1	FF		
87	2	K-2			X		6	CK	--	--	1	FF		
19	3	K-6		X			4	GL	EH	O	1 1 1 5	FS FL TM PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Auxiliary Feedwater (AF)

Dwg. No. (Rev.) 2165-S-0544(1)

VALVE NO. 1AF-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
34	3	K-8		X			4	GL	EH	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
5	3	N-6		X			2	GL	MO	O	1	FS		
											1	TM		
											5	PI		
24	3	N-9		X			2	GL	MO	O	1	FS		
											1	TM		
											5	PI		
65	2	C-6			X		6	CK	--	--	2	BS	R-31	
84	2	E-5			X		6	CK	--	--	2	BS	R-31	
103	2	G-4			X		6	CK	--	--	2	BS	R-31	

SHNPP VALVE TEST PROGRAM

SYSTEM: Condensate (CE)

Dwg. No. (Rev.) 2165-S-0545 (1)

VALVE NO. 1CE-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (Inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
36	3	I-7			X		6	CK	--	--	1	FF		
46	3	I-8			X		6	CK	--	--	1	FF		
56	3	I-9			X		8	CK	--	--	1	FF		
1157	3	H-7			X		1	RL	--	--	4	RL		
1158	3	H-8			X		1	RL	--	--	4	RL		
1159	3	H-9			X		1	RL	--	--	4	RL		

SYSTEM: Service Water (SW) Dwg. No. (Rev.) 2165-S-0547(2)

VALVE NO. 1SW-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
1	3	B-6		X			30	BF	MO	O	1	FS		
											1	TM		
											5	PI		
2	3	B-4		X			30	BF	MO	O	1	FS		
											1	TM		
											5	PI		
3	3	C-1		X			96	BF	MO	C	1	FS		
											1	TM		
											5	PI		
4	3	C-3		X			96	BF	MO	C	1	FS		
											1	TM		
											5	PI		
9	3	D-2			X		30	CK	--	--	1	FF		
10	3	D-3			X		30	CK	--	--	1	FF		
20	3	E-1		X			3	BA	PO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
23	3	E-3		X			3	BA	PO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
39	3	I-1		X			30	BF	MO	O	1	FS		
											1	TM		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Service Water (SW)

Dwg. No. (Rev.) 2165-S-0547(2)

VALVE NO. 1SW-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
40	3	I-2		X			30	BF	MO	O	1	FS		
											1	TM		
											5	PI		
45	3	H-2		X			3	GL	PO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
47	3	I-3		X			3	GL	PO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
86	3	F-6			X		14	CK	--	--	1	FF		
											1	BS		
220	3	F-14			X		14	CK	--	--	1	FF		
											1	BS		
91	2	D-6		X			8	BF	MO	O	1	FS		
											1	TM		
											5	PI		
92	2	D-7		X			8	BF	MO	O	1	FS		
											1	TM		
											5	PI		
227	2	D-13		X			8	BF	MO	O	1	FS		
											1	TM		
											5	PI		
225	2	D-14		X			8	BF	MO	O	1	FS		
											1	TM		
											5	PI		

SYSTEM: Service Water (SW)

Dwg. No. (Rev.) 2165-S-0547(2)

VALVE NO. 1SW-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
97	2	D-8		X			8	BF	MO	O	1 1 5	FS TM PI		
98	2	D-9		X			8	BF	MO	O	1 1 5	FS TM PI		
109	2	D-12		X			8	BF	MO	O	1 1 5	FS TM PI		
110	2	D-13		X			8	BF	MO	O	1 1 5	FS TM PI		
116	3	H-7		X			14	BF	AO	O	1 1 1 5	FS FL TM PI		
118	3	G-13		X			14	BF	AO	O	1 1 1 5	FS FL TM PI		
141	3	H-8			X		1½	CK	--	--	1 1	FF BS		
143	3	H-8			X		1½	CK	--	--	1 1	FF BS		
152	3	H-9			X		1½	CK	--	--	1 1	FF BS		
154	3	H-10			X		1½	CK	--	--	1 1	FF BS		

SHNPP VALVE TEST PROGRAM

SYSTEM: Service Water (SW)

Dwg. No. (Rev.) 2165-S-0547(2)

VALVE NO. 1SW-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
163	3	H-11			X		1½	CK	--	--	1	FF		
											1	BS		
165	3	H-12			X		1½	CK	--	--	1	FF		
											1	BS		
179	3	I-14		X			4	GA	PO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
180	3	I-15		X			4	GA	PO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
206	3	K-16		X			4	GA	PO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
204	3	K-16		X			4	GA	PO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
124	3	I-8		X			8	BF	MO	C	1	FS		
											1	TM		
											5	PI		
126	3	I-8		X			8	BF	MO	C	1	FS		
											1	TM		
											5	PI		
127	3	I-9		X			8	BF	MO	C	1	FS		
											1	TM		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Service Water (SW)

Dwg. No. (Rev.) 2165-S-0547(2)

VALVE NO. 1SW-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
129	3	I-9		X			8	BF	MO	C	1 1 5	FS TM PI		
121	3	J-8		X			8	BF	MO	C	1 1 5	FS TM PI		
123	3	J-8		X			8	BF	MO	C	1 1 5	FS TM PI		
130	3	J-9		X			8	BF	MO	C	1 1 5	FS TM PI		
132	3	J-9		X			8	BF	MO	C	1 1 5	FS TM PI		
275	3	L-16		X			30	BF	MO	O	1 1 5	FS TM PI		
274	3	L-16		X			30	BF	MO	O	1 1 5	FS TM PI		
270	3	K-17		X			30	BF	MO	O	1 1 5	FS TM PI		
271	3	J-17		X			30	BF	MO	O	1 1 5	FS TM PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Service Water (SW)

Dwg. No. (Rev.) 2165-S-0547(2)

VALVE NO. 1SW-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
233	2	C-15			X		12	CK	--	--	2	BS	R-26	
231	2	D-15		X			12	BF	AO	O	2	FS	R-26	
											2	FL		
											2	TS		
											5	PI		
240	2	D-17		X			12	BF	AO	O	2	FS	R-26	
											2	FL		
											2	TS		
											5	PI		
242	2	E-17		X			12	BF	AO	O	2	FS	R-26	
											2	FL		
											2	TS		
											5	PI		
95	2	C-8			X		1	RL	--	--	4	RL		
96	2	C-9			X		1	RL	--	--	4	RL		
107	2	C-12			X		1	RL	--	--	4	RL		
108	2	C-13			X		1	RL	--	--	4	RL		
150	3	F-8			X		3/4	RL	--	--	4	RL		
160	3	F-9			X		3/4	RL	--	--	4	RL		
171	3	F-10			X		3/4	RL	--	--	4	RL		
60	3	I-6			X		3/4	RL	--	--	4	RL		
257	3	I-13			X		3/4	RL	--	--	4	RL		

SHNPP VALVE TEST PROGRAM

SYSTEM: Service Water (SW)

Dwg. No. (Rev.) 2165-S-0547(2)

VALVE NO. 1SW-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
276	3	M-15		X			36	BF	MO	O	1	FS		
											1	TM		
											5	PI		
50	3	J-1			X		36	CK	--	--	3	BS	R-21	

SI

SHNPP VALVE TEST PROGRAM

SYSTEM: Containment Spray (CT) Dwg. No. (Rev.) 2165-S-0550(1)

VALVE NO. 1CT-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
26	2	F-15		X			12	GA	MO	O	1	FS		
											1	TM		
											5	PI		
71	2	K-16		X			12	GA	MO	O	1	FS		
											1	TM		
											5	PI		
27	2	F-14			X		12	CK	--	--	1	FF		
72	2	L-15			X		12	CK	--	--	1	FF		
105	2	N-7		X			12	GA	MO	C	1	FS		
											1	TM		
											5	PI		
102	2	M-7		X			12	GA	MO	C	1	FS		
											1	TM		
											5	PI		
62	2	H-7			X		2	CK	--	--	1	FF		
65	2	J-7			X		2	CK	--	--	1	FF		
47	2	E-4		X			6	GA	MO	C	1	FS		
											1	TM		
											5	PI		
95	2	L-4		X			6	GA	MO	C	1	FS		
											1	TM		
											5	PI		
50	2	F-4		X			8	GA	MO	C	1	FS		
											1	TS		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Containment Spray (CT) Dwg. No. (Rev.) 2165-S-0550(1)

VALVE NO. 1CT-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
88	2	K-4		X			8	GA	MO	C	1	FS		
											1	TS		
											5	PI		
53	2	F-3			X		8	CK	--	--	3	FF	R-1	
											3	BS		
91	2	K-3			X		8	CK	--	--	3	FF	R-1	
											3	BS		
24	2	H-14		X			2	GL	MO	C	1	FS		
											1	TM		
											5	PI		
12	3	I-11		X			2	GL	MO	C	1	FS		
											1	TM		
											5	PI		
11	3	I-11		X			2	GL	MO	C	1	FS		
											1	TM		
											5	PI		
5	3	B-9			X		1	RL	--	--	4	RL		
25	2	H-14		X			2	GL	MO	C	1	FS		
											1	TM		
											5	PI		
40	2	G-12			X		3/4	RL	--	--	4	RL		
70	2	K-12			X		3/4	RL	--	--	4	RL		

SHNPP VALVE TEST PROGRAM

SYSTEM: S.G. Blowdown (BD)

VALVE NO. 1BD-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
11	2	D-7		X			4	GL	PO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
30	2	I-6		X			4	GL	PO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
49	2	N-7		X			4	GL	PO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
1	2	D-3		X			2	GL	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
7	2	C-3		X			4	GA	PO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
20	2	I-3		X			2	GL	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
26	2	H-3		X			4	GA	PO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: S. G. Blowdown (BD) Dwg. No. (Rev.) 2165-S-0551(1)

VALVE NO. 1BD-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (Inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
39	2	N-3		X			2	GL	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
45	2	M-3		X			4	GA	PO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		

SHNPP VALUE TEST PROGRAM

SYSTEM: Sampling (SP) Dwg. No. (Rev.) 2165-S-0551(1)

VALVE NO. 1SP	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
224	2	L-4		X			3/4	GL	SO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
226	2	M-4		X			3/4	GL	SO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
219	2	H-4		X			3/4	GL	SO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
221	2	I-4		X			3/4	GL	SO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
214	2	C-4		X			3/4	GL	SO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
217	2	C-6		X			3/8	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
222	2	H-6		X			3/8	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Sampling (SP)

Dwg. No. (Rev.) 2165-S-0551(1) Page 2 of 2

VALVE NO. 1SP-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
227	2	M-6		X			3/8	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
216	2	D-4		X			3/4	GL	SO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		

S1

SHNPP VALVE TEST PROGRAM

SYSTEM: Sampling (SP)

Dwg. No. (Rev.) 2165-S-0552(1)

VALVE NO. 1SP-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
60	2	D-4		X			3/8	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
41	2	C-4		X			3/8	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
949	2	B-4		X			3/8	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
59	2	D-4		X			3/8	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
40	2	C-4		X			3/8	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Sampling (SP)

VALVE NO. 1SP-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
948	2	B-4		X			3/8	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
85	2	F-4		X			3/8	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
78	2	E-2		X			3/8	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
81	2	F-2		X			3/8	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
84	2	F-2		X			3/8	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
200	2	M-6		X			1	GL	SO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		
201	2	M-4		X			1	GL	SO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: SAMPLING (SP)

Dwg. No. (Rev.) 2165-S-0552(1)

VALVE NO. 1SP-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
208	2	N-6		X			3/4	GL	SO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		
209	2	N-4		X			3/4	GL	SO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Diesel Fuel Oil (FO) Dwg. No. (Rev.) 2165-S-0563(1)

VALVE NO. 1DFO-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
168	3	G-2			X		2	CK	--	--	1	FF		
186	3	G-6			X		2	CK	--	--	1	FF		
170	3	G-1			X		3/4	RL	--	--	4	RL		
188	3	G-5			X		3/4	RL	--	--	4	RL		

SHNPP VALVE TEST PROGRAM

SYSTEM: Radiation Monitoring (SP)

Dwg. No. (Rev.) 2165-S-0605(0)

VALVE NO. 1SP-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (Inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
12	2	C-12		X			1	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
30	2	D-12		X			1	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
916	2	C-13		X			1	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
918	2	D-13		X			1	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
42	2	G-11		X			1	GL	SO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		
62	2	I-11		X			1	GL	SO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		
919	2	F-12		X			1	GL	SO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Radiation Monitoring (SP)

Dwg. No. (Rev.) 2165-S-0605(0)

VALVE NO. 1SP-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
56	2	J-12		X			1	GL	SO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		
915	2	C-12		X			1	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
917	2	D-12		X			1	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
16	2	C-13		X			1	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
28	2	D-13		X			1	GL	SO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		

SYSTEM: Diesel Generator

Dwg. No. (Rev.) 2165-S-0633(2) Page 1 of 1

VALVE NO. 1EA-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
6	3	B-3			X		1½	RL	--	--	4	RL		
21	3.	C-3			X		1½	RL	--	--	4	RL		
37	3	B-13			X		1½	RL	--	--	4	RL		
52	3	D-13			X		1½	RL	--	--	4	RL		

SHNPP VALVE TEST PROGRAM

SYSTEM: Diesel Generator

Dwg. No. (Rev.) 2165-S-0633S01(1)

VALVE NO. 1DLO-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
5	3	M-6			X			RL	--	--	4	RL		
35	3	M-13			X			RL	--	--	4	RL		
27	3	M-8			X			RL	--	--	4	RL		
57	3	M-15			X			RL	--	--	4	RL		

SYSTEM: Misc. Drains (MD)

Dwg. No. (Rev.) 2165-S-0685(0)

VALVE NO. 1ED-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
94	2	M-7		X			3	GA	MO	O	1	FS		
											1	TS		
											5	PI		
95	2	M-7		X			3	GA	MO	O	1	FS		
											1	TS		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Demineralized Water (DW) Dwg. No. (Rev.) 2165-S-0799(0)

VALVE NO. 1DW-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (Inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
65	2	H-6			X		3	CK	--	--	3	BS	R-33	

SHNPP VALVE TEST PROGRAM

SYSTEM: Service Air (SA)

Dwg. No. (Rev.) 2165-S-0800(1) Page 1 of 1

VALVE NO.	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
1SA-82	2	C-3			X		2	CK	--	--	3	BS	R-33	

SHNPP VALVE TEST PROGRAM

SYSTEM: Instrument Air (IA)

Dwg. No. (Rev.) 2165-S-0801(0) Page 1 of 1

VALVE NO.	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
1IA-216	2	C-3		X			3	GA	PO	O	3	FS	R-23	
											3	FL		
											3	TS		
											5	PI		
1IA-220	2	C-3			X		3	CK	--	--	3	BS	R-23	

SHNPP VALVE TEST PROGRAM

SYSTEM: Fuel Pool Cooling

Dwg. No. (Rev.) 2165-S-805(2)

VALVE NO. 1SF-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (Inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
3	3	G-9			X		12	CK	--	--	1	FF		
13	3	J-9			X		12	CK	--	--	1	FF		
45	3	H-3			X		3/4	RL	--	--	4	RL		
66	3	K-3			X		3/4	RL	--	--	4	RL		

SHNPP VALVE TEST PROGRAM

SYSTEM: Emergency Screen Wash (SC)

Dwg. No. (Rev.) 2165-S-0808(0)

VALVE NO. 1SC-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
24	3	C-15			X		3	CK	--	--	1	FF		
34	3	C-12			X		3	CK	--	--	1	FF		
40	3	B-16		X			3	GL	EH	O	1	FS		
											1	TM		
											5	PI		
											1	FL		
37	3	B-13		X			3	GL	EH	O	1	FS		
											1	TM		
											5	PI		
											1	FL		
20	3	D-16		X			3	GL	EH	C	1	FS		
											1	TM		
											5	PI		
											1	FL		
30	3	D-13		X			3	GL	EH	C	1	FS		
											1	TM		
											5	PI		
											1	FL		
3SC-41	3	B-16		X			3	GL	EH	D	1	FS		
											1	TM		
											5	PI		
											1	FL		

SI

SHNPP VALVE TEST PROGRAM

SYSTEM: Fire Protection (FP)

Dwg. No. (Rev.) 2165-S-0888(0)

VALVE NO. 1FP-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (Inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
355	2	L-2		X			4	GL	AO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		
357	2	L-3			X		4	CK	--	--	3	BS	R-33	
347	2	L-2		X			6	GL	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
349	2	L-3			X		6	CK	--	--	3	BS	R-33	

SHNPP VALVE TEST PROGRAM

SYSTEM: ESW Bearing Lubrication

Dwg. No. (Rev.) 2165-S-936(2)

VALVE NO. 1SW-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
1317	3	J-11			X		3/4	CK	--	--	1	FF		
1319	3	J-13			X		3/4	CK	--	--	1	FF		
280	3	I-11		X			3/4	GA	SO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
282	3	I-13		X			3/4	GA	SO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
1335	3	J-15		X			1	GL	SO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
1326	3	K-15		X			1	GL	SO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
1331	3	J-13			X		1	RL	--	--	4	RL		
1323	3	K-13			X		1	RL	--	--	4	RL		

S1

SHNPP VALVE TEST PROGRAM

SYSTEM: HVAC - Chilled Water . Dwg. No. (Rev.) 2165-S-0998(0) Page 1 of 1

VALVE NO. 1CH-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
115	3	H-14		X			4	BF	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
126	3	L-10		X			4	BF	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
116	3	H-14		X			4	BF	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
125	3	L-10		X			4	BF	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		

SYSTEM: Chilled Water

Dwg. No. (Rev.) 2165-S-998S02(0)

VALVE NO.	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
1SW-1171	3	G-5		X			1	GL	SO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
1SW-1175	3	E-6		X			10	BF	EH	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
1SW-1199	3	C-8			X		8	CK	--	--	1	FF		
											1	BS		
1CH-6	3	F-3			X		1	RL	--	--	4	RL		
1CH-10	3	H-3			X		1	RL	--	--	4	RL		
1FP-1015	3	I-4		X			1	GL	SO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
1FP-1014	3	I-4		X			1	GL	SO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
1SA-494	3	E-3		X			1	GL	SO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
1SA-495	3	E-3		X			1	GL	SO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Chilled Water

Dwg. No. (Rev.) 2165-S-998S02(0)

VALVE NO.	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	VALVE CATEGORY B	VALVE CATEGORY C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
1SW-1170	3	F-5			X		1	CK	--	--	1	FF		
1SW-1198	3	C-8			X		3/4	RL	--	--	4	RL		
1CH-19	3	H-6			X		3/4	RL	--	--	4	RL		
1CH-34	3	F-11			X		3/4	RL	--	--	4	RL		
1SW-1183	3	E-8			X		1½	RL	--	--	4	RL		

SHNPP VALVE TEST PROGRAM

SYSTEM: Chilled Water

Dwg. No. (Rev.) 2165-S-998S03

VALVE NO. 1CH-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
199	3	B-1		X			2½	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
213	3	B-5		X			3	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
232	3	B-8		X			3	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
251	3	B-11		X			2½	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
265	3	B-15		X			2½	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
485	3	G-1		X			2½	GA	AO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
279	3	G-5		X			4	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		

SYSTEM: Chilled Water

VALVE NO. 1CH-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
299	3	G-8		X			4	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
323	3	G-15		X			2½	3W	EH	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
343	3	K-1		X			3	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
363	3	K-5		X			2½	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
381	3	K-8		X			2½	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
394	3	K-15		X			2½	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		

SI

SHNPP VALVE TEST PROGRAM

SYSTEM: Chilled Water

Dwg. No. (Rev.) 2165-S-998S04

VALVE NO. 1CH-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
409	3	B-1		X			1	GA	AO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
422	3	B-4		X			1½	GA	AO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
434	3	B-8		X			1½	GA	AO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
446	3	B-11		X			2½	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
460	3	F-8		X			1½	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
472	3	F-11		X			1½	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Chilled Water

Dwg. No. (Rev.) 2165-S-999

VALVE NO. 1CH-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
148	3	A-16		X			4	BF	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
196	3	L-15		X			4	BF	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
149	3	A-16		X			4	BF	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
197	3	L-16		X			4	BF	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Chilled Water

Dwg. No. (Rev.) 2165-S-999S02

VALVE NO.	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
1SW-1204	3	H-5		X			1	GL	SO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
1SW-1208	3	F-6		X			10	BF	EH	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
1SW-1232	3	D-8			X		8	CK	--	--	1	FF		
											1	BS		
1CH-50	3	G-3			X		1	RL	--	--	4	RL		
1CH-54	3	I-3			X		1	RL	--	--	4	RL		
1FP-1025	3	J-4		X			1	GL	SO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
1FP-1026	3	J-4		X			1	GL	SO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
1SA-502	3	E-3		X			1	GL	SO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
1SA-503	3	E-3		X			1	GL	SO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Chilled Water

Dwg. No. (Rev.) 2165-S-999S02 Page 2 of 2

VALVE NO.	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	VALVE CATEGORY B	VALVE CATEGORY C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
1SW-1216	3	E-9			X		1½	RL	--	--	4	RL		
1SW-1203	3	G-3			X		1	CK	--	--	1	FF		
1SW-1231	3	C-8			X		3/4	RL	--	--	4	RL		
1CH-63	3	H-7			X		3/4	RL	--	--	4	RL		
1CH-78	3	F-10			X		3/4	RL	--	--	4	RL		

SHNPP VALVE TEST PROGRAM

SYSTEM: Chilled Water

Dwg. No. (Rev.) 2165-S-999S03

VALVE NO. 1CH-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
551	3	B-1		X			2½	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
564	3	B-5		X			3	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
583	3	B-8		X			3	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
603	3	B-13		X			2½	GA	AO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
616	3	F-5		X			2½	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
630	3	F-8		X			2½	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
643	3	K-1		X			2½	GA	AO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Chilled Water

Dwg. No. (Rev.) 2165-S-999S03

VALVE NO. 1CH-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	ALTERNATE TEST	NOTE NO.
660	3	K-5		X			4	3W	AO	--	1	FS			
											1	FL			
											1	TM			
											5	PI			
680	3	K-9		X			4	3W	AO	--	1	FS			
											1	FL			
											1	TM			
											5	PI			
703	3	K-12		X			2½	3W	EH	--	1	FS			
											1	FL			
											1	TM			
											5	PI			

SYSTEM: Chilled Water

Dwg. No. (Rev.) 2165-S-999S04

VALVE NO. 1CH-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
726	3	B-1		X			3	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
745	3	B-5		X			2½	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
764	3	B-10		X			2½	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
777	3	B-13		X			2½	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
793	3	G-7		X			1½	GA	AO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
807	3	J-1		X			1½	GA	AO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
820	3	J-5		X			2½	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Chilled Water

Dwg. No. (Rev.) 2165-S-999S04

VALVE NO. 1CH-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (Inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
833	3	J-9		X			1	GA	AO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
846	3	J-13		X			1½	3W	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Reactor Coolant (RC)

Dwg. No. (Rev.) 2165-S-1301(0)

VALVE NO. 1RC-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
127	1	F-8			X		6	RL	--	--	4	RL		
125	1	F-6			X		6	RL	--	--	4	RL		
123	1	F-4			X		6	RL	--	--	4	RL		
117	1	E-2		X			3	GA	MO	O	1	FS		
											1	TM		
											5	PI		
115	1	F-2		X			3	GA	MO	O	1	FS		
											1	TM		
											5	PI		
113	1	H-2		X			3	GA	MO	O	1	FS		
											1	TM		
											5	PI		
118	1	E-1		X			3	GL	AO	C	3	FS	R-17	
											3	FL		
											3	TM		
											5	PI		
116	1	F-1		X			3	GL	AO	C	3	FS	R-17	
											3	FL		
											3	TM		
											5	PI		
114	1	H-1		X			3	GL	AO	C	3	FS	R-17	
											3	FL		
											3	TM		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Reactor Coolant (RC) Dwg. No. (Rev.) 2165-S-1301(0)

VALVE NO. 1RC-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
141	2	C-16		X			1	DA	AO	O	1	FS		
											1	FL		
											1	TS		
											6	PI		
144	2	C-17		X			1	DA	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
164	2	D-16			X		3	CK	--	--	3	BS	R-33	
161	2	D-17		X			3	DA	AO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
900	2	B-7		X			1	GL	SD	C	2	FS	R-15	
											2	FL		
											2	TM		
											5	PI		
901	2	B-7		X			1	GL	SD	C	2	FS	R-15	
											2	FL		
											2	TM		
											5	PI		
902	2	B-7		X			1	GL	SD	C	2	FS	R-15	
											2	FL		
											2	TM		
											5	PI		
903	2	A-7		X			1	GL	SD	C	2	FS	R-15	
											2	FL		
											2	TM		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Reactor Coolant (RC)

Dwg. No. (Rev.) 2165-S-1301(0)

VALVE NO. 1RC-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
904	2	A-7		X			1	GL	SD	C	2	FS	R-15	
											2	FL		
											2	TM		
											5	PI		
905	2	A-8		X			1	GL	SD	C	2	FS	R-15	
											2	FL		
											2	TM		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: CVC (CS)

Dwg. No. (Rev.) 2165-S-1303(2)

VALVE NO. 1CS-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
341	2	K-3		X			1½	GL	MO	O	3	FS	R-4	
											3	TS		
											5	PI		
344	2	K-3			X		1½	CK	--	--	3	BS	R-18	
460	1	D-8		X			1	GL	AO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
461	1	D-8		X			1	GL	AO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
470	2	D-17		X			2	GL	MO	O	3	FS	R-4	
											3	TS		
											5	PI		
472	2	D-17		X			2	GL	MO	O	3	FS	R-4	
											3	TS		
											5	PI		
471	2	E-17			X		3/4	CK	--	--	3	FF	R-4	
											3	BS		
1	1	A-3		X			3	GL	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: CVC (CS)

VALVE NO. 1CS-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
2	1	A-4		X			3	GL	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
7	2	B-10		X			2	GL	AO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		
8	2	B-11		X			2	GL	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
9	2	B-12		X			2	GL	AO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		
10	2	A-10			X		2	RL	--	--	4	RL		
11	2	A-17		X			3	GL	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
238	2	B-17		X			3	GA	MO	O	1	FS		
											1	TS		
											5	PI		
477	2	B-16			X		3	CK	--	--	1	FF	R-19	
											3	BS		

SHNPP VALVE TEST PROGRAM

SYSTEM: CVC (CS) Dwg. No. (Rev.) 2165-S-1303(2)

VALVE NO. 1CS-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
467	2	D-16			X		2	RL	--	--	4	RL		
492	2	C-4		X			3	GL	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
497	1	C-3			X		3	CK	--	--	1	FF		
500	1	C-2			X		3	CK	--	--	1	FF		
493	2	C-3			X		3/4	CK	--	--	3	FF	R-34	

SHNPP VALVE TEST PROGRAM

SYSTEM: CVC (CS) Dwg. No. (Rev.) 2165-S-1303 S01(1) Page 1 of 1

VALVE NO. 1CS-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
382	2	K-3		X			1½	GL	MO	O	3	FS	R-4	
											3	TS		
											5	PI		
385	2	K-3			X		1½	CK	--	--	3	BS	R-18	

SYSTEM: CVC (CS)

Dwg. No. (Rev.) 2165-S-1303S02(1) Page 1 of 1

VALVE NO. 1CS-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
423	2	K-3		X			1½	GL	MO	O	3	FS	R-4	
											3	TS		
											5	PI		
426	2	K-3			X		1½	CK	--	--	3	BS	R-18	

SHNPP VALVE TEST PROGRAM

SYSTEM: CVC (CS) Dwg. No. (Rev.) 2165-S-1304(2)

VALVE NO. 1CS-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	VALVE CATEGORY B	VALVE CATEGORY C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
744	2	H-16			X		2	RL	--	--	4	RL		
755	2	I-16			X		2	RL	--	--	4	RL		
746	2	H-17		X			2	GL	MO	C	1	FS		
											1	TM		
											5	PI		
752	2	I-17		X			2	GL	MO	C	1	FS		
											1	TM		
											5	PI		
98	3	J-14		X			3	GL	AO	O	1	FS		
											1	TM		
											1	FL		
											5	PI		
47	2	E-12			X		2	RL	--	--	4	RL		

SHNPP VALVE TEST PROGRAM

SYSTEM: CVC (CS)

Dwg. No. (Rev.) 2165-S-1305(3)

VALVE NO. 1CS-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
165	2	G-11		X			4	GA	MO	O	3	FS	R-5	
											3	TM		
											5	PI		
166	2	G-11		X			4	GA	MO	O	3	FS	R-5	
											3	TM		
											5	PI		
278	2	J-16		X			2	GL	MO	C	1	FS		
											1	TM		
											5	PI		
279	2	J-16			X		2	CK	--	--	3	FF	R-20	
292	2	K-11		X			8	GA	MO	C	1	FS		
											1	TM		
											5	PI		
291	2	I-12		X			8	GA	MO	C	1	FS		
											1	TM		
											5	PI		
170	2	I-11		X			8	GA	MO	O	1	FS		
											1	TM		
											5	PI		
168	2	I-11		X			8	GA	MO	O	1	FS		
											1	TM		
											5	PI		
169	2	J-11		X			8	GA	MO	O	1	FS		
											1	TM		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: CVC (CS)

Dwg. No. (Rev.) 2165-S-1305(3)

VALVE NO. 1CS-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
171	2	J-11		X			8	GA	MO	O	1	FS		
											1	TM		
											5	PI		
294	2	J-14			X		8	CK	--	--	3	FF	R-6	
179	2	H-8			X		2	CK	--	--	1	FF		
											1	BS		
207	2	J-8			X		2	CK	--	--	1	FF		
											1	BS		
193	2	K-8			X		2	CK	--	--	1	FF		
											1	BS		
178	2	H-7			X		3	CK	--	--	1	FF		
											1	BS		
206	2	J-7			X		3	CK	--	--	1	FF		
											1	BS		
192	2	K-7			X		3	CK	--	--	1	FF		
											1	BS		
182	2	G-7		X			2	GL	MO	O	1	FS		
											1	TM		
											5	PI		
210	2	I-7		X			2	GL	MO	O	1	FS		
											1	TM		
											5	PI		
196	2	J-7		X			2	GL	MO	O	1	FS		
											1	TM		
											5	PI		

SYSTEM: CVC (CS)

Dwg. No. (Rev.) 2165-S-1305(3)

VALVE NO. 1CS-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
219	2	I-6		X			4	GA	MO	O	2	FS	R-7	
											2	TM		
											5	PI		
217	2	I-6		X			4	GA	MO	O	2	FS	R-7	
											2	TM		
											5	PI		
218	2	K-6		X			4	GA	MO	O	2	FS	R-7	
											2	TM		
											5	PI		
220	2	K-6		X			4	GA	MO	O	2	FS	R-7	
											2	TM		
											5	PI		
235	2	H-2		X			3	GA	MO	O	1	FS		
											1	TM		
											5	PI		
290	2	J-12			X		3/4	RL	--	--	4	RL		
293	2	K-12			X		3/4	RL	--	--	4	RL		
167	2	G-11			X		4	CK	--	--	1	FF		
214	2	F-4		X			3	GA	MO	O	1	FS		
											1	TM		
											5	PI		
310	2	E-3			X		2	RL	--	--	4	RL		
127	2	C-10			X		3	RL	--	--	4	RL		

SHNPP VALVE TEST PROGRAM

SYSTEM: CVC (CS)

Dwg. No. (Rev.) 2165-S-1305(3)

VALVE NO. 1CS-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
231	2	H-4		X			3	GL	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
151	3	F-15		X			2	GL	AO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: CVC (CS)

Dwg. No. (Rev.) 2165-S-1306

VALVE NO. 1CS-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	VALVE CATEGORY B	VALVE CATEGORY C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
570	3	B-5		X			3	DA	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
662	3	D-3		X			3	DA	AO	--	1	FS		
											1	FL		
											1	TM		
											5	PI		
601	3	F-17			X		3/4	RL	--	--	4	RL		

S1

SHNPP VALVE TEST PROGRAM

SYSTEM: CVC (CS)

Dwg. No. (Rev.) 2165-S-1307(1) Page 1 of 1

VALVE NO. 1CS-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (Inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
536	3	E-7			X		2	CK	--	--	1	FF		
											3	BS		
546	3	G-7			X		2	CK	--	--	1	FF		
											3	BS		
559	3	E-4		X			2	PG	PO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
563	3	E-2		X			2	PG	PO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		

OSI

SHNPP VALVE TEST PROGRAM

SYSTEM: Safety Injection (SI)

Dwg. No. (Rev.) 2165-S-1308(1)

VALVE NO. 1SI-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	VALVE CATEGORY B	VALVE CATEGORY C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
3	2	F-2		X			3	GA	MO	C	1 1 5	FS TS PI		
4	2	F-3		X			3	GA	MO	C	1 1 5	FS TS PI		
8	1	D-3			X		2	CK	--	--	3	FF	R-32	
9	1	D-4			X		2	CK	--	--	3	FF	R-32	
10	1	D-5			X		2	CK	--	--	3	FF	R-32	
81	1	B-3			X		6	CK	--	--	3	FF	R-32	
82	1	C-3			X		6	CK	--	--	3	FF	R-32	
83	1	D-3			X		6	CK	--	--	3	FF	R-32	
86	2	F-12		X			3	GA	MO	C	3 3 5	FS TM PI	R-8	
104	1	D-12			X		2	CK	--	--	3	FF	R-32	
105	1	D-13			X		2	CK	--	--	3	FF	R-32	
106	1	D-14			X		2	CK	--	--	3	FF	R-32	
134	1	B-11	X		X		6	CK	--	--	2 5	FF LK	R-9	
135	1	C-11	X		X		6	CK	--	--	2 5	FF LK	R-9	

SHNPP VALVE TEST PROGRAM

SYSTEM: Safety Injection (SI), Dwg. No. (Rev.) 2165-S-1308(1)

VALVE NO. 1SI-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
136	1	B-17			X		6	CK	--	--	3	FF	R-32	
137	1	C-17			X		6	CK	--	--	3	FF	R-32	
138	1	D-17			X		6	CK	--	--	3	FF	R-32	
107	2	F-14		X			3	GA	MO	C	3 3 5	FS TM PI	R-8	
127	1	D-15			X		2	CK	--	--	3	FF	R-32	
128	1	D-15			X		2	CK	--	--	3	FF	R-32	
129	1	D-16			X		2	CK	--	--	3	FF	R-32	
52	2	F-11		X			3	GA	MO	C	3 3 5	FS TM PI	R-8	
72	1	D-6			X		2	CK	--	--	3	FF	R-32	
73	1	D-7			X		2	CK	--	--	3	FF	R-32	
74	1	D-8			X		2	CK	--	--	3	FF	R-32	
1	2	M-5		X			3	GA	MO	C	1 1 5	FS TM PI		
2	2	N-5		X			3	GA	MO	C	1 1 5	FS TM PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Safety Injection (SI)

Dwg. No. (Rev.) 2165-S-1309(2)

VALVE NO. 1SI	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
250	1	D-3	X		X		12	CK	--	--	2 5	FF LK	R-14	
252	1	G-3	X		X		12	CK	--	--	2 5	FF LK	R-14	
254	1	J-3	X		X		12	CK	--	--	2 5	FF LK	R-14	
249	1	D-5	X		X		12	CK	--	--	2 5	FF LK	R-14	
251	1	G-5	X		X		12	CK	--	--	2 5	FF LK	R-14	
253	1	J-5	X		X		12	CK	--	--	2 5	FF LK	R-14	
225	2	B-12			X		1	RL	--	--	4	RL		
226	2	E-12			X		1	RL	--	--	4	RL		
227	2	H-12			X		1	RL	--	--	4	RL		
264	2	D-4		X			3/4	GL	AO	C	1 1 1 5	FS FL TS PI		
263	2	D-4		X			3/4	GL	AO	C	1 1 1 5	FS FL TS PI		
182	2	J-16			X		1	CK	--	--	3	BS	R-33	

SHNPP VALVE TEST PROGRAM

SYSTEM: Safety Injection (SI) Dwg. No. (Rev.) 2165-S-1309(2)

VALVE NO. 1SI-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
179	2	J-17		X			1	GL	AO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		
290	2	C-16			X		1	CK	--	--	3	BS	R-33	
287	2	C-17		X			1	GL	AO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		

VALVE NO. 1SI-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
301	2	M-6		X			14	GA	MO	C	1	FS		
											1	TM		
											5	PI		
300	2	N-6		X			14	GA	MO	C	1	FS		
											1	TM		
											5	PI		
311	2	M-7		X			14	GA	MO	C	1	FS		
											1	TM		
											5	PI		
310	2	N-7		X			14	GA	MO	C	1	FS		
											1	TM		
											5	PI		
323	2	M-10		X			14	GA	MO	O	1	FS		
											1	TM		
											5	PI		
322	2	N-10		X			14	GA	MO	O	1	FS		
											1	TM		
											5	PI		
321	2	M-12			X		14	CK	--	--	1	FF		
320	2	N-12			X		14	CK	--	--	1	FF		
329	2	E-4			X		3/4	RL	--	--	4	RL		
328	2	B-4			X		3/4	RL	--	--	4	RL		
327	2	E-5		X			10	GA	MO	O	1	FS		
											1	TM		
											5	PI		

SYSTEM: Safety Injection (SI)

Dwg. No. (Rev.) 2165-S-1310(2)

VALVE NO. 1SI-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
326	2	D-5		X			10	GA	MO	O	1 1 5	FS TM PI		
359	2	B-3		X			10	GA	MO	C	1 1 5	FS TM PI		
341	2	F-4		X			10	GA	MO	O	1 1 5	FS TM PI		
340	2	C-4		X			10	GA	MO	O	1 1 5	FS TM PI		
347	2	F-3	X		X		10	CK	--	--	2 5	FF LK	R-9	
346	2	C-3	X		X		10	CK	--	--	2 5	FF LK	R-9	
356	1	C-1	X		X		6	CK	--	--	2 5	FF LK	R-9	
357	1	E-1	X		X		6	CK	--	--	2 5	FF LK	R-9	
358	1	F-1	X		X		6	CK	--	--	2 5	FF LK	R-9	
330	2	B-5			X		3/4	RL	--	--	4	RL		

SHNPP VALVE TEST PROGRAM

SYSTEM: Containment - Waste Processing

Dwg. No. (Rev.) 2165-S-1313(2)

VALVE NO: 1ED-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
164	2	E-6		X			3/4	DA	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
161	2	C-7		X			3/4	DA	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
125	2	D-16		X			3	DA	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
121	2	E-16		X			3	GL	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		

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SHNPP VALVE TEST PROGRAM

SYSTEM: Component Cooling Water (CC) Dwg. No. (Rev.) 2165-S-1319(0) Page 1 of 2

VALVE NO. 1CC-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
33	3	E-8			X		18	CK	--	--	1	FF		
											1	BS		
64	3	H-8			X		18	CK	--	--	1	FF		
											1	BS		
50	3	K-8			X		18	CK	--	--	1	FF		
											1	BS		
99	3	F-17		X			18	BF	MO	O	1	FS		
											1	TM		
											5	PI		
113	3	G-17		X			18	BF	MO	O	1	FS		
											1	TM		
											5	PI		
3	3	C-3			X		3	RL	--	--	4	RL		
128	3	G-3		X			18	BF	MO	O	1	FS		
											1	TM		
											5	PI		
127	3	H-3		X			18	BF	MO	O	1	FS		
											1	TM		
											5	PI		
29	3	G-4			X		3/4	RL	--	--	4	RL		
114	3	G-18		X			4	DA	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		

SYSTEM: Component Cooling Water (CC)

Dwg. No. (Rev.) 2165-S-1319(0)

VALVE NO. 1CC-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
115	3	F-18		X			4	DA	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
118	3	H-1			X		4	CK	--	--	1	BS	R-22	
119	3	I-1			X		4	CK	--	--	1	BS	R-22	

OSI

SHNPP VALVE TEST PROGRAM

SYSTEM: Component Cooling Water (CC)

Dwg. No. (Rev.) 2165-S-1320(0)

VALVE NO. 1CC-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
147	3	A-7		X			12	GA	MO	C	1 1 5	FS TM PI		
167	3	L-7		X			12	GA	MO	C	1 1 5	FS TM PI		
145	3	B-8			X		1	RL	--	--	4	RL		
165	3	L-8			X		1	RL	--	--	4	RL		

SHNPP VALVE TEST PROGRAM

SYSTEM: Component Cooling Water (CC)

Dwg. No. (Rev.) 2165-S-1321(1)

VALVE NO. 1CC-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
176	2	D-3		X			6	GA	MO	O	1	FS		
											1	TS		
											5	PI		
202	2	B-10		X			6	GA	MO	O	1	FS		
										1	TS			
											5	PI		
208	2	F-1		X			6	GA	MO	O	3	FS	R-10	
											3	TS		
											5	PI		
211	2	F-1			X		6	CK	--	--	3	BS	R-13	
294	3	F-12			X		3	RL	--	--	4	RL		
297	2	E-12		X			6	GA	MO	O	3	FS	R-10	
											3	TS		
											5	PI		
298	2	F-13			X		3/4	CK	--	--	3	FF	R-29	
											3	BS		
299	2	E-13		X			6	GA	MO	O	3	FS	R-10	
											3	TS		
											5	PI		
249	2	E-15		X			4	GA	MO	O	3	FS	R-10	
											3	TS		
											5	PI		
250	2	F-16			X		3/4	CK	--	--	3	FF	R-29	
											3	BS		

SHNPP VALVE TEST PROGRAM

SYSTEM: Component Cooling Water (CC) Dwg. No. (Rev.) 2165-S-1321(1)

VALVE NO. 1CS-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
251	2	E-15		X			4	GA	MO	O	3 3 5	FS TS PI	R-10	
207	2	E-1		X			6	GA	MO	O	3 3 5	FS TS PI	R-10	
186	2	D-8			X		3/4	RL	--	--	4	RL		
194	2	E-8			X		3	RL	--	--	4	RL		
219	3	N-4			X		3/4	RL	--	--	4	RL		
230	3	N-8			X		3/4	RL	--	--	4	RL		
241	3	N-11			X		3/4	RL	--	--	4	RL		
215	3	N-1			X		2	CK	--	--	3	BS	R-13	
216	3	N-2			X		2	CK	--	--	3	BS	R-13	
226	3	N-3			X		2	CK	--	--	3	BS	R-13	
227	3	N-5			X		2	CK	--	--	3	BS	R-13	
237	3	N-9			X		2	CK	--	--	3	BS	R-13	
238	3	N-9			X		2	CK	--	--	3	BS	R-13	
252	2	D-15		X			4	GA	MO	O	3 3 5	FS TM PI	R-10	

SHNPP VALVE TEST PROGRAM

SYSTEM: Component Cooling Water (CC)

Dwg. No.(Rev.) 2165-S-1322(0)

VALVE NO. 1CC-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	VALVE CATEGORY B	VALVE CATEGORY C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
304	3	A-6		X			3/4	DA	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
305	3	A-6		X			3/4	DA	AO	O	1	FS		
											1	FL		
											1	TM		
											5	PI		
313	3	E-5			X		3/4	RL	--	--	4	RL		
322	3	J-2			X		3/4	RL	--	--	4	RL		
335	3	J-4			X		3/4	RL	--	--	4	RL		
352	3	J-8			X		3/4	RL	--	--	4	RL		
355	3	J-10			X		3/4	RL	--	--	4	RL		
362	3	J-12			X		3/4	RL	--	--	4	RL		
306	3	C-6			X		3/4	CK	--	--	3	BS	R-22	
307	3	D-6			X		3/4	CK	--	--	3	BS	R-22	

SHNPP VALVE TEST PROGRAM

SYSTEM: Component Cooling Water (CC)

VALVE NO. 1CC-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	VALVE CATEGORY B	VALVE CATEGORY C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
381	3	G-3			X		3/4	RL	--	--	4	RL		
397	3	D-6			X		3/4	RL	--	--	4	RL		
486	3	G-10			X		3/4	RL	--	--	4	RL		
472	3	D-14			X		3/4	RL	--	--	4	RL		

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SHNPP VALVE TEST PROGRAM

SYSTEM: Residual Heat Removal (RH)

Dwg. No. (Rev.) - 2165-S-1324(2)

VALVE NO. 1RH-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
39	1	I-3	X			X	12	GA	MO	C	2 2 5 5	FS TM PI LK	R-12	
40	1	I-4	X			X	12	GA	MO	C	2 2 5 5	FS TM PI LK	R-12	
1	1	L-3	X			X	12	GA	MO	C	2 2 5 5	FS TM PI LK	R-12	
2	1	L-4	X			X	12	GA	MO	C	2 2 5 5	FS TM PI LK	R-12	
45	2	H-6			X		3	RL	--	--	4	RL		
7	2	K-6			X		3	RL	--	--	4	RL		
20	2	D-11		X			8	BF	AO	O	1 1 1 5	FS FL TM PI		
58	2	G-13		X			8	BF	AO	O	1 1 1 5	FS FL TM PI		

OSI

SHNPP VALVE TEST PROGRAM

SYSTEM: Residual Heat Removal (RH)

Dwg. No. (Rev.) 2165-S-1324(2)

VALVE NO. 1CS-	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
63	2	F-12		X			8	GA	MO	C	1	FS		
											1	TM		
											5	PI		
25	2	D-12		X			8	GA	MO	C	1	FS		
											1	TM		
											5	PI		
66	2	E-11		X			10	BF	AO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
30	2	C-11		X			10	BF	AO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
70	2	E-8			X		10	CK	--	--	1	FF		
											1	BS		
34	2	C-7			X		10	CK	--	--	1	FF		
											1	BS		
31	2	H-7		X			3	GA	MO	O	1	FS		
											1	TM		
											5	PI		
69	2	H-8		X			3	GA	MO	O	1	FS		
											1	TM		
											5	PI		
120	2	I-4			X		3/4	RL	--	--	4	RL		
121	2	L-4			X		3/4	RL	--	--	4	RL		

SHNPP VALVE TEST PROGRAM

SYSTEM: Containment-HVAC

Dwg. No. (Rev.) 2168-G-517 (5)

VALVE NO.	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
CM-B5	2	E-3		X			3	BF	AO	C	1	FS		
											1	FL		
											1	TM		
											5	PI		
CP-B5	2	I-3		X			8	BF	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
CP-B6	2	I-2		X			8	BF	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
CP-B7	2	H-3		X			42	BF	AO	LC	2	FS	R-27	
											2	FL		
											2	TS		
											5	PI		
CP-B8	2	H-2		X			42	BF	AO	LC	2	FS	R-27	
											2	FL		
											2	TS		
											5	PI		
CP-B1	2	J-3		X			8	BF	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		
CP-B2	2	J-3		X			8	BF	AO	O	1	FS		
											1	FL		
											1	TS		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Containment-HVAC

Dwg. No. (Rev.) 2168-G-517 (5)

VALVE NO.	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
CP-B3	2	K-3		X			42	BF	AO	LC	2	FS	R-27	
											2	FL		
											2	TS		
											5	PI		
CP-B4	2	K-2		X			42	BF	AO	LC	2	FS	R-27	
											2	FL		
											2	TS		
											5	PI		
CB-V1	2	L-3			X		24	CK	--	--	3	FF	R-1	
											3	BS		
CB-B1	2	L-2		X			24	BF	AO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		
CB-V2	2	M-3			X		24	CK	--	--	3	FF	R-1	
											3	BS		
CB-B2	2	M-2		X			24	BF	AO	C	1	FS		
											1	FL		
											1	TS		
											5	PI		
CM-V1	2	N-3			X		3	CK	--	--	3	FF	R-1	
											3	BS		

SYSTEM: Auxiliary Bldg. HVAC

Dwg. No. (Rev.) 2168-G-517S03

VALVE NO.	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
3AV-B1	3	F-14		X			20	BF	MO	C	1	FS		
											1	TM		
											5	PI		
3AV-B2	3	F-17		X			20	BF	MO	C	1	FS		
											1	TM		
											5	PI		
3AV-B3	3	E-14		X			6	BF	MO	C	1	FS		
											1	TM		
3AV-B4	3	F-14		X			20	BF	MO	C	1	FS		
											1	TM		
											5	PI		
3AV-B5	3	F-17		X			20	BF	MO	C	1	FS		
											1	TM		
											5	PI		
3AV-B6	3	G-14		X			6	BF	MO	C	1	FS		
											1	TM		
3AV-V3	3	E-14			X		6	CK	--	--	1	FF		
3AV-V4	3	G-14			X		6	CK	--	--	1	FF		

SHNPP VALVE TEST PROGRAM

SYSTEM: Control Room HVAC

Dwg. No. (Rev.) 2168-G-517S04

VALVE NO.	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	VALVE CATEGORY B	VALVE CATEGORY C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
3CZ-B17	3	G-2		X			36	BF	MO	C	1	FS		
											1	TM		
											5	PI		
3CZ-B18	3	G-2		X			36	BF	MO	C	1	FS		
											1	TM		
											5	PI		
3CZ-B1	3	H-2		X			16	BF	MO	O	1	FS		
											1	TM		
											5	PI		
3CZ-B2	3	H-2		X			16	BF	MO	O	1	FS		
											1	TM		
											5	PI		
3CZ-B25	3	G-4		X			36	BF	MO	O	1	FS		
											1	TM		
3CZ-B26	3	H-4		X			36	BF	MO	C	1	FS		
											1	TM		
3CZ-B3	3	E-2		X			12	BF	MO	O	1	FS		
											1	TM		
											5	PI		
3CZ-B4	3	E-2		X			12	BF	MO	O	1	FS		
											1	TM		
											5	PI		
3CZ-B13	3	B-4		X			30	BF	MO	C	1	FS		
											1	TM		
											5	PI		
3CZ-B14	3	B-4		X			30	BF	MO	C	1	FS		
											1	TM		
											5	PI		
3CZ-B9	3	N-5		X			12	BF	MO	C	1	FS		
											1	TM		
											5	PI		
3CZ-B10	3	N-5		X			12	BF	MO	C	1	FS		
											1	TM		
											5	PI		

SYSTEM: Control Room HVAC

VALVE NO.	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (Inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
3CZ-B11	3	N-11		X			12	BF	MO	C	1	FS		
											1	TM		
											5	PI		
3CZ-B12	3	N-11		X			12	BF	MO	C	1	FS		
											1	TM		
											5	PI		
3CZ-B23	3	L-6		X			20	BF	MO	C	1	FS		
											1	TM		
											5	PI		
3CZ-B21	3	K-6		X			20	BF	MO	C	1	FS		
											1	TM		
											5	PI		
3CZ-B24	3	L-7		X			20	BF	MO	C	1	FS		
											1	TM		
											5	PI		
3CZ-B22	3	L-6		X			20	BF	MO	C	1	FS		
											1	TM		
											5	PI		
3CZ-B19	3	H-7		X			20	BF	MO	C	1	FS		
											1	TM		
											5	PI		
3CZ-B20	3	H-8		X			20	BF	MO	C	1	FS		
											1	TM		
											5	PI		
3CZ-V1	3	L-7		X			6	CK	--	--	1	FF		
3CZ-V2	3	L-7		X			6	CK	--	--	1	FF		

SHNPP VALVE TEST PROGRAM

SYSTEM: Switchgear & Protection Room HVAC

Dwg. No. (Rev.) 2168-G-517S05

VALVE NO.	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	VALVE CATEGORY B	VALVE CATEGORY C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
3CZ-B5	3	L-3		X			12	BF	MO	O	1	FS		
											1	TM		
											5	PI		
3CZ-B6	3	L-3		X			12	BF	MO	O	1	FS		
											1	TM		
											5	PI		
3CZ-B7	3	K-10		X			12	BF	MO	O	1	FS		
											1	TM		
											5	PI		
3CZ-B8	3	K-9		X			12	BF	MO	O	1	FS		
											1	TM		
											5	PI		

SHNPP VALVE TEST PROGRAM

SYSTEM: Fuel Handling Bldg. HVAC

Dwg. No. (Rev.) 2168-G-533(7)

VALVE NO.	SECTION XI CLASS	DRAWING COORDINATES	VALVE CATEGORY A	B	C	PASSIVE	SIZE (inches)	VALVE TYPE	ACTUATOR TYPE	NORMAL POSITION	TEST FREQUENCY	REQUIRED TEST	RELIEF REQUEST	NOTE NO.
3FV-B2	3	G-14		X			24	BF	MO	C	1	FS		
											1	TM		
											5	PI		
3FV-B4	3	F-14		X			24	BF	MO	C	1	FS		
											1	TM		
											5	PI		

Relief Request: R-1
Valves: CB-V1, CB-V2, 1CT-53, 1CT-91, CM-V1

Category: C
Class: 2
Function: Containment Spray (CT), Containment Vacuum Relief (CB), and Containment Hydrogen Purge Makeup

Test Requirement: Demonstrate operability by performing forward flow and backseat tests quarterly.

Basis for Relief: These check valves cannot be tested with system fluid flow through the valves. Entrance must be made into Containment to test the valves. Entry into Containment quarterly to perform these tests would result in personnel radiation exposure that is not in compliance with requirements of the NRC mandated ALARA Program. As these valves sole function is to mitigate the consequences of an accident, and are not in contact with any process liquid, it is not expected that their mechanical condition will degrade from test to test.

Alternate Test: Demonstrate operability by performing forward flow and backseat tests at refueling.

Relief Request: R-2
Valves: 1MS-80, 82, 84

Category: B
Class: 2
Function: Main Steam Isolation Valves (MSIV)

Test Requirement: Exercise for operability; observe proper operation of fail-safe mechanism; and measure stroke time quarterly.

Basis for Relief: Cycling these valves during normal operation results in a loss of main steam to the turbine, causing a reactor trip.

Alternate Test: Exercise valve for operability; observe proper operation of fail-safe mechanism; and measure stroke time during cold shutdown. Partial stroke valve during normal operation in accordance with Technical Specification at least quarterly.

Relief Request: R-3
Valves: 1FW-159, 217, 277

Category: B
Class: 2
Function: Main Feedwater Isolation Valves (MFIV)

Test Requirement: Exercise for operability; observe proper operation of fail-safe actuator; and measure stroke time quarterly.

Basis for Relief: Cycling these valves during normal operation results in a loss of feedwater to the steam generators, causing a reactor trip.

Alternate Test: Exercise valve for operability; observe proper operation of fail-safe actuator; and measure stroke time during cold shutdown. Partial stroke during normal operation at least quarterly.

Relief Request: R-4
Valves: 1CS-341, 382, 423, 470, 471, 472

Category: B, C
Class: 2
Function: Reactor Coolant Pump Seal Water Lines

Test Requirement: Exercise for operability and measure stroke time quarterly for the motor operated valves, and perform forward flow and backseat tests quarterly for the check valve.

Basis for Relief: Cycling these valves during normal operation or cold shutdown results in loss of normal seal water flow through the reactor coolant pump seals, resulting in possible damage to the seals.

Alternate Test: Exercise for operability and measure stroke time at refueling for the motor operated valves, and perform forward flow and backseat tests at refueling for the check valve.

Relief Request: R-5
Valves: 1CS-165, 166

Category: B
Class: 3
Function: Isolate Volume Control Tank on Safety Injection Signal

Test Requirement: Exercise for operability and measure stroke time quarterly.

Basis for Relief: These valves cannot be cycled during normal operation because of the loss of normal charging source of borated water (the volume control tank). Aligning charging pumps to alternate source of water would either cause uncontrolled boration or dilution of the reactor coolant system. In addition, testing during normal operation or at cold shutdown with a CSIP in operation could result in loss of RCP seal injection and CSIP damage if both the VCT and RWST supply valves were inadvertently closed.

Alternate Test: Exercise for operability and measure stroke time at refueling.

Relief Request: R-6
Valves: 1CS-294

Category: C
Class: 2
Function: Supply Water from Refueling Water Storage Tank to Suction of High-Head Safety Injection Pumps.

Test Requirement: Demonstrate operability by performing a forward flow test quarterly.

Basis for Relief: This valve cannot be tested during normal operation because the charging pumps would be taking suction from the refueling water storage tank to test the valve. This operation would cause an uncontrolled boration of the reactor coolant system.

Alternate Test: Demonstrate operability by performing a forward flow test at refueling.

Relief Request: R-7
Valves: 1CS-218, 217, 219, 220

Category: B
Class: 2
Function: Isolate High-Head Safety Injection System Headers During the Long-Term Recirculation Phase After a LOCA.

Test Requirement: Exercise for operability and measure stroke time quarterly.

Basis for Relief: These valves cannot be cycled during normal operation because cycling them would cause loss of seal injection to RCP and safety injection from pumps A & C to high head safety injection. Loss of seal injection to the reactor coolant pumps will cause degradation of pump seals.

Alternate Test: Valves will be exercised at cold shutdown. Partial stroking is precluded by valve design.

Relief Request: R-8
Valves: 1SI-52, 86, 107

Category: B
Class: 2
Function: High head safety injection isolation valves

Test Requirement: Exercise valve for operability and measure stroke time quarterly.

Basis for Relief: Cycling these valves during normal operation or cold shutdown would cause RCS injection flow to bypass the regenerative heat exchanger, thereby thermally shocking the RCS piping and causing an overtemperature condition in the letdown line. During cold shutdown with the RCS solid, a cold overpressurization event could occur.

Alternate Test: Exercise valve for operability and measure stroke time at refueling.

Relief Request: R-9
Valves: 1SI-134, 135, 346, 347, 356, 357, 358

Category: C
Class: 1, 2
Function: Safety Injection

Test Requirement:	Demonstrate operability by performing a forward flow test quarterly.
Basis for Relief:	These check valves cannot be tested during normal operation because RC system pressure is greater than RHR system pressure, and flow cannot be established through these valves.
Alternate Test:	Demonstrate operability by performing a forward flow test at cold shutdown.

Relief Request: R-10
Valves: 1CC-208, 249, 251, 297, 299, 207, 252

Category: B, C
Class: 2
Function: Isolate Component Cooling Water to RCP's

Test Requirement: Exercise for operability and measure stroke time quarterly.

Basis for Relief: Cooling water cannot be isolated to the RCP's during normal operation nor at cold shutdown, as one or more RCP is running while in cold shutdown and RC temperature above 140°F.

Alternate Test: Exercise for operability and measure stroke time at refueling.

Relief Request: R-11
Valves: 1FW-307, 319, 313

Category: B
Class: 2
Function: Feedwater Isolation Valve Bypass Isolation

Test Requirement: Exercise valve for operability, observe proper operation of fail-safe mechanism, and measure stroke time quaterly.

Basis for Relief: Feedwater system control interlocks prevent opening these valves during normal operation above approximately 15 percent power. When operating below 15 percent power, cycling these valves could result in feedwater flow control instability.

Alternate Test: Exercise valve for operability, observe proper operation of fail-safe mechanism, and measure stroke time during cold shutdown. Partial stroking is precluded by valve design.

Relief Request: R-12
Valves: 1RH-1, 2, 39, 40

Category: A
Class: 1
Function: RHR Suction from RCS Hot Legs Isolation

Test Requirement:	Exercise valve for operability and measure stroke time quarterly.
Basis for Relief:	These valves are equipped with protective interlocks to prevent them from being opened during normal operation. This would result in a loss of reactor coolant and overpressurization of the RHR system.
Alternate Test:	Exercise valve for operability and measure stroke time during cold shutdown.

Relief Request: R-13
Valves: 1CC-211, 215, 216, 226, 227, 237, 238

Category: C
Class: 2, 3
Function: Component Cooling Water Check Valves

Test Requirement:	Demonstrate operability by performing a backseat test quarterly.
Basis for Relief:	Cooling water cannot be interrupted to the RCP's during normal operation nor at cold shutdown, since one or more RCP may be running during cold shutdown. In addition, due to system design, six of these valves can only be tested in pairs as follows: 1CC-215 & 216, 1CC-266 & 277, 1CC-237 & 238.
Alternate Test:	Demonstrate operability by performing a backseat test at refueling.

Relief Request: R-14
Valves: 1SI-249, 250, 251, 252, 253, 254

Category: A/C
Class: 1
Function: Accumulator Check Valves

Test Requirement: Demonstrate operability by performing a forward flow test quarterly.

Basis for Relief: The pressure differential across these valves during normal operation prevents them from being tested quarterly.

Alternate Test: Demonstrate operability by performing a forward flow test at cold shutdown.

Relief Request: R-15
Valves: 1RC-900, -901, -902, -903, -904, -905

Category: B
Class: 2
Function: RCS Vent Valves

Test Requirement: Exercise valve for operability, observe proper operation of fail-safe actuators, and measure stroke time quarterly.

Basis for Relief: Testing these valves during operation could cause an uncontrolled loss of reactor coolant if one of the valves were to leak or fail to reclose. For added safety, these valves will be tested at cold shutdown.

Alternate Test: Exercise valve for operability, observe proper operation of fail-safe actuators, and measure stroke time at cold shutdown.

Relief Request: R-16
Valves: All valves tested at cold shutdown

Category: A, B, C or A/C
Class: 1, 2, or 3
Function: Various

Test Requirement: Test all valves with cold shutdown test frequencies at each cold shutdown unless it has been less than three months since the last cold shutdown test.

Basis for Relief: Testing all valves with cold shutdown would have a severe impact on plant availability. Substantial generating capacity would be lost in those instances where only a brief shutdown is necessary for minor repairs. Operational readiness of these valves is maintained, and the impact on plant availability is minimized by allowing the first 48 hours of a cold shutdown to pass before valve testing is commenced. In addition, once the conditions have been established for plant heatup, valve testing will stop and plant heatup will proceed. This prevents the plant from being held in cold shutdown for valve testing alone.

Alternate Test: Test all valves with cold shutdown test frequencies at each cold shutdown unless: (1) it has been less than three months since the last cold shutdown test, or (2) the cold shutdown has lasted for less than 48 hours, or (3) valve testing is the only thing preventing going above cold shutdown.

Relief Request: R-17
Valves: 1RC-114, 116, 118

Category: B
Class: 1
Function Pressurizer Power Operated Relief Valves

Test Requirement: Exercise valve for operability, demonstrate proper operation of fail-safe actuators, and measure stroke time quarterly.

Basis for Relief: Cycling these valves during normal operation would increase the possibility of a self-imposed plant transient. An uncontrolled loss of reactor coolant could result if: 1) a PORV were to fail to reseat following a test or 2) a PORV block valve were to fail to provide adequate pressure isolation. The added confidence in valve operability afforded by quarterly testing during normal operation does not justify the increased possibility of a serious self-imposed transient. At cold shutdown, testing is not possible because of Tech Spec requirements to have two PORV's operable for cold overpressure protection.

Alternate Test: Exercise valve for operability, demonstrate proper operation of fail-safe actuators, and measure stroke time at cold shutdown.

Relief Request: R-18
Valves: 1CS-344, 385, 426

Category: C
Class: 2
Function Reactor Coolant Pump seal injection check valves

Test Requirement: Exercise valve for operability by performing a backseat test quarterly.

Basis for Relief: Performing a backseat test on these valves during normal operation or cold shutdown requires interruption of flow to the reactor coolant pump seals, resulting in possible damage to the seals.

Alternate Test: Exercise valve for operability by performing a backseat test at refueling.

Relief Request: R-19
Valve: 1CS-477

Category: C
Class: 2
Function: Normal charging line check valve

Test Requirement: Exercise valve for operability by performing a backseat test quarterly.

Basis for Relief: A backseat test on this valve requires isolation of normal charging and installation of test equipment. Performance of this test during normal operation would result in the loss of charging flow for an unacceptably long period of time. Also, performance of this test during cold shutdown with the RCS solid would create RCS pressure control problems.

Alternate Test: Exercise valve for operability by performing a backseat test at refueling.

Relief Request: R-20
Valve: 1CS-279

Category: C
Class: 2
Function: Emergency boration check valve

Test Requirement: Exercise valve for operability by performing a forward flow test quarterly.

Basis for Relief: Verification of boric acid flow through this valve during normal operation would result in an excessive boration of the RCS, and a test at cold shutdown would result in highly concentrated boric acid being injected through the reactor coolant pump seals thus, increasing the possibility of seal failure. This valve will be tested at refueling when the impact on primary system boron concentration and on plant equipment is minimized.

Alternate Test: Exercise valve for operability by performing a forward flow test at refueling.

Relief Request: R-21
Valve: 1SW-50

Category: C
Class: 3
Function: Check valve in normal service water supply to ESW

Test Requirement: Perform a backseat test quarterly.

Basis for Relief: Backseat testing of this valve cannot be performed during normal operation since isolation of normal service water would be required. NSW supplies cooling to various secondary plant components, and without it, a prompt plant shutdown is necessary.

Alternate Test: Perform a backseat test at refueling.

Relief Request: R-22
Valves: 1CC-118, 119, 306, 307

Category: C
Class: 3
Function: CCW check valves from sample panel and gross failed fuel detector

Test Requirement: Demonstrate operability by performing a backseat test quarterly.

Basis for Relief: Due to system design, these valves cannot be individually tested. However, a test of the valves as pairs is adequate to demonstrate their ability to isolate safety and non-safety portions of the CCW system. The test will prove that the valves prevent back flow of CCW. If the valves should fail the test, then both valves will receive inspection and if necessary corrective maintenance.

Alternate Test: Demonstrate operability by performing a backseat test of the valves as pairs quarterly.

Relief Request: R-23
Valves: 1IA-216, 220

Category: B, C
Class: 2
Function: Instrument air containment isolation valves

Test Requirement: Exercise for operability, demonstrate proper operation of fail-safe actuators, and measure stroke time quarterly for the power operated valve; and demonstrate operability by performing a backseat test quarterly for the check valve.

Basis for Relief: Testing these valves results in temporary loss of instrument air to containment. Air operated valves inside containment that are not equipped with backup accumulators could not be operated. This would result in a serious self-imposed transient. Adequate assurance that these valves will function properly is maintained by testing at refueling when the impact on plant operation is least.

Alternate Test: Exercise for operability, demonstrate proper operation of fail-safe actuators, and measure stroke time at refueling for the power operated valve, and demonstrate operability by performing a backseat test at refueling for the check valve.

Relief Request: R-24
Valves: 1AF-64, 102, 81

Category: B
Class: 2
Function: Steam generator preheater bypass valves

Test Requirement: Exercise valve for operability, demonstrate proper operation of fail-safe actuators, and measure stroke time quarterly.

Basis for Relief: At 100% power, these valves carry 18% of total feedwater flow. Cycling them during operation would result in partial loss of feedwater to the steam generators.

Alternate Test: Exercise valve for operability, demonstrate proper operation of fail-safe actuators, and measure stroke time at cold shutdown.

Relief Request: R-25
Valves: 1MS-58, 60, 62

Category: B
Class: 2
Function: Main steam power operated relief valves.

Test Requirement: Exercise valve for operability, demonstrate proper operation of fail-safe actuators, and measure stroke time quarterly.

Basis for Relief: Testing these valves during normal operation would cause an increase in secondary system steam demand resulting in a serious self-imposed plant transient.

Alternate Test: Exercise valve for operability, demonstrate proper operation of fail-safe actuators, and measure stroke time at cold shutdown.

Relief Request: R-26
Valves: 1SW-231, 233, 240, 242

Category: B, C
Class: 2
Function: Fan coil units normal service water containment isolation valves

Test Requirement: Exercise for operability, demonstrate proper operation of fail-safe actuators, and measure stroke time quarterly for the power operated valves; and demonstrate operability by performing a backseat test quarterly for the check valve.

Basis for Relief: Normally all three containment fan coil units are in operation along with a portion of the containment fan coolers to maintain containment temperature below Tech Spec limits. Testing these valves during normal operation would result in loss of cooling water to the fan coil units resulting in reduced cooling capacity. Not only would the margin to the Tech Spec temperature limit be reduced, the loss of cooling to areas containing important components, such as RCP's, could lead to their premature failure.

Alternate Test: Exercise for operability, demonstrate proper operation of fail-safe actuators, and measure stroke time at refueling for the power operated valves; and demonstrate operability by performing a backseat test at refueling for the check valve..

Relief Request: R-27
Valves: CP-B7, -B8, -B3, -B4

Category: B
Class: 2
Function: Normal containment purge and pre entry purge isolation valves

Test Requirement: Exercise for operability, demonstrate proper operation of fail-safe actuators, and measure stroke time quarterly.

Basis for Relief: These valves are locked closed during normal operation and therefore cannot be tested until cold shutdown.

Alternate Test: Exercise for operability, demonstrate proper operation of fail-safe actuators, and measure stroke time at cold shutdown.

Relief Request: R-28
Valves: 1FW-133, 191, 249, 140, 198, 256

Category: B
Class: 3
Function: Main and bypass feedwater flow control valves

Test Requirement: Exercise for operability, demonstrate proper operation of fail-safe actuators, and measure stroke time quarterly.

Basis for Relief: Cycling the main control valves during normal operation would result in a loss of feedwater to the steam generators, causing a reactor trip, and cycling the bypass control valves would produce a severe feedwater flow transient also possibly causing a trip.

Alternate Test: Exercise for operability, demonstrate proper operation of fail-safe actuators, and measure stroke time at cold shutdown.

Relief Request: R-29
Valves: lCC-250, 298

Category: C
Class: 2
Function: Component Cooling Water Check Valves

Test Requirement: Demonstrate operability by performing forward flow and backseat tests quarterly.

Basis for Relief: Cooling water cannot be interrupted to the RCP's during normal operation nor at cold shutdown, since one or more RCP's may be running during cold shutdown.

Alternate Test: Demonstrate operability by performing forward flow and backseat tests at refueling.

Relief Request: R-30
Valves: 1MS-71, -73

Category: C
Class: 3
Function: Check valves in Main Steam supply to AFP turbine

Test Requirement: Perform a backseat test quarterly.

Basis for Relief: Backseat testing of these valves requires installation in the main steam tunnel of special test equipment, which during normal operation, presents an undue risk to personnel and plant safety. The possibility of a steam leak via test connections exists whenever steam is being supplied to the main steam lines.

Alternate Test: Perform a backseat test at cold shutdown.

Relief Request: R-31
Valves: 1FW-158, -216, -276, 1AF-65, -84, -103

Category: C
Class: 2
Function: Feedwater check valves

Test Requirement: Perform a backseat test quarterly.

Basis for Relief: Backseat testing of these valves requires reversal of the pressure differential across the valves. This cannot be accomplished during normal operation since it would result in loss of feedwater to the steam generators.

Alternate Test: Perform a backseat test at cold shutdown.

Relief Request: R-32
Valves: 1SI-8, 9, 10, 81, 82, 83, 104, 105, 106, 136, 137, 138,127, 128, 129, 72, 73, 74

Category: C
Class: 1
Function: Safety Injection check valves

Test Requirement: Perform a forward flow test quarterly.

Basis for Relief: Passing flow through these valves during normal operation would cause RCS injection flow to bypass the regenerative heat exchanger, thereby thermally shocking the RCS piping and causing an overtemperature condition in the letdown line. Testing these valves at cold shutdown with the RCS solid could cause a cold overpressure event.

Alternate Test: Perform a forward flow test at refueling.

Relief Request: R-33
Valves: 1DW-65, 1SA-82, 1FP-357,1FP-349, 1RC-164, 1SI-182,1SI-290

Category: C
Class: 2
Function: Containment isolation check valves

Test Requirement: Perform a backseat test quarterly.

Basis for Relief: These valves cannot be tested using system fluid. An entry into containment must be made to perform these tests using temporary test equipment. Quarterly entries would result in personnel radiation exposure that is not in keeping with the plants' ALARA program.

Alternate Test: Perform a backseat test at refueling.

Relief Request: R-34
Valve: 1CS-493

Category: C
Class: 2
Function Normal charging line bypass check valve

Test Requirement: Perform a forward flow test quarterly.

Basis for Relief: Positive verification that this valve will pass forward flow can only be made by closing 1CS-492 and verifying flow through the line. During normal operation this would cause an imbalance in charging and letdown flows resulting higher letdown temperature and possible flashing. During cold shutdown with the RCS solid, primary pressure control would be adversely affected.

Alternate Test: Perform a forward flow test at refueling.

CHAPTER 1

PURPOSE OF THE PROPOSED FACILITY AND ASSOCIATED TRANSMISSION

TABLE OF CONTENTS

Superseded per Amdt 2 to Environmental Rept dtd 3.31.82 D-400/401

1.0 PURPOSE OF THE PROPOSED FACILITY AND ASSOCIATED TRANSMISSION

1.1 SYSTEM DEMAND AND RELIABILITY

Carolina Power & Light Company (CP&L) is an investor-owned utility serving portions of North and South Carolina. Carolina Power & Light Company provides electric service for a 30,000 square mile area and for approximately 725,000 customers as of December 1979. A general map of the service area is shown in Figure 1.1-1. Other maps are included with Sections 1.1.1.3 and 1.1.2.

In the 1969-1970 time period, CP&L's peak demand forecasts indicated a need for additional capacity of about 800 MW per year for the years 1977 and 1978 to meet projected peaks and to provide an adequate generating reserve. In December of 1970, CP&L's Board of Directors approved construction of the Shearon Harris Nuclear Power Plant (SHNPP) (initially called White Oak) to be placed in service in 1977 and 1978. Subsequently, the plans for SHNPP were revised to include the construction of four units. Due to lower load growth projections, financial considerations, and changing regulatory requirements, the first unit at the SHNPP is now scheduled to begin operation in 1984. Table 1.1.3-1 shows reserves on the CP&L system with and without the SHNPP.

In January 1974, CP&L was granted an exemption to do certain site preparation and related activities prior to the issuance of a construction permit. The NRC granted CP&L a construction permit for the SHNPP in January 1978.

1.1.1 LOAD CHARACTERISTICS

Carolina Power & Light Company provides service to a mixture of customer classifications with varying load characteristics. The major customer classifications are Residential, Commercial, Industrial, Sales for Resale (wholesale), Public Street and Highway Lighting, and other Sales to Public Authorities (governmental). This mix of customer load characteristics produces an annual load factor of approximately 60 percent. A representative annual load duration curve is shown on Figure 1.1.1-1.

1.1.1.1 Load Analysis

This section discusses historical and projected peak demands and energy requirements. In Table 1.1.1-1 actual monthly peak demands are listed for January 1972 through March 1980. Actual and projected annual peak demands and increases for the period 1970 through 1993 are tabulated in Table 1.1.1-2.

Figure 1.1.1-2 graphically illustrates historical and forecasted annual peak demands and shows the trend of the historical loads as compared to the current forecast. The decrease in load growth in recent years can be attributed to such things as a downturn in the economy, load management and conservation activities, and the availability of alternative energy sources. These effects have been incorporated into the current load forecast.

Table 1.1.1-3 compares actual peak demands for the period 1969-1979 with the "latest" forecast made for each year.

Table 1.1.1-4 shows total monthly megawatt-hour sales for the period January 1972 through March 1980. Table 1.1.1-5 contains CP&L's annual historical and projected system energy requirements for the period 1969 through 1993. These energy figures include total megawatt-hour sales, system losses, CP&L Company usage, and wheeled energy.

1.1.1.2 Demand Projections

In the forecasting procedure used by CP&L, the energy forecast serves as a basis for the demand forecast and is therefore described first.

1.1.1.2.1 Energy Forecast

To develop the forecast of future system energy requirements, data on historical energy usage and anticipated changes in energy requirements are forecast for six classifications of customers (Residential, Commercial, Industrial, Public Street and Highway Lighting, Other Sales to Public Authorities, and Sales for Resale). Predicted energy requirements for these customer classifications are then combined with other energy requirements, such as system losses, Company use, and energy wheeled for delivery from the federal power project (Kerr Dam in Virginia) to Southeastern Power Administration (SEPA) preference customers. The combined energy requirements for these nine energy classifications make up the total system energy requirement. This methodology is limited to the forecast of future energy usage by the six customer classes. Additions for losses, Company use and wheeled energy are included in the methodology for the Company's Load Forecast.

In developing the forecast of energy requirements for each of the sales classifications, consideration is given to many factors which influence customer electric energy requirements. Among these factors are number and type of new customers; availability of other energy forms; indicated customer preference; anticipated levels of market saturation for major energy-using equipment, such as water heaters, electric heat, and air conditioning; the anticipated price of electric energy relative to other energy forms; and conservation and load-management opportunities.

In the current energy forecast, the real price of electricity (nominal price deflated by the consumer price index) is assumed to increase by 1% per year.

The Company reviews and updates its forecast at least annually.

One of the mathematical procedures used in the preparation of the forecasts is a regression analysis. The basic concept behind the regression analysis procedure is that a number of factors influence the amount of electricity that the typical customer in the service area uses. Some of the factors which influence usage are weather, real disposable income of the service area, customer attitude toward conservation, the price of substitute fuels, and structural shifts, such as strikes in a predominant industry, the oil embargo of 1973, or anything which causes a radical change in the customers' behavior. In setting up the regression equations, one takes the energy usage for each month and applies the known values of each of these variables for the same month over a period of time. These equations are solved simultaneously to get the coefficient or the magnitude of the impact of each one of these variables on the monthly energy usage. The results indicate that the coefficients explain the contribution of each of these variables to the total usage for the historical period.

Each of these regressions was initially set up with a number of variables, and coefficients were obtained. The resulting coefficients were analyzed statistically and those which were found to be statistically insignificant, or which were colinear with some other variable, were deleted. They were deleted, not because they were small, but because they might in fact detract from the explanatory value of some of the very significant variables.

In order for the significance to be verified statistically, a number of observations are needed. The observation period should include data which are not uniform but which vary significantly. This way, the impact during the period of observation can be measured for each of the variables; and if the total of these impacts closely tracks the actual usage, then the variables are said to be explanatory. Further statistical tests indicate the amount of the actual usage which is explained over the entire observation period by the variables used.

1.1.1.2.2 Demand Forecast

The Energy Forecast serves as a basis for the Demand Forecast. Projected annual system load factors are determined for each year of the forecast. The annual system load factors and forecasted system energy requirements determine the forecasted annual peak loads.

Projected annual system load factors are derived by determining the coincident peak load factor for each of the components of the total system energy requirement. The coincident peak load factor for a sales classification is determined by the ratio of the sales classification's average demand during the year to its demand at the time of the annual system peak.

These load factors are called coincident peak load factors (CPLF) because they relate usage at the time of the annual CP&L system peak to the average usage of the particular sales classification. This takes into account the fact that each sales classification peak does not necessarily coincide with the system peak.

Once the coincident peak load factors for each of the six sales classifications plus Company use, SEPA, and system losses have been determined, the coincident demand for the system is calculated by applying these load factors to the proper class and combining the demands. Adjustments are made for certain demand controllers and for municipal peak shaving equipment. The resulting numbers are the system peak load forecasted annual demands.

1.1.1.2.3 Load Management and Conservation

Carolina Power & Light Company's load and energy forecasting practices take into account reductions attributed to load management, conservation and alternative energy sources. Carolina Power & Light Company has emphasized conservation and the wise use of electricity for many years with some formal activities under way as early as 1970. The Company categorizes its activities in load and energy management in the following primary areas:

a) Load management and conservation through pricing activities;

b) Load management and conservation through the control of customer-owned equipment;

c) Load management and conservation through customer education, contact, and assistance; and

d) Load management through other means.

Carolina Power & Light Company is involved in these load management and conservation activities for all four of its major classes of customers (Residential, Commercial, Industrial, and Sales for Resale).

Under the Residential classification, five programs are involved: Common Sense Program, Wrap-up Program, Heat Pump Program, Consumer Awareness, and Thermal Storage Rates. The Common Sense Program originated in 1977 with the "Common Sense House." A direct result of the "Common Sense House" was the Wrap-up Program. In 1976, CP&L began to encourage the installation of heat pumps. Thermal storage time-of-day rates were introduced to the CP&L system in March 1979.

The Company is preparing to implement a Residential Electric Water Heater Control Program in Raleigh, North Carolina. The program is voluntary for qualifying residential customers and involves the installation of radio control equipment at the residences. Control sequences will be established to interrupt power to the desired number of water heater loads. Up to 15,000 installations are expected by the end of 1981. The program may be expanded once a full evaluation has been completed.

Under the Commercial classification, each of the above mentioned programs, excluding Water Heater Control are in effect. Demand controllers in commercial buildings have also played a role in reducing CP&L's peak load.

Under the Industrial classification, the system load and energy requirements are affected by five different areas: Interruptible Rates, Heat Pump Program, Customer Contact, Demand Control, and Self-Generation. Carolina Power & Light Company is involved in a program to offer voluntary industrial interruptible rates to its customers. Also CP&L is currently engaged in several cogeneration negotiations which could affect the peak load and energy requirements on the system.

Load management programs, conservation efforts, and generation ventures of wholesale customers are impacting the load growth on the CP&L system. Load management programs are presently under way with new programs being investigated. Wholesale customers also have their consumer education programs to encourage conservation. These load management and conservation efforts are taken into consideration in the sales for resale forecasts.

Additional load management activities being considered by CP&L include: Time-of-Use Rates, Appliance Control Projects, Voltage Reduction -Energy Conservation Study, Energy Management Exposition, and Residential Conservation Rate. Also the impact of solar energy and renewable resources on system load and energy requirements are considered in CP&L's load and energy forecasts.

A copy of the report supplied in 1973 to the FPC (now FERC) in accordance with Order 496 is provided as Appendix 1.1A. This report describes the steps undertaken internally by CP&L to reduce electricity consumption at that time. Since that time, CP&L has annually updated its General Load Reduction Plan which describes steps undertaken by CP&L during emergency situations to reduce demand on its system to a level which can be safely carried until either the demand diminishes or arrangements can be made for additional sources of power. The plan includes internal steps taken by CP&L to reduce load at its own facilities as well as those of its customers.

1.1.1.3 Power Exchanges

Table 1.1.1-6 shows CP&L net long-term and short-term purchases during the time of the annual summer peak from 1969 through 1979. Table 1.1.1-7 shows the projected net purchases for the period 1980 through 1993 that are under long-term contract. The other short-term purchases cannot be predicted at this time; however, unscheduled economical and emergency transactions do occur regularly. Carolina Power & Light Company is interconnected to neighboring utilities with numerous ties as shown in Figure 1.1.1-3.

1.1.2 SYSTEM CAPACITY

Carolina Power & Light Company is one of seven members of the Virginia-Carolinas (VACAR) Subregion which is one of four subregions of the Southeastern Electric Reliability Council (SERC). The other subregions of SERC are Florida, Southern Companies, and Tennessee Valley Authority. See Figures 1.1.2-1 through 1.1.2-3 for a geographical description. Other systems comprising VACAR are Duke Power Company, South Carolina Electric & Gas Company, South Carolina Public Service Authority, Southeastern Power Administration, Virginia Electric & Power Company, and Yadkin, Inc.

The construction and operation of the SHNPP Units 1, 2, 3, and 4 are essential to the ability of Carolina Power & Light Company to meet its load requirements during the period 1984-1991 and beyond. These units also contribute to adequate reserve situations in both the VACAR Subregion and SERC Region. Carolina Power & Light Company presently has seven fossil-fired steam electric generating plants with a summer net capability of 3,956 MW, four hydroelectric plants with a net capability of 214 MW, two nuclear plants with a net capability of 2,245 MW, and combustion turbine generating units with a net capability of 1,018 MW, for a total installed summer net capability of 7,433 MW. Table 1.1.2-1 shows CP&L's system capability (summer), including net power available under purchase/sale agreements, for the period 1975-1993 and comparable figures for VACAR for 1975-1993. System capability anticipated for the summer of 1980 is 7,600.5 MW.

Table 1.1.2-2 lists the major (100 MW or greater) existing and planned units for the CP&L system, indicating unit location, type (nuclear, fossil, etc.), capability and function (base load, intermediate, peaking).

In a general sense, Carolina Power & Light Company distinguishes between base load, intermediate load, and peaking capacity based on the amount of time the unit is expected to be used. An economic dispatch procedure is used whereby available units are loaded in order of increasing generation costs to meet customers' demands and then retired in reverse order. This assures CP&L of meeting its customers' needs in the most economical manner possible. When this method is used, however, the amount of generation that is required from any given unit is tied directly to its cost of operation, load characteristics, and system conditions. With delivered fuel costs varying monthly, load characteristics changing seasonally, and system conditions changing daily, it becomes difficult to state categorically that a given unit will always be base loaded or will be cycled as intermediate or peaking capacity. The exceptions to this are nuclear (base load) and combustion turbine or hydroelectric units which are energy limited (peaking capacity). When a new unit becomes commercial, it will be used in accordance with economic dispatch procedures and its effect on the use of other units on the system will be determined by the variables mentioned above.

Table 1.1.2-3 lists all existing and planned generating units for the VACAR Subregion, and includes a key to the symbols used throughout the table.

Capacity factors on the CP&L system are expected to range from 50-70 percent for base loaded units, from 20-50 percent for intermediate units, and below 20 percent for peaking units.

1.1.3 RESERVE MARGINS

Generating capacity additions are planned to maintain a system reserve level of 20 percent or greater. Carolina Power & Light Company feels, based on historical experience and judgment, that this level of reserves is necessary to maintain reliable service to its customers during system peak periods. This reserve level is supported by the North Carolina Utilities Commission in its December 1978 Report (see Section 1.1.4). The 20 percent minimum reserve criteria allows for miscellaneous generating plant curtailments and forced outages.

Major planned outages are scheduled to the extent possible when they will least impact the CP&L power system from an economic and reliability standpoint. Normally, major maintenance is planned for the spring and fall periods when the loads are somewhat less (and therefore resources are greater) than the summer and winter peak load periods. Studies are conducted and scheduling of generating units for major maintenance is normally done a year in advance.

Although VACAR has no established reserve criteria, the outage schedule is then reviewed with the other VACAR systems to assure that the overall maintenance planning within the VACAR Subregion meets sound reliability considerations.

Carolina Power & Light Company currently has installed 1018 MW of oil-fired IC turbine (peaking) capacity which comprises a large part of its reserves. Due to the uncertainty of future oil supplies for operation of these ICs, the reserves as shown in Table 1.1.3-1 including IC's may be overstated. Therefore, included in this table are reserves without IC's.

Postponing the SHNPP indefinitely would result in firm power resources approximately 12 percent less than the projected peak demand in 1991. When completed the SHNPP will constitute 27 percent of CP&L's generating capability. In terms of actual electrical energy production, SHNPP is even more significant than its relative size would indicate. As a base load plant, it will be operating at a higher capacity factor than the average plant for the generating system.

1.1.4 EXTERNAL SUPPORTING STUDIES

In December 1978, the North Carolina Utilities Commission issued a report entitled, "Future Electricity Needs for North Carolina: Load Forecast and Capacity Plan." This report covered generation requirements as seen by the Commission for North Carolina, for the period 1978-1992.

The following statement concerning reserve margins deemed necessary by the Commission for reliable and adequate service is taken from the above mentioned report.

> "The generating reserves needed to ensure system reliability for . . . CP&L . . . are 20% for both the summer and winter peak seasons."

Carolina Power & Light Company's current reserve planning criteria calls for a minimum reserve margin of 20 percent of the forecast peak. The SHNPP is included in the current construction schedule which satisfies these reserve requirements.

TABLE 1.1.1-1.

CAROLINA POWER & LIGHT COMPANY
MONTHLY PEAK DEMAND
(MW)

	1972	1973	1974	1975	1976	1977	1978	1979	1980
January	3,625	3,957	4,019	4,197	4,968	5,509	5,476	5,588	5,295
February	3,505	3,884	4,219	4,054	4,381	5,002	5,605	5,436	5,809
March	3,250	3,564	3,924	4,171	4,162	4,206	4,762	4,817	5,226
April	3,073	3,413	3,713	3,631	3,681	3,723	3,958	3,872	
May	2,994	3,621	3,883	4,243	3,765	4,262	4,487	4,299	
June	3,602	4,059	4,479	4,537	4,542	5,060	5,379	4,713	
July	4,090	4,448	4,695	4,759	5,121	5,597	5,398	5,489	
August	4,119	4,711	4,771	5,060	4,923	5,381	5,538	5,907	
Spetember	3,829	4,404	4,440	4,774	4,465	4,994	5,315	5,141	
October	3,442	3,943	3,960	3,677	4,484	4,216	4,089	4,352	
November	3,612	3,759	4,097	4,055	4,712	4,511	4,276	4,925	
December	3,851	4,129	4,261	4,761	4,974	5,048	5,148	5,330	

NOTE: Monthly load forecasts not made.

TABLE 1.1.1-2

ANNUAL PEAK DEMANDS AND INCREASES

Year		Peak Loads(1) MW	Increase MW	Increase %
1970		3484	313	9.9
1971		3625	141	4.0
1972		4119	494	13.6
1973		4711	592	14.4
1974	Actual	4771	60	1.3
1975		5060	289	6.1
1976		5509	449	8.9
1977		5605	96	1.7
1778		5588	-17	-0.3
1979		5907	319	5.7
1980		6047	140	2.4
1981		6354	307	5.1
1982		6681	327	5.1
1983		7007	326	4.9
1984		7366	359	5.1
1985		7738	372	5.1
1986		8102	364	4.7
1987	Projected	8476	374	4.6
1988		8841	365	4.3
1989		9204	363	4.1
1990		9543	339	3.7
1991		9889	346	3.6
1992		10235	346	3.5
1993		10601	366	3.6

(1) Winter peaks are forecast to be equal to previous summer peaks from 1979 through 1993 because the forecasted winter peak loads developed using winter coincident peak load factors were not significantly different from the forecasted summer peak loads using summer coincident peak load factors.

TABLE 1.1.1-3.

CAROLINA POWER & LIGHT COMPANY
COMPARISON OF ACTUAL VERSUS FORECAST SUMMER PEAK DEMANDS
1969 - 1979

Year	Forecast MW	Forecast Date of Forecast	Actual MW	Deviation of Forecast From Actual MW	Deviation of Forecast From Actual %
1969	3043	3-69	3055	(12)	0.4
1970	3415	11-69	3484	(69)	(2.0)
1971	3818	10-70	3625	193	5.3
1972	4279	7-71	4119	160	3.9
1973	4679	5-73	4711	(32)	(0.7)
1974	5019	6-74	4771	248	5.2
1975	5001	3-75	5060	(59)	(1.2)
1976	5396	10-75	5121	275	5.4
1977	5548	9-76	5597	(49)	(0.9)
1978	5829	11-77	5538	291	5.3
1979	5958	4-79	5907	51	0.9

( ) Indicates actual peak demand was greater than forecast.

TABLE 1.1.1-4

CAROLINA POWER & LIGHT COMPANY
TOTAL MONTHLY MWH SALES
JANUARY 1972 TO MARCH, 1980

	1972	1973	1974	1975	1976	1977	1978	1979	1980
January	1,821,607	2,099,287	2,105,158	2,147,374	2,403,591	2,552,304	2,529,948	2,535,057	2,587,378
February	1,834,445	2,029,895	1,922,033	1,934,972	2,284,465	2,509,095	2,578,992	2,712,451	2,721,050
March	1,794,395	1,925,731	1,886,634	1,838,300	2,044,910	2,122,712	2,597,806	2,547,090	2,654,803
April	1,651,914	1.811,210	1,851,196	1,795,648	1,952,975	2,042,613	2,067,153	2,145,366	
May	1,687,064	1,798,730	1,863,918	1,706,099	1,941,072	1,891,199	1,904,501	2,069,850	
June	1,804,578	1,903,803	2,015,178	1,986,011	2,002,664	2,097,612	2,249,162	2,204,248	
July	2,070,159	2,087,914	2,087,914	2,061,709	2,205,428	2,437,036	2,372,945	2,303,168	
August	2,166,608	2,224,426	2,224,426	2,256,492	2,404,147	2,616 775	2,577,482	2,731,624	
September	1,854,763	2,227,359	2,227,359	2,364,746	2,330,480	2,637,450	2,647,179	2,673,848	
October	1,886,011	1,935,757	1,935,756	1,983,489	2,098,409	2,245,809	2,229,911	2,273,478	
November	1,827,603	1,913,406	1,913,406	1,973,616	2,124,793	1,997,321	2,034,806	2,222,334	
December	1,889,656	1,947,568	2,043,469	2,069,777	2,383,444	2,166,799	2,203,686	2,249,367	
Total	22,101,472	24,081,319	24,076,446	24,118,233	26,176,379	27,316,727	27,933,572	28,667,879	

Note: Monthly energy forecasts not made.

TABLE 1.1.1-5

CAROLINA POWER & LIGHT COMPANY
HISTORICAL & PROJECTED ENERGY REQUIREMENTS

Year	System Energy Requirements (MwH)	
1969	16,913,764	Actual
1970	18,616,630	
1971	20,277,463	
1972	22,329,076	
1973	24,881,983	
1974	25,303,452	
1975	25,906,928	
1976	27,577,168	
1977	29,025,737	
1978	29,849,721	
1979	30,450,325	
1980	31,598,000	Projected
1981	33,042,000	
1982	34,647,000	
1983	36,283,000	
1984	38,072,000	
1985	39,933,000	
1986	41,801,000	
1987	43,641,000	
1988	45,484,000	
1989	47,330,000	
1990	49,129,000	
1991	50,940,000	
1992	52,803,000	
1993	54,726,000	

TABLE 1.1.1-6

CAROLINA POWER & LIGHT COMPANY
NET PURCHASES AND SALES AT TIME
OF ANNUAL SUMMER PEAK DEMAND
1969 - 1979

Year	Net Long-Term Purchase & (Sale) (MW)	Net Short-Term Purchase & (Sale) (MW)
1969	212	(109)
1970	212	174
1971	213	(358)
1972	213	(288)
1973	228	(133)
1974	228	(108)
1975	228	(160)
1976	228	(145)
1977	128	40
1978	128	40
1979	128	40

TABLE 1.1.1-7

CAROLINA POWER & LIGHT COMPANY
NET FIRM PURCHASES AND SALES
1980 - 1993

Year	Net Purchases & Sales (MW)
1980	167.5
1981	135.0
1982	135.0
1983	135.0
1984	135.0
1985	135.0
1986	135.0
1987	135.0
1988	135.0
1989	135.0
1990	135.0
1991	135.0
1992	135.0
1993	135.0

TABLE 1.1.2-1

SYSTEM CAPABILITIES (MW)
CP&L & VACAR

Year	CP&L	VACAR
1975	5,781.5	31,332
1976	6,620.5	32,269
1977	7,495.5	33,267
1978	7,495.5	34,451
1979	7,495.5	36,003
1980	7,600.5	35,761
1981	8,288	38,861
1982	8,288	40,041
1983	9,008	40,761
1984	9,908	44,346
1985	10,628	46,445
1986	10,628	46,510
1987	11,528	48,267
1988	11,528	49,996
1989	12,428	51,756
1990	12,428	54,317
1991	13,328	56,767
1992	13,328	59,047
1993	13,328	61,353

TABLE 1.1.2-2

CP&L GENERATING UNITS 100 MW OR GREATER

Date	Plant	Unit	Type	Capability - MW	Function
Present	Brunswick	1	Nuclear	790	Base Load
Present	Brunswick	2	Nuclear	790	Base Boad
Present	Robinson	2	Nuclear	665	Base Load
Present	Roxboro	3	Fossil	720[1]	Base/Intermediate Load
Present	Roxboro	2	Fossil	670	Base/Intermediate Load
Present	Roxboro	1	Fossil	385	Intermediate Load
Present	Lee	3	Fossil	252	Intermediate Load
Present	Asheville	1	Fossil	198	Intermediate Load
Present	Asheville	2	Fossil	194	Intermediate Load
Present	Cape Fear	5	Fossil	143	Intermediate Load
Present	Cape Fear	6	fossil	173	Intermediate Load
Present	Sutton	2	Fossil	106	Intermediate Load
Present	Sutton	3	Fossil	420[2]	Intermediate Load
Present	Robinson	1	Fossil	174	Intermediate Load
Fall 1980	Roxboro	4	Fossil	720	Base/Intermediate Load
Spring 1983	Mayo	1	Fossil	720	Base/Intermediate Load
Spring 1984	SHNPP	1	Nuclear	900	Base Load
Spring 1987	SHNPP	2	Nuclear	900	Base Load
Spring 1985	Mayo	2	Fossil	720	Base/Intermediate Load
Spring 1989	SHNPP	4	Nuclear	900	Base Load
Spring 1991	SHNPP	3	Nuclear	900	Base Load

1 Includes an uprate of 70 MW scheduled for the summer of 1980.

2 Includes an uprate of 35 MW scheduled for the summer of 1980.

TABLE 1.1.3-1

CP&L POWER RESOURCES, LOAD, AND RESERVES
WITH AND WITHOUT SHNPP
1984-1991 (SUMMER)

WITH SHNPP ON SCHEDULE

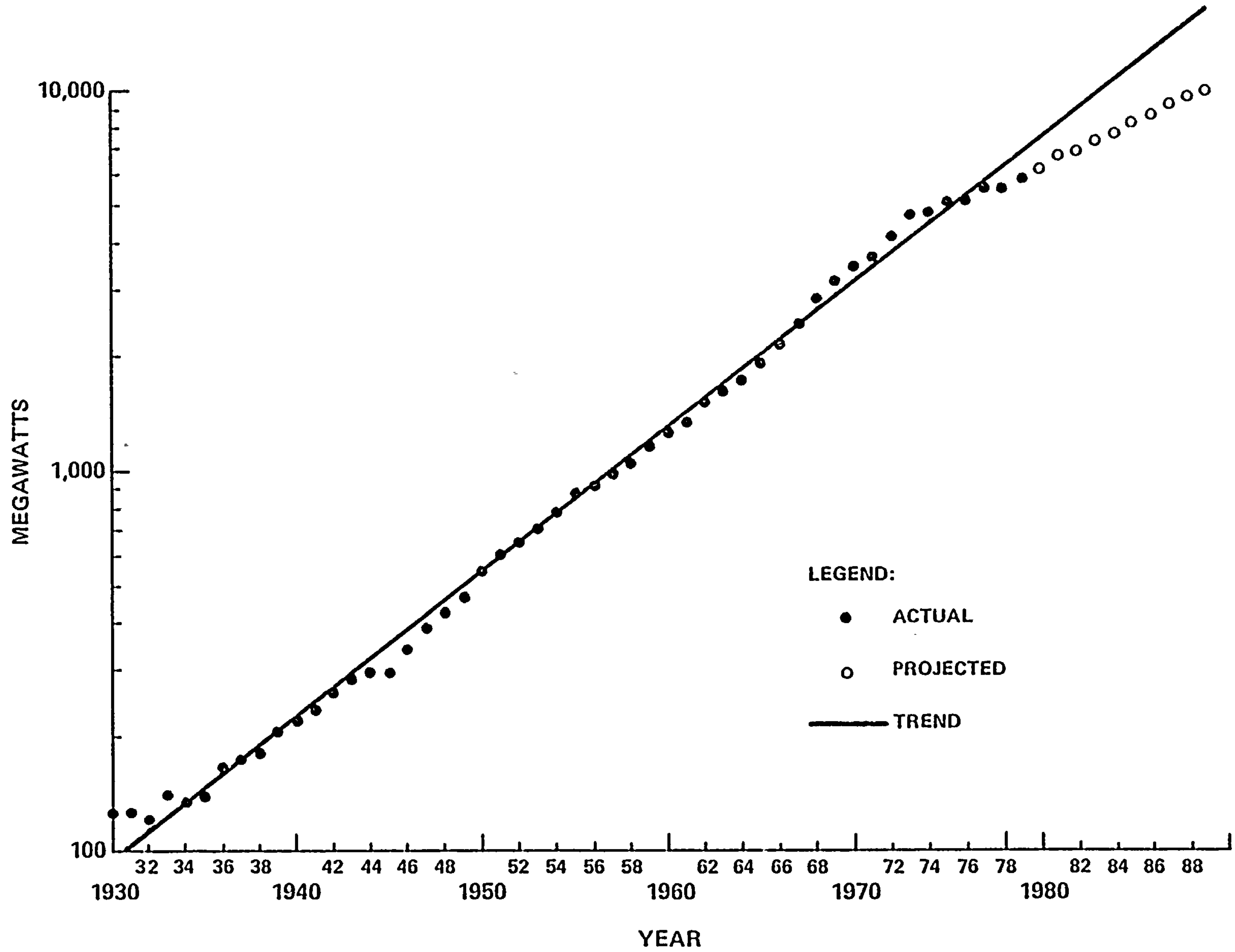
	1984	1985	1986	1987	1988	1989	1990	1991
Resources (MW)	9908	10628	10628	11528	11528	12428	12428	13328
Load (MW)	7366	7738	8102	8476	8841	9204	9543	9889
Reserve (MW)	2542	2890	2526	3052	2687	3224	2885	3439
Reserve (%)	34.5	37.3	31.2	36.0	30.4	35.0	30.2	34.8
W/O IC* Reserve (%)	20.7	24.2	18.6	24.0	18.9	24.0	19.6	24.5

WITHOUT SHNPP

	1984	1985	1986	1987	1988	1989	1990	1991
Resources (MW)	9008	9728	9728	9728	9728	9728	9728	9728
Load (MW)	7366	7738	8102	8476	8841	9204	9543	9889
Reserve (MW)	1642	1990	1626	1252	887	524	185	-161
Reserve (%)	22.3	25.7	20.1	14.8	10.0	5.7	1.9	-1.6
W/O IC* Reserve (%)	8.5	12.6	7.5	2.8	-1.5	-5.4	-8.7	-11.9

*IC turbines rated at 1018 MW.

SHEARON HARRIS NUCLEAR POWER PLANT
Carolina Power & Light Company
ENVIRONMENTAL REPORT



PEAK LOAD TREND

FIGURE 1.1.1-2

1.3 CONSEQUENCES OF DELAY

The impact of delays in the operation of the SHNPP units beyond the current schedule would be serious to CP&L and its customers. The impact would be significant economic penalties and reduced reliability. Tables 1.3-1 and 1.3-2 show reserve margins for the CP&L system and the VACAR Subregion with delays of one, two, and three years of the SHNPP units, and for postponing the project indefinitely.

In the Spring of 1979, CP&L made a study of the cost of deferring SHNPP Unit 1 by one year. This study indicated that for the SHNPP Unit 1, 41 percent of the Unit's budget would have been spent by the end of 1979. A one-year delay would increase construction costs by 11 percent. In addition, increased production costs for a one-year delay would total approximately $57,000,000.

As indicated in Section 1.1.3, delay of the project will place CP&L in a position where reserves will be inadequate for reliable service in several years. This is of particular significance because CP&L and neighboring utilities with which CP&L is interconnected are in similar situations with respect to the prospects of importing large quantities of power. Each utility is confronted with long lead times for construction of generating facilities and the uncertainties of maintaining construction schedules. None of these other companies are installing extra generating capacity in quantities required to allow the selling of power to CP&L on a firm basis in the amounts required if the SHNPP units are not brought into operation in the years 1984-1991 as scheduled. Sufficient transmission interconnection capacity for interchanges of large blocks of power between CP&L and its neighbors is planned under the VACAR agreement for the primary purpose of providing emergency assistance in the event of equipment failure.

TABLE 1.3-1

CP&L RESOURCES LOAD & RESERVES

Delay 1 year all 4 SHNPP units:

Year	Total Power Resources	Load	Reserves	% Reserves	W/O IC* % Reserves
1984	9008	7366	1642	22.3	8.5
1985	10628	7738	2890	37.3	24.2
1986	10628	8102	2526	31.2	18.6
1987	10628	8476	2152	25.4	13.4
1988	11528	8841	2687	30.4	18.9
1989	11528	9204	2324	25.2	14.2
1990	12428	9543	2885	30.2	19.6
1991	12428	9889	2539	25.7	15.4
1992	13328	10235	3093	30.2	20.3

Delay 2 years all 4 SHNPP units:

Year	Total Power Resources	Load	Reserves	% Reserves	W/O IC* % Reserves
1984	9008	7366	1642	22.3	8.5
1985	9728	7738	1990	25.7	12.6
1986	10628	8102	2526	31.2	18.6
1987	10628	8476	2152	25.4	13.4
1988	10628	8841	1787	20.2	8.7
1989	11528	9204	2324	25.2	14.2
1990	11528	9543	1985	20.8	10.1
1991	12428	9889	2539	25.7	15.4
1992	12428	10235	2193	21.4	11.5
1993	13328	10601	2727	25.7	16.1

*IC turbines rated at 1018 MW

TABLE 1.3-1 (CONT'D)

Delay 3 years all 4 SHNPP units:

Year	Total Power Resources	Load	Reserves	% Reserves	W/O IC* % Reserves
1984	9008	7366	1642	22.3	8.5
1985	9728	7738	1990	25.7	12.6
1986	9728	8102	1626	20.1	7.5
1987	10628	8476	2152	25.4	13.4
1988	10628	8841	1787	20.2	8.7
1989	10628	9204	1424	15.5	4.4
1990	11528	9543	1985	20.8	10.1
1991	11528	9889	1639	16.6	6.3
1992	12428	10235	2193	21.4	11.5
1993	12428	10601	1827	17.2	7.6
1994	13328	10971	2357	21.5	12.2

Indefinitely Postpone all 4 SHNPP units:

Year	Total Power Resources	Load	Reserves	% Reserves	W/O IC* % Reserves
1984	9008	7366	1642	22.3	8.5
1985	9728	7738	1990	25.7	12.6
1986	9728	8102	1626	20.1	7.5
1987	9728	8476	1252	14.8	2.8
1988	9728	8841	887	10.0	-1.5
1989	9728	9204	524	5.7	-5.4
1990	9728	9543	185	1.9	-8.7
1991		9889	-161	-1.6	-11.9

IC turbines rated at 1018 MW

TABLE 1.3-2

VACAR RESOURCES LOAD & RESERVES

Delay 1 year all 4 SHNPP units:

Year	Total Power Resources	Load	Reserves	% Reserves
1984	43746	34904	8842	25.3
1985	46745	36531	10214	28.0
1986	46510	38149	8361	21.9
1987	47367	39869	7498	18.8
1988	49996	41635	8361	20.1
1989	50856	43433	7423	17.1
1990	54317	45895	8422	18.4
1991	55867	47840	8027	16.8
1992	59047	49849	9198	18.5

Delay 2 years all 4 SHNPP units:

Year	Total Power Resources	Load	Reserves	% Reserves
1984	43746	34904	8842	25.3
1985	45845	36531	9314	25.5
1986	46510	38149	8361	21.9
1987	47367	39869	7498	18.8
1988	49096	41635	7461	17.9
1989	50856	43433	7423	17.1
1990	53417	45895	7522	16.4
1991	55867	47840	8027	16.8
1992	58147	49849	8298	16.6
1993	61353	51953	9400	18.1

Note: As of 1980, approximately 19% of VACAR resources were composed of oil-fired capacity.

TABLE 1.3-2 (CONT'D)

Delay 3 years all 4 SHNPP units:

Year	Total Power Resources	Load	Reserves	% Reserves
1984	43746	34904	8842	25.3
1985	45845	36531	9314	25.5
1986	45610	38149	7461	19.6
1987	47367	39869	7498	18.8
1988	49096	41635	7461	17.9
1989	49956	43433	6523	15.0
1990	53417	45895	7522	16.4
1991	54967	47840	7127	14.9
1992	58147	49849	8298	16.6
1993	60453	51953	8500	16.4
1994	63931	54120	9811	18.1

Indefinitely Postpone all 4 SHNPP units:

Year	Total Power Resources	Load	Reserves	% Reserves
1984	43746	34904	8842	25.3
1985	45845	36531	9314	25.5
1986	45610	38149	7461	19.6
1987	46467	39869	6598	16.5
1988	48196	41635	6561	15.8
1989	49056	43433	5623	12.9
1990	51617	45895	5722	12.5
1991	53167	47840	5327	11.1

CHAPTER 2 LIST OF TABLES (Cont'd)

CHAPTER 2 LIST OF TABLES (Cont'd)

CHAPTER 2 LIST OF TABLES (Cont'd)

CHAPTER 2 LIST OF TABLES (Cont'd)

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LIST OF TABLES (Cont'd)

CHAPTER 2 LIST OF TABLES (Cont'd)

CHAPTER 2 LIST OF FIGURES (Cont'd)

2.0 THE SITE AND ENVIRONMENTAL INTERFACES

2.1 GEOGRAPHY AND DEMOGRAPHY

2.1.1 SITE LOCATION AND DESCRIPTION

2.1.1.1 Specification of Location

The SHNPP site is located in the extreme southwest corner of Wake County, North Carolina, and the southeast corner of Chatham County, North Carolina. The City of Raleigh, North Carolina, is approximately 16 mi. northeast and the City of Sanford is about 15 mi. southwest.

Carolina Power & Light Company has constructed a dam on Buckhorn Creek about 2.5 mi. north of its confluence with the Cape Fear River. This dam has created an approximately 4000-acre reservoir which will be used for cooling tower makeup requirements. The power block structures are located on the northwest shore of the Main Reservoir about 4.5 mi. north of the Main Dam. Coordinates of the reactors are:

		Unit No. 1	Unit No. 2
Latitude	(North)	35° 38' 00"	35° 38' 03"
Longitude	(West)	78° 57' 22"	78° 57' 24"
North Carolina	(North)	685,444.524	685,716.417
Plane Coordinates	(East)	2,013,001.262	2,012,874.476
Universal Transverse	(North)	3,945,013.683	3,945,095.767
Mercator Coordinates	(East)	685,064.389	685,024.074

		Unit No. 3	Unit No. 4
Latitude	(North)	35° 38' 02"	35° 37' 59"
Longitude	(West)	78° 57' 26"	78° 57' 25"
North Carolina	(North)	685,631.893	685,360.000
Plane Coordinates	(East)	2,012,693.215	2,102,820.000
Universal Transverse	(North)	3,945,068.890	3,944,986.806
Mercator Coordinates	(East)	684,969.342	685,009.655

The universal transverse Mercator zone number for the SHNPP is 17. |1

2.1.1.2 Site Area

A site area map is included as Figure 2.1.1-1 and indicates the site boundary line (which is the same as the station property boundary), the exclusion boundary, and principal transportation routes. Figure 2.1.1-2 details the exclusion area boundary and identifies principal station structures. There are no industrial, recreational, or residential structures on CP&L property. However, as discussed in Section 2.1.3, CP&L will cooperate with appropriate State agencies to provide public access for boating, fishing, hunting, and other recreational uses which are not inconsistent with the primary purpose of the lands and waters. As such, some recreational facilities such as boat ramps and access areas may be located on station property for public use.

Carolina Power & Light Company's Harris Energy & Environmental Center, as discussed in Sections 2.1.2.3 and 2.1.3, is located approximately 2.1 mi. ENE of the plant.

2.1.1.3 Boundaries for Establishing Effluent Release Limits

The exclusion area includes approximately 3534 acres (Figure 2.1.1-2). The boundary of this area is used to determine effluent release limits. All effluent release limits meet requirements as specified in 10CFR Part 20.

Airborne effluent release points for each of the four units are indicated in Figure 3.1-5. The liquid effluent release point for the plant (via the cooling tower blowdown discharge line) is identified in Figure 2.4.1-1. Minimum distance from the center point of the four reactors to the exclusion boundary is 7000 ft. in all directions, with the exceptions of the N (6980 ft.), WNW (6660 ft.), NW (6640 ft.), NNW (6640 ft.), and S (7200 ft.).

2.1.2 POPULATION DISTRIBUTION

Estimates of existing population distribution are based on 1980 census data 1
and were derived by using methods described in the Electric Power Research
Institute's Guidelines for Estimating Present and Forecasting Future
Population Distributions Surrounding Reactor Sites (Draft of a Standard)
(Reference 2.1.2-1). As a general procedure, calculations of population were
made using the smallest geographic unit used by the U. S. Bureau of the
Census. Where a Census Bureau geographical unit did not fall entirely into a
"standard nuclear site display geographical unit," population of such census
unit was distributed proportionately to the standard display units.

2.1.2.1 Population Within Ten Miles

Population distribution within a 10-mile radial area of the plant is for the
most part considered rural. The exception to this is in Apex, North Carolina
(9 mi. NE) where the 1980 population was 2847. 1

A map showing the 10-mile radial area of the site is presented in
Figure 2.1.2-1. Concentric circles have been drawn at distances of 1, 2, 3, 4,
5, and 10 miles using the center line of the four reactors as center point.
The circles have ben divided into 22-1/2-degree segments with each segment
centered on one of the 16 compass points. The 1980 estimates of residential 1
population within each of these areas are presented in Table 2.1.2-1. Also
presented are population projections for 1985 (the expected first year of
plant operation), for each census decade through the projected plant life, and
for the year 2031.

Population projections have been based on population growth patterns and
projections as described in Update North Carolina Population Projections 1
(Reference 2.1.2-2). County growth patterns have been assumed to apply
evenly throughout each county area.

Age distribution projections for the midpoint of the station life (2008) are 1
presented in Table 2.1.2-2. Projections are based on population estimates and
projections prepared by the U.S. Bureau of the Census (Reference 2.1.2-3).

2.1.2.2 Population Between Zero and Fifty Miles

The population within a 50-mile radius of the plant site is marked by
concentrations of people in and around Raleigh (16 mi. NE), Durham
(19 mi. N), and Fayetteville (37 mi. S), each having populations greater than
50,000. Six other smaller cities and towns have populations greater than 1
10,000. Away from these population concentrations, there is a rural type
population distribution with small towns interspersed through the area. A map
showing the 50-mile radial area and identifying major cities and towns is
presented as Figure 2.1.2-2. Concentric circles have been drawn at distances
of 10, 20, 30, 40, and 50 miles, using the center line of the four reactors as
center point. The circles have been divided into 22-1/2-degree segments with
each segment centered on one of the 16 compass points. The 1980 estimates of 1
residential population within each of these areas are presented in
Table 2.1.2-3. Also presented are population projections for 1985 (the
expected first year of plant operation), for each census decade through the
projected plant life, and for the year 2031. Cumulative totals of population

estimates and projections are included in Table 2.1.2-4. Projected age
1 distributions for the midpoint of the station life (2008) are presented in
Table 2.1.2-5.

Methods used for determining population, population projections and age distributions were similar to those described in Section 2.1.2.1.

2.1.2.3 Transient Population

Recreational land uses which would attract transient concentrations of people within the 50-mile radius of the site are not extensive and are limited to Umstead State Park (20 mi. NE), Raven Rock State Park (13 mi. SSE), Eno River State Park (30 mi. N), and when completed, the New Hope Project (3 mi. NNW) and the Falls of the Neuse Project (22 mi. NNE). Although the Falls Project has not been completed, it was originally estimated that the project will have an annual attendance of 2,431,000 in 2000 (Reference 2.1.2-4). Figure 2.1.2-3 includes locations of principal recreation areas.

On occasions, there are high concentrations of people at sporting events and
at functions at the various universities in the area. The North Carolina
1 State Fair, held during October of each year in Raleigh, attracted 110,925
people during a one-day period in 1981.

Daily transient population concentrations in and around the major industrial
areas of the region are a result of commuting patterns of workers.
Approximately 20 mi. NNE of the site, the Research Triangle Park attracts
about 19,000 workers daily. In Moncure (7 mi. WSW) approximately 1300 workers
1 are employed; and in Apex (8 mi. NE) industries employ approximately 2200
people. Additionally, the Harris Energy and Environmental Center, located
2.1 mi. ENE of the plant site, employs approximately 150 people and may
attract up to 60 additional people for training sessions. The associated
Visitors Center currently attracts an average of 63 people daily.

Land use and land use compatibility are discussed in Sections 2.1.4 and 3.1 (respectively) of the SHNPP Construction Permit Environmental Report.

TABLE 2.1.2-1

POPULATION ESTIMATES FOR 1980 AND POPULATION PROJECTIONS
FOR THE YEARS 1985 TO 2031 BETWEEN ZERO AND TEN MILES OF THE SHNPP

0 TO 1 MILES

DIRECTION	1980	1985	1990	2000	2010	2020	2030	2031
N	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0

1

TABLE 2.1.2-1 (continued)

POPULATION ESTIMATES FOR 1980 AND POPULATION PROJECTIONS FOR THE YEARS 1985 TO 2031 BETWEEN ZERO AND TEN MILES OF THE SHNPP

1 TO 2 MILES

DIRECTION	1980	1985	1990	2000	2010	2020	2030	2031
N	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0	0
NNW	25	28	32	40	48	56	64	65
TOTAL	25	28	32	40	48	56	64	65

1

TABLE 2.1.2-1 (continued)

POPULATION ESTIMATES FOR 1980 AND POPULATION PROJECTIONS FOR THE YEARS 1985 TO 2031 BETWEEN ZERO AND TEN MILES OF THE SHNPP

2 TO 3 MILES

DIRECTION	1980	1985	1990	2000	2010	2020	2030	2031	
N	30	34	38	47	56	66	76	77	
NNE	39	44	50	62	74	87	100	101	
NE	47	53	60	74	89	104	119	120	
ENE	3	3	4	5	6	7	8	8	
E	8	9	10	12	14	16	18	18	
ESE	17	19	22	27	32	37	42	43	
SE	0	0	0	0	0	0	0	0	
SSE	0	0	0	0	0	0	0	0	
S	0	0	0	0	0	0	0	0	1
SSW	0	0	0	0	0	0	0	0	
SW	5	5	6	7	8	9	10	10	
WSW	0	0	0	0	0	0	0	0	
W	15	16	17	19	21	23	25	25	
WNW	17	18	19	21	23	25	27	27	
NW	20	21	22	24	26	28	30	30	
NNW	95	105	114	134	155	176	197	200	
TOTAL	296	327	362	432	504	578	652	659	

TABLE 2.1.2-1 (continued)

POPULATION ESTIMATES FOR 1980 AND POPULATION PROJECTIONS
FOR THE YEARS 1985 TO 2031 BETWEEN ZERO AND TEN MILES OF THE SHNPP

3 TO 4 MILES

DIRECTION	1980	1985	1990	2000	2010	2020	2030	2031
N	38	42	47	57	67	78	89	90
NNE	43	49	55	68	82	96	110	111
NE	43	49	55	68	82	96	110	111
ENE	72	82	92	114	137	160	183	185
E	62	70	80	99	118	138	158	160
ESE	69	78	89	110	132	154	176	178
SE	56	63	71	88	105	123	141	143
SSE	53	60	68	84	100	117	134	136
S	28	30	32	36	40	44	48	48
SSW	26	27	29	32	35	38	41	41
SW	26	27	29	32	35	38	41	41
WSW	26	27	29	32	35	38	41	41
W	26	27	29	32	35	38	41	41
WNW	26	27	29	32	35	38	41	41
NW	26	27	29	32	35	38	41	41
NNW	26	27	29	32	35	38	41	41
TOTAL	646	712	792	948	1108	1272	1436	1449

1

TABLE 2.1.2-1 (continued)

POPULATION ESTIMATES FOR 1980 AND POPULATION PROJECTIONS FOR THE YEARS 1985 TO 2031 BETWEEN ZERO AND TEN MILES OF THE SHNPP

4 TO 5 MILES

DIRECTION	1980	1985	1990	2000	2010	2020	2030	2031
N	45	50	55	66	77	88	99	100
NNE	55	62	71	88	106	124	142	144
NE	55	62	71	88	106	124	142	144
ENE	76	86	98	122	146	171	196	199
E	97	110	124	154	185	216	248	251
ESE	97	110	124	154	185	216	248	251
SE	91	102	115	141	168	195	222	224
SSE	48	51	56	64	72	80	88	88
S	34	36	38	42	46	50	54	54
SSW	34	36	38	42	46	50	54	54
SW	34	36	38	42	46	50	54	54
WSW	34	36	38	42	46	50	54	54
W	34	36	38	42	46	50	54	54
WNW	34	36	38	42	46	50	54	54
NW	34	36	38	42	46	50	54	54
NNW	34	36	38	42	46	50	54	54
TOTAL	836	921	1018	1213	1413	1614	1817	1833

1

TABLE 2.1.2-1 (continued)

POPULATION ESTIMATES FOR 1980 AND POPULATION PROJECTIONS
FOR THE YEARS 1985 TO 2031 BETWEEN ZERO AND TEN MILES OF THE SHNPP

5 TO 10 MILES

DIRECTION	1980	1985	1990	2000	2010	2020	2030	2031	
N	439	477	519	603	689	776	863	871	
NNE	863	978	1110	1370	1650	1930	2210	2240	
NE	3760	4250	4820	5970	7160	8380	9610	9730	
ENE	871	987	1120	1390	1660	1950	2230	2260	
E	1490	1690	1920	2380	2850	3330	3820	3870	
ESE	2550	2890	3280	4060	4870	5700	6540	6620	1
SE	764	846	939	1130	1320	1510	1700	1720	
SSE	575	623	675	777	881	985	1090	1100	
S	515	556	601	690	779	869	959	968	
SSW	449	487	529	613	699	786	873	881	
SW	600	653	710	827	946	1070	1190	1200	
WSW	690	750	816	948	1080	1220	1360	1370	
W	607	646	687	770	853	937	1020	1030	
WNW	539	570	603	668	733	798	863	869	
NW	368	390	411	455	499	543	587	591	
NNW	340	360	380	421	462	503	544	548	
TOTAL	15420	17153	19120	23072	27131	31287	35459	35868	

TABLE 2.1.2-2

AGE DISTRIBUTION FOR THE YEAR 2008 FOR THE AREA BETWEEN ZERO AND TEN MILES OF THE SHNPP

0 TO 1 MILES

DIRECTION	AGE 0-13	AGE 14-18	AGE OVER 18
N	0	0	0
NNE	0	0	0
NE	0	0	0
ENE	0	0	0
E	0	0	0
ESE	0	0	0
SE	0	0	0
SSE	0	0	0
S	0	0	0
SSW	0	0	0
SW	0	0	0
WSW	0	0	0
W	0	0	0
WNW	0	0	0
NW	0	0	0
NNW	0	0	0
TOTAL	0	0	0

1

TABLE 2.1.2-2 (continued)

AGE DISTRIBUTION FOR THE YEAR 2008 FOR THE AREA BETWEEN ZERO AND TEN MILES OF THE SHNPP

1 TO 2 MILES

DIRECTION	AGE 0-13	AGE 14-18	AGE OVER 18	
N	0	0	0	
NNE	0	0	0	
NE	0	0	0	
ENE	0	0	0	
E	0	0	0	1
ESE	0	0	0	
SE	0	0	0	
SSE	0	0	0	
S	0	0	0	
SSW	0	0	0	
SW	0	0	0	
WSW	0	0	0	
W	0	0	0	
WNW	0	0	0	
NW	0	0	0	
NNW	11	3	32	
TOTAL	11	3	32	

TABLE 2.1.2-2 (continued)

AGE DISTRIBUTION FOR THE YEAR 2008 FOR THE AREA BETWEEN ZERO AND TEN MILES OF THE SHNPP

2 TO 3 MILES

DIRECTION	AGE 0-13	AGE 14-18	AGE OVER 18
N	13	3	38
NNE	17	5	50
NE	20	5	60
ENE	1	0	4
E	3	1	10
ESE	7	2	22
SE	0	0	0
SSE	0	0	0
S	0	0	0
SSW	0	0	0
SW	2	1	6
WSW	0	0	0
W	5	1	14
WNW	5	1	16
NW	6	2	18
NNW	35	9	105
TOTAL	114	30	343

1

TABLE 2.1.2-2 (continued)

AGE DISTRIBUTION FOR THE YEAR 2008 FOR THE AREA BETWEEN ZERO AND TEN MILES OF THE SHNPP

3 TO 4 MILES

DIRECTION	AGE 0-13	AGE 14-18	AGE OVER 18	
N	15	4	46	
NNE	19	5	55	
NE	19	5	55	
ENE	31	8	93	
E	27	7	80	1
ESE	30	8	89	
SE	24	6	71	
SSE	23	6	68	
S	9	2	27	
SSW	8	2	24	
SW	8	2	24	
WSW	8	2	24	
W	8	2	24	
WNW	8	2	24	
NW	8	2	24	
NNW	8	2	24	
TOTAL	253	65	752	

TABLE 2.1.2-2 (continued)

AGE DISTRIBUTION FOR THE YEAR 2008 FOR THE AREA BETWEEN ZERO AND TEN MILES OF THE SHNPP

4 TO 5 MILES

DIRECTION	AGE 0-13	AGE 14-18	AGE OVER 18
N	18	5	53
NNE	24	6	72
NE	24	6	72
ENE	33	9	99
E	42	11	125
ESE	42	11	125
SE	38	10	114
SSE	17	4	50
S	11	3	32
SSW	11	3	32
SW	11	3	32
WSW	11	3	32
W	11	3	32
WNW	11	3	32
NW	11	3	32
NNW	11	3	32
TOTAL	326	86	966

1

TABLE 2.1.2-2 (continued)

AGE DISTRIBUTION FOR THE YEAR 2008 FOR THE AREA BETWEEN ZERO AND TEN MILES OF THE SHNPP

5 TO 10 MILES

DIRECTION	AGE 0-13	AGE 14-18	AGE OVER 18	
N	158	42	470	
NNE	375	100	1110	
NE	1630	435	4840	
ENE	378	101	1120	
E	649	173	1930	1
ESE	1110	296	3290	
SE	301	80	894	
SSE	202	54	601	
S	180	48	533	
SSW	161	43	477	
SW	217	58	646	
WSW	249	67	740	
W	198	53	587	
WNW	170	45	505	
NW	116	31	343	
NNW	107	29	318	
TOTAL	6201	1655	18404	

TABLE 2.1.2-3

POPULATION ESTIMATES FOR 1980 AND
POPULATION PROJECTIONS FOR THE YEARS
1985 TO 2031 BETWEEN ZERO AND FIFTY MILES OF THE SHNPP

0 TO 10 MILES

DIRECTION	1980	1985	1990	2000	2010	2020	2030	2031
N	552	603	659	773	889	1010	1130	1140
NNE	1000	1130	1280	1590	1910	2240	2560	2590
NE	3900	4420	5000	6200	7440	8710	9980	10100
ENE	1020	1160	1310	1630	1950	2280	2620	2650
E	1660	1880	2130	2640	3170	3700	4250	4300
ESE	2740	3100	3510	4350	5220	6110	7000	7090
SE	911	1010	1130	1350	1590	1830	2070	2090
SSE	676	734	799	925	1050	1180	1310	1320
S	577	622	671	768	865	963	1060	1070
SSW	509	550	596	687	780	874	968	976
SW	665	721	783	908	1040	1160	1290	1310
WSW	750	813	883	1020	1170	1310	1460	1470
W	682	725	771	863	955	1050	1140	1150
WNW	616	651	689	763	837	911	985	991
NW	448	474	500	553	606	659	712	716
NNW	520	556	593	669	746	823	900	908
TOTAL	17226	19149	21304	25689	30218	34810	39435	39871

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TABLE 2.1.2-3 (continued)

POPULATION ESTIMATES FOR 1980 AND
POPULATION PROJECTIONS FOR THE YEARS
1985 TO 2031 BETWEEN ZERO AND FIFTY MILES OF THE SHNPP

10 TO 20 MILES

DIRECTION	1980	1985	1990	2000	2010	2020	2030	2031	
N	17100	18600	20100	23100	26100	29200	32200	32500	
NNE	5520	6030	6590	7700	8850	10000	11200	11300	
NE	50100	56800	64300	79600	95600	112000	128000	130000	
ENE	43400	49200	55700	69100	82900	97000	111000	113000	
E	8430	9550	10800	13400	16100	18800	21600	21800	
ESE	6950	7790	8750	10700	12700	14800	16800	17000	
SE	5710	6190	6720	7750	8790	9840	10900	11000	1
SSE	5260	5700	6180	7120	8070	9030	9990	10100	
S	2970	3220	3490	4020	4560	5100	5640	5690	
SSW	5090	5550	6040	7050	8080	9120	10200	10300	
SW	18500	20200	22100	25800	29600	33500	37500	37800	
WSW	4060	4410	4790	5550	6340	7140	7940	8020	
W	1990	2100	2220	2460	2700	2940	3180	3210	
WNW	3640	3850	4070	4510	4950	5400	5840	5880	
NW	2950	3120	3300	3660	4020	4380	4750	4780	
NNW	26500	29600	33200	40200	47200	54300	61400	62100	
TOTAL	208170	231910	258350	311720	366560	422550	478140	484480	

TABLE 2.1.2-3 (continued)

POPULATION ESTIMATES FOR 1980 AND
POPULATION PROJECTIONS FOR THE YEARS
1985 TO 2031 BETWEEN ZERO AND FIFTY MILES OF THE SHNPP

20 TO 30 MILES

DIRECTION	1980	1985	1990	2000	2010	2020	2030	2031
N	92500	99000	106000	120000	133000	147000	160000	162000
NNE	42000	44800	47800	53600	59500	65400	71300	71900
NE	57600	65300	73900	91600	110000	129000	147000	149000
ENE	79900	90600	103000	127000	153000	178000	205000	207000
E	14700	16000	17500	20400	23400	26400	29500	29800
ESE	5810	6170	6550	7300	8050	8810	9560	9630
SE	23300	25200	27200	31200	35200	39300	43300	43700
SSE	9370	10100	10800	12300	13700	15100	16600	16700
S	8950	9670	10400	11900	13500	15000	16500	16700
SSW	4780	5200	5670	6610	7570	8530	9500	9600
SW	5680	6290	6980	8390	9850	11300	12900	13000
WSW	3120	3380	3680	4280	4890	5520	6140	6200
W	4700	4970	5250	5820	6390	6960	7530	7580
WNW	3440	3620	3810	4200	4580	4960	5350	5380
NW	5100	5300	5530	5930	6330	6720	7110	7150
NNW	17000	19100	21500	26200	30900	35600	40400	40800
TOTAL	377950	414700	455570	536730	619860	703600	787690	796140

1

TABLE 2.1.2-3 (continued)

POPULATION ESTIMATES FOR 1980 AND
POPULATION PROJECTIONS FOR THE YEARS
1985 TO 2031 BETWEEN ZERO AND FIFTY MILES OF THE SHNPP

30 TO 40 MILES

DIRECTION	1980	1985	1990	2000	2010	2020	2030	2031	
N	16900	18200	19700	22500	25400	28200	31100	31400	
NNE	14500	15000	15600	16600	17600	18600	19600	19700	
NE	13700	15300	17100	20700	24400	28200	32100	32400	
ENE	18700	21100	23800	29300	35000	40900	46700	47300	
E	11400	12100	12900	14300	15800	17300	18800	18900	
ESE	19000	20200	21500	23900	26400	28800	31300	31600	1
SE	12300	13200	14100	15900	17800	19600	21500	21700	
SSE	14900	15800	16800	18500	20200	21900	23500	23700	
S	114000	121000	128000	141000	154000	166000	179000	180000	
SSW	3860	4230	4650	5490	6350	7220	8090	8170	
SW	12800	14500	16500	20600	24900	29300	33800	34200	
WSW	7090	8020	9060	11200	13500	15800	18200	18400	
W	8830	9480	10200	11500	12900	14300	15700	15900	
WNW	11000	11700	12400	13900	15400	16800	18300	18500	
NW	34100	34200	34300	34100	33800	33400	32900	32800	
NNW	21800	23400	25100	28500	31800	35100	38400	38700	
TOTAL	334880	357430	381710	427990	475250	521420	568990	573370	

TABLE 2.1.2-3 (continued)

POPULATION ESTIMATES FOR 1980 AND
POPULATION PROJECTIONS FOR THE YEARS
1985 TO 2031 BETWEEN ZERO AND FIFTY MILES OF THE SHNPP

40 TO 50 MILES

DIRECTION	1980	1985	1990	2000	2010	2020	2030	2031
N	8410	8910	9440	10500	11500	12600	13700	13800
NNE	8070	8190	8310	8490	8660	8810	8950	8970
NE	13900	14700	15400	16900	18400	19900	21400	21500
ENE	10000	10600	11300	12600	13900	15200	16500	16700
E	14200	15100	15900	17600	19300	21000	22600	22800
ESE	10200	10800	11500	12800	14000	15300	16600	16700
SE	7070	7410	7760	8460	9170	9870	10600	10600
SSE	12500	13200	13900	15300	16600	17900	19200	19300
S	101000	108000	114000	126000	138000	149000	160000	161000
SSW	12700	14100	15500	18600	21800	25000	28200	28500
SW	20400	23200	26300	32800	39600	46600	53700	54400
WSW	8770	9740	10800	13100	15400	17800	20200	20500
W	34400	37400	40600	47000	53600	60200	66800	67400
WNW	24200	25800	27500	30800	34100	37500	40900	41200
NW	64300	64900	65600	66200	66600	66800	67000	67000
NNW	9380	9650	9950	10500	11000	11500	12000	12000
TOTAL	359500	381700	403760	447650	491630	534980	578350	582370

1

TABLE 2.1.2-4

CUMULATIVE POPULATION ESTIMATES AND PROJECTIONS BETWEEN ZERO AND FIFTY MILES OF THE SHNPP

YEAR	0-1	0-2	0-3	0-4	0-5	0-10	1-20	0-30	0-40	0-50	
1980	0	25	321	967	1800	17200	225000	603000	938000	1300000	
1985	0	28	355	1070	1990	19200	251000	666000	1020000	1400000	
1990	0	32	394	1190	2210	21300	280000	735000	1120000	1520000	
2000	0	40	472	1420	2630	25700	337000	873000	1300000	1750000	1
2010	0	48	552	1660	3070	30200	397000	1020000	1500000	1990000	
2020	0	56	634	1910	3520	34800	457000	1160000	1680000	2210000	
2030	0	64	716	2150	3970	39400	518000	1310000	1880000	2460000	
2031	0	65	724	2170	4000	39900	524000	1320000	1890000	2470000	

TABLE 2.1.2-5

AGE DISTRIBUTION FOR THE YEAR 2008 FOR THE AREA BETWEEN ZERO AND FIFTY MILES OF THE SHNPP

0 TO 10 MILES

DIRECTION	AGE 0-13	AGE 14-18	AGE OVER 18	
N	204	54	607	
NNE	435	116	1290	
NE	1690	451	5030	
ENE	443	118	1320	
E	721	192	2140	1
ESE	1190	317	3530	
SE	363	96	1080	
SSE	242	64	719	
S	200	53	592	
SSW	180	48	533	
SW	238	64	708	
WSW	268	72	796	
W	222	59	657	
WNW	194	51	577	
NW	141	38	417	
NNW	172	46	511	
TOTAL	6903	1839	20507	

TABLE 2.1.2-5 (continued)

AGE DISTRIBUTION FOR THE YEAR 2008 FOR THE AREA BETWEEN ZERO AND FIFTY MILES OF THE SHNPP

10 TO 20 MILES

DIRECTION	AGE 0-13	AGE 14-18	AGE OVER 18
N	6020	1610	17900
NNE	2030	542	6030
NE	21700	5810	64600
ENE	18900	5040	56000
E	3660	976	10900
ESE	2900	774	8610
SE	2020	540	6010
SSE	1860	496	5520
S	1050	280	3120
SSW	1860	495	5510
SW	6810	1820	20200
WSW	1460	389	4330
W	625	167	1860
WNW	1150	306	3410
NW	932	249	2770
NNW	10800	2880	32000
TOTAL	83777	22374	248770

1

TABLE 2.1.2-5 (continued)

AGE DISTRIBUTION FOR THE YEAR 2008 FOR THE AREA BETWEEN ZERO AND FIFTY MILES OF THE SHNPP

20 TO 30 MILES

DIRECTION	AGE 0-13	AGE 14-18	AGE OVER 18
N	30700	8210	91300
NNE	13800	3670	40900
NE	25000	6680	74300
ENE	34700	9260	103000
E	5370	1430	16000
ESE	1860	497	5530
SE	8110	2170	24100
SSE	3160	844	9390
S	3100	828	9220
SSW	1740	464	5160
SW	2250	601	6690
WSW	1120	300	3340
W	1480	395	4390
WNW	1060	283	3150
NW	1470	393	4380
NNW	7050	1880	20900
TOTAL	141970	37905	421750

1

TABLE 2.1.2-5 (continued)

AGE DISTRIBUTION FOR THE YEAR 2008 FOR THE AREA BETWEEN ZERO AND FIFTY MILES OF THE SHNPP

30 TO 40 MILES

DIRECTION	AGE 0-13	AGE 14-18	AGE OVER 18
N	5850	1560	17400
NNE	4110	1100	12200
NE	5580	1490	16600
ENE	7970	2130	23700
E	3660	977	10900
ESE	6100	1630	18100
SE	4110	1100	12200
SSE	4690	1250	13900
S	35700	9540	106000
SSW	1450	388	4320
SW	5660	1510	16800
WSW	3070	820	9130
W	2980	796	8860
WNW	3550	948	10600
NW	7990	2130	23700
NNW	7330	1960	21800
TOTAL	109800	29329	326210

1

TABLE 2.1.2-5 (continued)

AGE DISTRIBUTION FOR THE YEAR 2008 FOR THE AREA BETWEEN ZERO AND FIFTY MILES OF THE SHNPP

40 TO 50 MILES

DIRECTION	AGE 0-13	AGE 14-18	AGE OVER 18
N	2670	713	7940
NNE	2040	543	6050
NE	4270	1140	12700
ENE	3220	859	9560
E	4470	1190	13300
ESE	3250	868	9660
SE	2130	568	6320
SSE	3850	1030	11400
S	31900	8520	94800
SSW	4980	1330	14800
SW	9000	2400	26700
WSW	3520	940	10500
W	12300	3290	36600
WNW	7890	2110	23400
NW	15700	4190	46600
NNW	2570	686	7630
TOTAL	113760	30377	337960

1

2.1.3 USES OF ADJACENT LANDS AND WATERS

Figure 2.1.3-1 includes land contours, site boundary, exclusion boundary, CP&L property, area properties, water bodies, and transportation links. There are no settlements, commercial areas, industrial plants, dedicated areas, or valued historic, scenic, cultural, or natural areas on CP&L property.

Total land area owned by CP&L in the plant vicinity is approximately 22,850 ac. Total required site area (station property) is approximately 10,800 ac. Approximately 4000 ac. are utilized by the Main Reservoir, and about 1217 ac. are used for plant related activities.

The Harris Energy & Environmental Center is located approximately 2.1 miles ENE of the plant. The facility houses various CP&L environmental testing and training laboratories and includes a visitors' center. A Boy Scout camping area is located approximately 3.7 mi. SSE of the site, and a private nursing home is located approximately 2.2 mi. NE.

Table 2.1.3-1 indicates the distances from the center line of the first operational nuclear unit to the nearest milk cow, milk goat, residence, site boundary, vegetable garden and meat animal. Distances are indicated for each of the 16 sectors as described in Section 2.1.2 to a radial distance of 5 mi.

The majority of the land within the five-mile radial area is wooded, with a
scattering of fields and residential properties (Figure 2.1.3-2). The reservoir 1
area is now cleared and filling with water. Much of the land is used for timber
and pulpwood production. Agricultural development exists on a limited basis,
and three dairy farms are in operation. Major commercial and expanded
residential development is not expected to occur due to the poor septic
characteristics of the soils and the lack of adequate sewage and water systems.

Due to CP&L's land and reservoir use policy, there will be some recreational usage of CP&L's property. It is the policy of CP&L to make available for the enjoyment of the general public the lands and waters of the SHNPP and reservoir consistent with their primary purpose — the generation of electric power. Property in the flood control strip around the reservoir and plant will not be sold or leased by CP&L for private development. Private construction of piers, docks, moors, boat houses, or similar facilities in or adjacent to the reservoir will not be permitted.

To permit the greatest use by the greatest number of people, the Company will cooperate with appropriate State agencies to provide public access for boating, fishing, hunting, and other uses which are not inconsistent with the primary purpose of the lands and waters. It is the desire of CP&L that the public benefits of the SHNPP reservoir and property shall contribute to the quality of life in the area, in addition to meeting the power needs of all its customers.

Consistent with the provisions of the SHNPP land policy, CP&L will permit the appropriate State agencies to establish wildlife refuge areas adjacent to the reservoir and a wildlife management program for the Company-owned lands. The development of a favorable sport fishery in the Main Reservoir is expected to result from existing Whiteoak and Buckhorn creek populations with some seeding from Cape Fear River makeup water. Operational monitoring programs (Section 6.2) will be conducted.

A majority of the land within a 50-mile radial area of the plant is devoted to some form of agricultural activity. Major crops include tobacco, soybeans, corn for grain and sweet potatoes. Secondary crops include corn for silage, other grain crops and hay. Livestock production includes hog, beef, poultry, and dairy products. Data on annual agricultural, livestock, and poultry production within a 50-mile radius of the plant for sectors as described in Section 2.1.2 are presented in Tables 2.1.3-2 and 2.1.3-3 (Reference 2.1.3-1).

Commercial fish and shellfish catch is negligible from waters within 50 mi. of the station discharge. A small number of American shad, striped bass and blueback herring are harvested seasonally (spring) from the Cape Fear River below Lillington. This number is considered insignificant as compared to North Carolina's commercial fishing harvest. The nearest commercial fishery port is Wilmington, North Carolina, approximately 150 river miles downstream of the site. Commercial catches reported for Wilmington are principally salt water species harvested from the lower Cape Fear River estuary and from the Atlantic Ocean.

Recreational fishing catch within the 50-mile radial area is dominated by sunfish species, largemouth bass, and catfish (Reference 2.1.3-2). The limited number of lakes within the area and the fact that there are no estuarine or salt water bodies principally confines sport fishing to private ponds, impounded areas, and bridge crossings on rivers and streams. Data estimating catch for this type of recreational fishing in North Carolina are not available. However, the small catch which is associated with this fishing would probably not be a principal food source for residents within the 50-mile area.

In addition to the SHNPP reservoir, the development of the Falls of the Neuse Project and the New Hope Project will create two large reservoirs within 30 mi. of the SHNPP site. Fish species similar to those discussed in Section 5.1.3 are expected to develop in the reservoirs. Each reservoir will provide significant recreational fishing opportunities, thus increasing the region's recreational fishery harvest.

The cooling tower blowdown pipeline discharges into the Main Reservoir just north of the Main Dam. Discharges will enter the reservoir via a submerged discharge outfall, and the public will have access to the discharge area. Although a reasonable sport fishery is expected to develop in the reservoir, limited fishing success in the area affected by plant discharges is expected.

As discussed in Sections 5.1.3 and 5.3, the thermal and chemical effects of the
1 cooling tower blowdown are expected to be minimal and to be restricted to a small mixing zone (ranging from 90 to 200 acres). Fishing success in the mixing zone area, which represents only two to five percent of the reservoir's surface area, is not expected to be as good as in other parts of the reservoir. For the most part, the anticipated lower fishing success in the mixing zone area will result from the lack of favorable habitat for the expected important species—largemouth

TABLE 2.1.3-2

1980 AGRICULTURAL PRODUCTION OF MAJOR CROPS
BETWEEN ZERO AND FIFTY MILES OF THE SHNPP

0 TO 10 MILES

DIRECTION	SOYBEANS	TOBACCO	SWEET POTATOES	CORN FOR GRAIN
N	134000	286000	28600	316000
NNE	288000	708000	82800	316000
NE	288000	708000	82800	316000
ENE	288000	708000	82800	316000
E	288000	708000	82800	316000
ESE	288000	708000	82800	316000
SE	486000	775000	182000	767000
SSE	574000	748000	230000	1020000
S	388000	512000	144000	746000
SSW	181000	319000	24100	287000
SW	180000	306000	21600	284000
WSW	195000	344000	26200	276000
W	90100	143000	8220	310000
WNW	66500	99700	4720	317000
NW	66500	99700	4720	317000
NNW	80900	135000	8870	332000
TOTAL	3882000	7307400	1097030	6552000

1

All data reported in kilograms
Basis: Reference 2.1.3-1

TABLE 2.1.3-2 (continued)

1980 AGRICULTURAL PRODUCTION OF MAJOR CROPS BETWEEN ZERO AND FIFTY MILES OF THE SHNPP

10 TO 20 MILES

DIRECTION	SOYBEANS	TOBACCO	SWEET POTATOES	CORN FOR GRAIN	
N	273000	531000	24800	758000	
NNE	686000	1690000	182000	771000	
NE	837000	2060000	241000	918000	
ENE	795000	1950000	228000	871000	
E	917000	2250000	274000	1010000	1
ESE	1220000	2370000	1290000	2030000	
SE	2060000	2480000	856000	3710000	
SSE	2140000	2560000	890000	3860000	
S	2150000	2570000	892000	3870000	
SSW	1240000	1730000	371000	1850000	
SW	770000	1310000	93000	790000	
WSW	592000	986000	66300	849000	
W	173000	224000	4440	956000	
WNW	175000	228000	4500	969000	
NW	172000	223000	4590	937000	
NNW	316000	399000	14400	1200000	
TOTAL	14516000	23561000	5436030	25349000	

All data reported in kilograms
Basis: Reference 2.1.3-1

TABLE 2.1.3-2 (continued)

1980 AGRICULTURAL PRODUCTION OF MAJOR CROPS
BETWEEN ZERO AND FIFTY MILES OF THE SHNPP

20 TO 30 MILES

DIRECTION	SOYBEANS	TOBACCO	SWEET POTATOES	CORN FOR GRAIN
N	636000	1180000	56300	1360000
NNE	654000	1610000	115000	806000
NE	1420000	3490000	408000	1560000
ENE	1440000	3550000	415000	1580000
E	2740000	4600000	5110000	5800000
ESE	3460000	5240000	7570000	8060000
SE	3560000	4410000	2310000	6670000
SSE	3280000	3630000	1280000	5840000
S	3530000	4070000	1420000	6330000
SSW	2900000	3630000	1120000	5050000
SW	823000	1610000	103000	1120000
WSW	540000	1070000	59900	1230000
W	319000	413000	8170	1760000
WNW	332000	437000	8430	1720000
NW	873000	1180000	27300	3100000
NNW	894000	1120000	49100	2670000
TOTAL	27401000	41240000	20060200	54656000

1

All data reported in kilograms
Basis: Reference 2.1.3-1

TABLE 2.1.3-2 (continued)

1980 AGRICULTURAL PRODUCTION OF MAJOR CROPS BETWEEN ZERO AND FIFTY MILES OF THE SHNPP

30 TO 40 MILES

DIRECTION	SOYBEANS	TOBACCO	SWEET POTATOES	CORN FOR GRAIN	
N	1000000	1690000	79200	2380000	
NNE	1190000	3530000	129000	1750000	
NE	2060000	4730000	463000	2420000	
ENE	2380000	5270000	1720000	3300000	1
E	4720000	7170000	10400000	11000000	
ESE	4670000	7090000	10300000	10900000	
SE	4930000	5670000	6210000	13900000	
SSE	4250000	2100000	1220000	8120000	
S	4130000	1740000	805000	6710000	
SSW	3660000	1650000	249000	3430000	
SW	490000	1440000	70600	1300000	
WSW	506000	1340000	63900	1540000	
W	817000	602000	9750	4550000	
WNW	925000	1040000	16900	4430000	
NW	1390000	1960000	33700	5010000	
NNW	1320000	1710000	60100	4200000	
TOTAL	38438000	48732000	31830150	84940000	

All data reported in kilograms
Basis: Reference 2.1.3-1

TABLE 2.1.3-2 (continued)

1980 AGRICULTURAL PRODUCTION OF MAJOR CROPS
BETWEEN ZERO AND FIFTY MILES OF THE SHNPP

40 TO 50 MILES

DIRECTION	SOYBEANS	TOBACCO	SWEET POTATOES	CORN FOR GRAIN
N	499000	5030000	31100	4410000
NNE	1450000	4920000	26500	2840000
NE	3100000	5880000	449000	4860000
ENE	3230000	6670000	3220000	6090000
E	5420000	10800000	10400000	18100000
ESE	7400000	9120000	9870000	22000000
SE	6210000	5200000	5200000	22900000
SSE	6030000	3830000	3280000	16600000
S	5970000	2320000	865000	8940000
SSW	7730000	1630000	99600	5190000
SW	642000	1750000	87400	1650000
WSW	607000	1490000	77400	1780000
W	1210000	778000	12200	6750000
WNW	1120000	1670000	21700	5980000
NW	1390000	2810000	40500	5620000
NNW	1160000	3520000	43800	4510000
TOTAL	53168000	67418000	33724200	138220000

1

All data reported in kilograms
Basis: Reference 2.1.3-1

TABLE 2.1.3-2 (continued)

1980 AGRICULTURAL PRODUCTION OF MAJOR CROPS
BETWEEN ZERO AND FIFTY MILES OF THE SHNPP

CUMULATIVE TOTALS

SECTOR	SOYBEANS	TOBACCO	SWEET POTATOES	CORN FOR GRAIN	
00 TO 10	3882000	7307400	1097030	6552000	1
00 TO 20	18398000	30868400	6533060	31901000	
00 TO 30	45799000	72108400	26593260	86557000	
00 TO 40	84237000	120840400	58423410	171497000	
00 TO 50	137405000	188258400	92146710	309717000	

All data reported in kilograms
Basis: Reference 2.1.3-1

2.2.1 SITE TERRESTRIAL ECOLOGY

2.2.1.1 Site Terrestrial Flora

The SHNPP site occupies approximately 10,800 acres of land within the Buckhorn-Whiteoak Creek watershed, a tributary system of the Cape Fear River. Because the agricultural history of the Buckhorn-Whiteoak basin generally follows that of the Piedmont province, the entire project area is an aggregate of farmland, abandoned fields, and forests of various ages. While farming was once a major occupation on the SHNPP site, the primary land use at the time CP&L acquired the project land was the production of pulpwood and other wood products. The existing vegetation characteristics of the site were the outcome of disturbance through clearing, farming, and logging followed by the natural process of secondary succession. To identify the vegetation characteristics of the SHNPP site, baseline botanical investigations were designed to include qualitative and quantitative determinations of species and community types. Qualitatively, 452 species of vascular plants (Table 2 in Reference 2.2.0-5) were identified within seven generalized vegetative communities (Table 2.14 in Reference 2.2.0-4). These plants and communities were identified during field sampling throughout the project area with special emphasis within four terrestrial sample areas (Figure 2 in Reference 2.2.0-5). Quantitative botanical evaluations included vegetation cover mapping of the project area (Figures 3.6-1 through 3.6-6 in SHNPP Construction Permit Environmental Report) with the resulting acreage estimates (Table 2.14 in Reference 2.2.0-4) and quarter method analyses of the two wooded sample areas.

Estimates based on the 1972 vegetation cover map indicated that 8% of the SHNPP project area was in field and 14% was cutover woodlands. The remaining 78% was covered by forests of various types.

Results of botanical studies of four terrestrial sample areas indicated that the vegetation of the SHNPP project area was typical of the eastern portion of the Piedmont province of North Carolina. The fields and cleared areas were undergoing changes described as secondary or "old field" succession. The areas covered with forests were also undergoing successional changes, although these changes were not as easily detectable.

The two old field sample areas were representative of the majority of the fields throughout the project area. In 1972, these areas were dominated by various herbaceous plants such as grasses, (Poaceae), asters (Asteraceae), and other forbs. By 1978, the areas were being invaded by woody species including pines (*Pinus* spp.) river birch (*Betula nigra*), black willow (*Salix nigra*), and oaks (*Quercus* spp). These changes in species dominance were expected and predictable, and if allowed to continue, would reflect the development of these areas into hardwood forests.

The two wooded transects were representative of the majority of the vegetation of the SHNPP project area. This included forests in various stages of succession, from young pine stands to fairly mature hardwood stands. These forests represented the later stages of secondary succession, and reflected the ultimate fate of the abandoned fields and cutover areas. Eventually, if not disturbed, the majority of the project area would become a forest dominated by various species of oaks, hickories (Carya spp.), sourwood (Oxydendrum arboreum), pines and red maple (Acer rubrum) (Table 2.15 in Reference 2.2.0-4). Some variation in species composition would occur in areas along stream bottoms, where more water tolerant species such as river birch, sycamore (Platanus occidentalis), and yellow poplar (Liriodendron tulipifera) would predominate.

Because the creeks within the SHNPP site were generally well shaded and highly variable in flow, few aquatic macrophytes existed there. However, aquatic vegetation was prevalent along the banks of the Cape Fear River, and growths were readily visible among the exposed rocks and islands, especially during low flow conditions. The emergent water willow (Justica americana) was a macrophyte found in and along the river. Elodea (Elodea canadensis), filamentous algae (probably Cladophora sp.) and riverweed (Podostemum ceratophyllum) comprised a major portion of the aquatic river vegetation.

1 The results of construction phase monitoring at SHNPP are presented in the annual reports for 1978 and 1979 (References 2.2.0-7 and 2.2.0-8). Construction effects are discussed in Section 4.1.3 of the document.

2.2.1.2 Site Terrestrial Fauna

The available wildlife habitat in the Buckhorn-Whiteoak watershed, although diverse, generally was conceded to be of below average quality. That evaluation was initially based on a U. S. Bureau of Sport Fisheries and Wildlife survey of the Buckhorn-Whiteoak basin conducted in the fall of 1969 (Table 2.16 in Reference 2.2.0-4).

Generally, the wildlife habitat and the wildlife populations identified at the SHNPP site were characteristic of the Piedmont province of North Carolina. More specifically, the habitat and associated wildlife were typical of a highly exploited, but relatively uninhabited area of the Piedmont. A variety of non-game wildlife species was observed in the various habitats of the project area. Although small game species were common in appropriate habitats, big game species were nearly non-existent.

The baseline inventory study of the amphibians and reptiles inhabiting the SHNPP site was conducted by recording observations during all phases of terrestrial vertebrate field studies. The primary source of data regarding bird species inhabiting the SHNPP site was periodic roadside surveys. In addition to the quantitative data provided by the roadside surveys, qualitative information was obtained by recording observations by species throughout the project area with emphasis on the four terrestrial sample areas. Information concerning the game bird populations was obtained by conducting call count surveys along the avifauna routes during the spring and summer of 1976 and 1977. The mammal investigations of the SHNPP site consisted of small mammal trapping at the terrestrial sample areas supplemented by observations of mammals or mammal sign throughout the project area. A leafnest survey of the site was conducted in mid-winter of four

2.3 METEOROLOGY

2.3.1 REGIONAL CLIMATOLOGY

The SHNPP site lies in the transition zone delineating the Coastal Plain Region and the Piedmont Region of North Carolina. Climatology of North Carolina largely depends on elevation above sea level and distance from the Atlantic Ocean. At an elevation of about 260 ft. MSL and 115 mi. from the nearest Atlantic coastline, the site area has a temporate climatic regime. Stations representing the regional climatology, their locations with respect to the site area, and their elevations are presented in Table 2.3.1-1.

The summer months of June, July, and August are characterized by a southwesterly air flow resulting from the extension of the Azores-Bermuda high pressure system. This Gulf of Mexico and occasionally Atlantic moisture laden air produces the bulk of precipitation for these months in the form of afternoon and evening thundershowers. During this three-month period, an average of 39 days reach 90F or above as reported by the Raleigh-Durham Weather Service, the nearest first-order reporting station to the site area. July is the hottest month at all stations within the site area. These months can be quite oppressive with dewpoints averaging between 66 and 67F (Reference 2.3.1-1).

The autumn months of September, October, and November show a gradual decrease of average temperature of about 10F per month. The combination of residual summer moisture and increased radiational cooling due to longer nights makes this the season of highest fog frequency. Although precipitation is distributed rather uniformly on an annual basis, the autumn months tend to be the driest. Daytime heating is not sufficiently intense to produce significant convective activity, and the general north-south temperature gradient has not substantially materialized to generate strong frontal precipitation. Winds tend to the northeast during the autumn reflecting a change in the pressure distribution. The summer wind flow configuration of a high pressure system offshore, and a lower pressure system over the continent is replaced by the northerly wind flow configuration of a continental high pressure system with a lower pressure systems centered offshore. The land-sea temperature contrast favors higher pressure over the ocean in spring and summer, higher pressure over the continent in autumn and winter, thus providing the seasonal reversal of wind directions. The higher autumnal northeastern frequency when compared to the winter frequency is the result of slower moving autumnal synoptic systems.

The winter months of December, January, and February show a shift of the wind direction frequency into the westerly quadrants from the northeasterly fall season distribution responding to a strengthened westerly component added to the predominant southwest-northeast bimodal distribution. January is the coldest month, averaging 18 days with a minimum temperature below 32F at the Raleigh-Durham Weather Service (Reference 2.3.1-1). Cold air outbreaks are either blocked or significantly modified by the Appalachian Mountain chain located some 150 miles to the west and northwest of the site. Most sustained winter precipitation is the result of two storm tracks. One track originates in the warm waters of the western Gulf of Mexico, then crosses Florida skirting the Atlantic Coast northward. The second track is called the "Cape

Hatteras Low", so named because the temperature contrast of the off-shore gulf stream and shape of the coastline just south of Cape Hatteras, N. C. provide excellent breeding conditions for cyclonic circulations. These two storm tracks are responsible for virtually all of the snowfall in the site area, January accumulating the greatest average snowfall totals.

The spring months of March, April, and May are characterized by consistently rising temperatures on the order of 9F per month. Precipitation occurs in a mixed mode of frontal and convective forms. This transitional season generally possesses more winter than summer characteristics. The mean date of the last 32F temperature for the area is around the first week in April (Reference 2.3.1-1). Maximum average wind speeds are generally observed in this season due to the intensity of the general north-south temperature gradient.

2.3.2 ATMOSPHERIC CONDITIONS

The extent of vertical mixing is a major factor in determining atmospheric diffusion characteristics. As a rule, mixing depths are characterized by a diurnal cycle of a nighttime minimum and a daytime maximum. The nighttime minimum is the result of surface radiational cooling producing stable conditions, frequently coupled with a low level inversion or isothermal layer.

The mid-afternoon maximum is attributable to surface heating producing instability and convective overturning through a larger portion of the atmosphere. Mean mixing depths also show a seasonal cycle of a winter season minimum and a summer season maximum. Holzworth (Reference 2.3.2-1) has shown this by listing monthly mean maximum mixing depths. Table 2.3.2-1 lists these results for Greensboro (nearest data point to plant site). The lowest mean maximum mixing depth occurs in January (390m), and the greatest mean maximum depth in June (1790m).

Low level inversions inhibit vertical mixing of the atmosphere. Hosler (Reference 2.3.2-2) has compiled frequencies based on the percent of total hours of occurrence of an inversion or isothermal layer based below 500 ft. The frequency of those low level inversions for Greensboro are presented in Table 2.3.2-2. The summer season averages inversions about 33 percent of all hours. Comparatively, inversions exist during approximately 43 percent of all hours during the winter season.

Cases of high air pollution potential occur during periods of stagnating anticyclones which exhibit low surface winds, no precipitation, and a shallow mixing depth resulting from a subsidence inversion. These conditions occur most frequently at the plant site during the fall months, particularly October. According to Korshover (Reference 2.3.2-3) about 32 cases of autumnal atmospheric stagnation, lasting four days or more, occurred during the period 1936-1970. A total of four cases lasting seven days or more were recorded during the same 35-year period.

2.3.3 TEMPERATURE

Monthly and annual summaries of climatological normal maximum, minimum, and average temperatures for Raleigh-Durham (Reference 2.3.3-1), Greensboro (Reference 2.3.3-2), Charlotte (Reference 2.3.3-3), Moncure (Reference

2.3.3-4), Pinehurst (Reference 2.3.3-4), and Asheboro (Reference 2.3.3-4) are given in Table 2.3.3-1. Monthly and annual onsite mean temperature data for January 1976 through December 1978 is presented in Table 2.3.3-2. The mean maximum and minimum temperature data from the onsite meteorological station is shown in Table 2.3.3-3. The site area diurnal temperature range spans from about 20F in the winter and summer seasons to around 25F in the transitional autumn and spring months (Reference 2.3.1-1). Measured maximum and minimum temperature extremes for the offsite stations are summarized in Table 2.3.3-4. The lowest temperature recorded was a -7F in January of 1940 in Greensboro, the highest recorded temperature being a 107F reading at Moncure in July of 1952 (References 2.3.3-1, 2.3.3-2, 2.3.3-3, 2.3.3-4).

2.3.4 WATER VAPOR

Mean monthly and annual dewpoint temperatures and corresponding absolute humidity values for Raleigh-Durham, Charlotte, and Greensboro are given in Table 2.3.4-1 (Reference 2.3.1-1). Monthly and annual onsite dewpoint temperatures for the period January 1976 through December 1978 are given in Table 2.3.4-2. The onsite average dewpoint temperature of 47.4F compares very well to the 48F average dewpoint temperature observed at Raleigh-Durham, although winter dewpoint temperatures tend to be lower at the site and summer values a little higher.

A maximum persisting 12-hour surface dewpoint temperature of record for the site area is approximately 77F and would be expected to occur during a period of extended air flow trajectories from the Gulf of Mexico (Reference 2.3.1-1).

Diurnal variations of relative humidity for Charlotte, Greensboro, and Raleigh-Durham are given in Table 2.3.4-3 for the local standard times of 1:00 a.m., 7:00 a.m., 1:00 p.m., and 7:00 p.m. (Reference 2.3.3-1, 2.3.3-2, 2.3.3-3). The 7:00 a.m. and 1:00 p.m. times correspond to the general maximum and minimum respective values of the diurnal relative humidity cycle, with 1:00 a.m. and 7:00 p.m. providing approximate midrange values. The late summer to early fall maximum of early morning (7:00 a.m.) relative humidity values results in a maximum of radiational fog frequency occurring at this time of year. See Section 5.1.4 for fogging and icing potentials.

2.3.5 PRECIPITATION

Precipitation is rather uniformly distributed on an annual basis in the site region. Table 2.3.3-1 gives climatological normal monthly and annual precipitation amounts for nearby recording stations (Reference 2.3.3-1, 2.3.3-2, 2.3.3-3). Onsite precipitation totals are summarized in Table 2.3.5-1. Climatologically, July has a tendency to be the wettest month, October the driest; but, the variance is small such that the region does not possess a "wet" and "dry" season. Extreme precipitation amounts for nearby recording stations are listed in Table 2.3.3-4 (Reference 2.3.3-1, 2.3.3-2, 2.3.3-3). The extreme rainfall rates summary for the onsite facility for the January 1976 through December 1978 period is shown in Table 2.3.5-2. The onsite extreme rainfall rates for all time periods included by the table occurred on the same date, March 21, 1976, with a maximum 24-hour precipitation total of 4.41 in.

On an average the site area receives precipitation one day in three. Table 2.3.5-3 displays precipitation statistics for the stations of Raleigh-Durham, Greensboro, and Charlotte (Reference 2.3.5-1). These statistics are presented for the months of January, April, June, and October which are considered representative of the four seasons. Table 2.3.5-3e indicates that precipitation intensities during July are about double those of January. Table 2.3.5-3f further characterizes the higher intensity, shorter duration July precipitation versus lower intensity, longer duration January precipitation. Generally, winter precipitation duration is about twice as long as that of July. However, daily rain totals are generally smaller. The transitional April and October months seem to fit the winter precipitation regime better, partly due to slower moving rain systems in the transitional seasons than in mid-winter. Onsite data showing the number of hours with measurable precipitation by month and year including the overall average for the January 1976 through December 1978 period is depicted in Table 2.3.5-4.

Seasonal and annual precipitation wind roses for Raleigh-Durham (Reference 2.3.5-2) are illustrated by Figures 2.3.5-1 and 2.3.5-2. Onsite precipitation wind roses for the period January 1976 through December 1978 are presented in Figure 2.3.5-3. A northeast-southwest wind frequency distribution is the dominate flow regime during precipitation periods for both stations. Extreme precipitation totals for representative offsite stations are shown by Table 2.3.3-4 along with measured extreme snowfall totals (References 2.3.3-1, 2.3.3-2, 2.3.3-3, 2.3.3-4).

2.3.6 WIND DISTRIBUTIONS

Wind direction and speed distributions are essential parameters for determining site characteristic diffusion climatology. Onsite joint frequency distributions of direction and speed by stability class and a summary of all winds as outlined by Regulatory Guide 1.23 (Reference 2.3.6-1) for the period January 1976 through December 1978 are given by Tables 2.3.6-1A through 2.3.6-1D. Annual and seasonal wind roses for Raleigh (Reference 2.3.5-2), Greensboro (Reference 2.3.6-2), and Charlotte (Reference 2.3.6-3) are illustrated by Figures 2.3.6-1 through 2.3.6-6.

The Raleigh (1955-1964) joint frequency distribution of wind direction and speed by Pasquill stability classes is given in Tables 2.3.6-2A through 2.3.6-2G. Pasquill stability classes were determined by the STAR method (Reference 2.3.5-2). Stability classes F and G were combined into F stability.

Despite differing techniques used to determine atmospheric stability (delta temperature method for onsite data and the STAR method for Raleigh data), the onsite joint wind frequencies of Table 2.3.6-1 compare favorably to those compiled for Raleigh. Neutral (D) and slightly stable (E) stability classes occur most frequently at both stations. However, Stable (F) and extremely stable (G) stability classes are more frequent at the onsite meteorological station. This is due in part to some nighttime cold air drainage into the broad, shallow basin in which the site is located (See Section 2.3.8).

The characteristic northeast-southwest bimodal frequency distribution is evident at all locations and is depicted by the onsite wind rose given in

Figure 2.3.6-7. Average annual wind speeds from the area offsite stations are rather uniform ranging from 6.9 mph at Charlotte to 7.9 mph at Raleigh-Durham.

The onsite lower level (12.5m) mean wind speed based on 1976-1978 data is 4.6 mph. The onsite value is about 35 percent lower than the 7.1 mph value observed at the Raleigh-Durham Weather Service. Differing time periods, averaging methods, and instrumentation account, in part, for the lower average onsite wind speed value.

It is believed that topography probably is the single most influential factor resulting in the lower average onsite wind speed. The SHNPP site lies in a broad, shallow 200 ft. deep basin extending about ten miles in directions west through south of the site (see Section 2.3.8). Cold air drainage into a basin during the night is a common occurrence in some areas. This phenomena tends to reduce the vertical momentum flux having a discoupling effect on the wind flow in the site area and thereby contributing to light surface winds. This colder air is denser than the surrounding environment, and therefore, difficult to displace and, in fact, quite often remains until dissipated soon after sunrise by the influx of solar radiation. Although unconfirmed, this phenomena is believed to be the major factor resulting in lower onsite wind speeds compared to those observed at the Raleigh-Durham Weather Service.

From the seasonal wind roses, the southwesterly component is most evident in the spring, summer, and winter seasons. The higher frequency of northeast wind directions in the fall, is the result of a trend toward continental high pressure systems introducing a northerly wind flow and the slower movement of synoptic systems due to weak upper level steering currents prevailing at this time of year. Winds from the southeastern quadrant are rare and for the most part preceed warm frontal passages.

Wind direction persistence for the on-site data is defined as the number of consecutive hours during which the wind direction was from the same 22.5 degree direction sector. Tables 2.3.6-3A through 2.3.6-3P show the number of hours of persisting wind directions by stability class as recorded at the 12.5m and 61.4 onsite levels of operation for the SHNPP. The maximum period of persistent wind direction for the 60 meter level was from the south-southwest and lasted 37 hours. The same synoptic pattern produced the maximum period of persistent wind direction at the 125 meter level which lasted 30 hours. Maximum persisting winds at both levels were out of the south-southwest direciton and ended at the same time. Figure 2.3.6-8 presents a graph of the number of persisting wind direction probability of one-sector wind direction persistence occurrence. An estimate of the percent of the total time a given number of wind persistence hours occurs can be taken directly from Figure 2.3.6-8. For example, a 10-hour wind direction persistence from any one of the 16 compass directions occurred about 2 percent of the total hours.

Sustained winds greater than 50 knots have occurred only twice in the past 24 years as recorded by the Raleigh-Durham Weather Service. A one-minute average 69 mph wind from the southwest was recorded during a thunderstorm on July 21, 1962. A maximum site area one-minute average wind of 73 mph from the west-northwest was recorded during Hurricane Hazel on October 15, 1954.

(Reference 2.3.3-1). A complete list of hurricanes affecting the site area, the amount of precipitation, and fastest-mile wind associated with each is given by Table 2.3.6-4. The intensities of wind and precipitation produced by hurricanes at the plant site are generally no greater than those produced by severe thunderstorms.

2.3.7 ATMOSPHERIC TRANSPORT PROCESSES TO 50 MILES

Meteorological data and analysis of the preceding sections have included onsite and representative offsite stations both within and outside a 50-mile radius of the plant. Because of the homogeneous nature of the topography and climatology of the parameters that govern atmospheric transport processes, the analysis presented in the preceding sections is also sufficient to characterize transport processes to within a 50-mile radius.

2.3.8 TOPOGRAPHIC FEATURES

The SHNPP site lies within a very shallow basin as depicted by Figures 2.3.8-1 through 2.3.8-4 which gives plots of elevation versus distance from the plant center by direction sectors. Generally, within 10 miles of the site, the elevation above mean sea level gradually increases from the plant grade level of 260 ft. to around 400 ft. in all but the west-southwest, southwest and north-northwest sectors.

Topographic features within a 5-mile radius as modified by the plant are shown in Figure 2.3.8-5. Filling of the main reservoir south and southeast of the plant will add an additional heat and moisture source to the area. As a result, a slight increase of wind speed is expected with possible changes in wind direction frequencies. Additionally, the reservoirs are expected to reduce the intensity of the nighttime surface inversion thereby reducing the frequency of Pasquill class G stability.

Topographic features within a 50-mile radius are shown in Figure 2.3.8-6. In general, the terrain slopes upward northwest of the site area averaging about 10 ft. per mile to reach an elevation of about 800 ft. at 50 miles from the plant site. The terrain from the north through the west sectors is gently rolling, ranging only from about 100 ft. to 500 ft. above mean sea level.

TABLE 2.3.6-11

JOINT PERCENTAGE FREQUENCIES OF WIND DIRECTION AND SPEED
FOR THE PERIOD 4:00 PM 1/14/76 TO 11:00 PM 12/31/78
LOWER LEVEL WIND
STABILITY CLASS A
STABILITY CALCULATED FROM DIFF. TEMPERATURE

HARRIS ON-SITE METEOROLOGICAL FACILITY

LOWER WIND DIRECTION	CALM	SPEED CLASS(MPH) 0.75 - 3.5	3.5 - 7.5	7.5 - 12.5	12.5 - 18.5	18.5 - 25.0	GREATER THAN 25.0	TOTAL	AVG. WIND SPEED
N	0.0	0.2404E-01	0.3727E+00	0.2404E+00	0.8014E-02	0.0	0.0	0.6452E+00	0.7025E+01
NNE	0.0	0.4007E-02	0.2685E+00	0.2164E+00	0.0	0.0	0.0	0.4889E+00	0.7267E+01
NE	0.0	0.1603E-01	0.2164E+00	0.1523E+00	0.8014E-02	0.0	0.0	0.3927E+00	0.7216E+01
ENE	0.0	0.4007E-02	0.1643E+00	0.4809E-01	0.0	0.0	0.0	0.2164E+00	0.6358E+01
E	0.0	0.1202E-01	0.7614E-01	0.1202E-01	0.0	0.0	0.0	0.1002E+00	0.5621E+01
ESE	0.0	0.1202E-01	0.6011E-01	0.8014E-02	0.0	0.0	0.0	0.8014E-01	0.4889E+01
SE	0.0	0.2404E-01	0.6011E-01	0.4007E-02	0.0	0.0	0.0	0.8816E-01	0.4875E+01
SSE	0.0	0.8014E-02	0.1042E+00	0.8014E-02	0.4007E-02	0.0	0.0	0.1242E+00	0.5815E+01
S	0.0	0.1603E-01	0.1162E+00	0.2004E-01	0.8014E-02	0.0	0.0	0.1603E+00	0.6220E+01
SSW	0.0	0.2004E-01	0.2364E+00	0.2885E+00	0.1603E-01	0.0	0.0	0.5610E+00	0.7830E+01
SW	0.0	0.2404E-01	0.2765E+00	0.3807E+00	0.1242E+00	0.0	0.0	0.8054E+00	0.8773E+01
WSW	0.0	0.3606E-01	0.3086E+00	0.2605E+00	0.7213E-01	0.1603E-01	0.0	0.6983E+00	0.8303E+01
W	0.0	0.2004E-01	0.1964E+00	0.1202E+00	0.2805E-01	0.4007E-02	0.0	0.3687E+00	0.7431E+01
WNW	0.0	0.1202E-01	0.1723E+00	0.3566E+00	0.9217E-01	0.8014E-02	0.0	0.6412E+00	0.9461E+01
NW	0.0	0.4007E-02	0.2484E+00	0.2805E+00	0.5209E-01	0.0	0.0	0.5851E+00	0.8164E+01
NNW	0.0	0.1202E-01	0.2284E+00	0.3005E+00	0.3606E-01	0.0	0.0	0.5770E+00	0.8134E+01
TOTAL	0.0	0.2484E+00	0.3106E+01	0.2697E+01	0.4488E+00	0.2805E-01	0.0	0.6528E+01	0.7086E+01

NUMBER OF CALMS - 1
NUMBER OF BAD HOURS - 568

TABLE 2.3.6-3A
WIND DIRECTION PERSISTENCE DATA *
HARRIS ON-SITE METEROLOGICAL FACILITY
JANUARY 14, 1976 TO DECEMBER 31, 1978
STABILITY CLASS A

LOWER LEVEL WIND DIRECTION	NUMBER OF OCCURRENCES - WIND DIRECTION PERSISTENCE (HOURS)											
	1	2	3	4	5 - 7	8 - 10	11 - 13	14 - 16	17 - 19	20 - 22	23 - 25	> 25
N	43	18	11	6	4							
NNE	24	13	4	7	4	1						
NE	20	10	8	2	6							
ENE	13	3	3	3	1							
E	6	4	2	2								
ESE	11	4	1									
SE	13	1	1									
SSE	9	7		1	1							
S	19	4	2									
SSW	29	12	8	12	4							
SW	32	26	16	5	9							
WSW	33	14	14	6	7							
W	29	11	2	2	2							
WNW	36	11	11	4	8							
NW	44	21	8	6	4							
NNW	31	15	6	3	9	1						
AVERAGE DURATION HOURS	1.0	2.0	3.0	4.0	5.6	8.5	0.0	0.0	0.0	0.0	0.0	0.0
MAXIMUM HOURS	1	2	3	4	7	9	0	0	0	0	0	0

NUMBER HOURS OF MISSING WIND DIRECTIONS: 49

*PERSISTENCE IS DEFINED AS A DELTA T EXISTING WITHIN A DEFINED WIND DIRECTION SECTOR AND IS NOT CONSIDERED TO BE INTERRUPTED IF IT DEPARTS FROM THAT DELTA T VALUE FOR UP TO 1 HOUR AND THEN RETURNS, OR IF THERE IS ONE HOUR OF MISSING DATA FOLLOWED BY A CONTINUED DELTA T VALUE. TWO OR MORE CONSECUTIVE HOURS OF LOST DATA ARE NOT INCLUDED IN THE PERSISTENCE DETERMINATION BUT ARE INDICATED AS "MISSING WIND DIRECTIONS".

TABLE 2.3.6-3B
WIND DIRECTION PERSISTENCE DATA *
HARRIS ON-SITE METEROLOGICAL FACILITY
JANUARY 14, 1976 TO DECEMBER 31, 1978
STABILITY CLASS B

LOWER LEVEL WIND DIRECTION	NUMBER OF OCCURRENCES - WIND DIRECTION PERSISTENCE (HOURS)											
	1	2	3	4	5 - 7	8 - 10	11 - 13	14 - 16	17 - 19	20 - 22	23 - 25	> 25
N	45	11	5									
NNE	41	4	1	1	2							
NE	37	7	6									
ENE	21	6		1								
E	19	3	1									
ESE	15	4	1									
SE	14											
SSE	10	2										
S	22	6	2		1							
SSW	39	13	3	2	1							
SW	56	16	6									
WSW	62	16	3	1	2							
W	31	7	2									
WNW	53	16	4	2								
NW	48	19	4	2	2							
NNW	50	8	1									
AVERAGE DURATION HOURS	1.0	2.0	3.0	4.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAXIMUM HOURS	1	2	3	4	6	0	0	0	0	0	0	0

NUMBER HOURS OF MISSING WIND DIRECTIONS: 18

*PERSISTENCE IS DEFINED AS A DELTA T EXISTING WITHIN A DEFINED WIND DIRECTION SECTOR AND IS NOT CONSIDERED TO BE INTERRUPTED IF IT DEPARTS FROM THAT DELTA T VALUE FOR UP TO 1 HOUR AND THEN RETURNS, OR IF THERE IS ONE HOUR OF MISSING DATA FOLLOWED BY A CONTINUED DELTA T VALUE. TWO OR MORE CONSECUTIVE HOURS OF LOST DATA ARE NOT INCLUDED IN THE PERSISTENCE DETERMINATION BUT ARE INDICATED AS "MISSING WIND DIRECTIONS".

TABLE 2.3.6-3C
WIND DIRECTION PERSISTENCE DATA *
HARRIS ON-SITE METEROLOGICAL FACILITY
JANUARY 14, 1976 TO DECEMBER 31, 1978
STABILITY CLASS C

LOWER LEVEL WIND DIRECTION	NUMBER OF OCCURRENCES - WIND DIRECTION PERSISTENCE (HOURS)											
	1	2	3	4	5 - 7	8 - 10	11 - 13	14 - 16	17 - 19	20 - 22	23 - 25	> 25
N	67	15	5	2	1							
NNE	43	7	2	1								
NE	39	4	2									
ENE	33	8	4									
E	27	7	1									
ESE	14	2	4									
SE	15	2	3									
SSE	24	6	1	1								
S	35	11	1									
SSW	80	15	1	2								
SW	80	14	7	3								
WSW	72	9	9	1	1							
W	46	10	1	5	1							
WNW	67	7	5		1							
NW	64	13	4		1							
NNW	66	8	3	3								
AVERAGE DURATION HOURS	1.0	2.0	3.0	4.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAXIMUM HOURS	1	2	3	4	5	0	0	0	0	0	0	0

NUMBER HOURS OF MISSING WIND DIRECTIONS: 17

*PERSISTENCE IS DEFINED AS A DELTA T EXISTING WITHIN A DEFINED WIND DIRECTION SECTOR AND IS NOT CONSIDERED TO BE INTERRUPTED IF IT DEPARTS FROM THAT DELTA T VALUE FOR UP TO 1 HOUR AND THEN RETURNS, OR IF THERE IS ONE HOUR OF MISSING DATA FOLLOWED BY A CONTINUED DELTA T VALUE. TWO OR MORE CONSECUTIVE HOURS OF LOST DATA ARE NOT INCLUDED IN THE PERSISTENCE DETERMINATION BUT ARE INDICATED AS "MISSING WIND DIRECTIONS".

TABLE 2.3.6-3D
WIND DIRECTION PERSISTENCE DATA *
HARRIS ON-SITE METEROLOGICAL FACILITY
JANUARY 14, 1976 TO DECEMBER 31, 1978
STABILITY CLASS D

LOWER LEVEL WIND DIRECTION	NUMBER OF OCCURRENCES - WIND DIRECTION PERSISTENCE (HOURS)											
	1	2	3	4	5 - 7	8 - 10	11 - 13	14 - 16	17 - 19	20 - 22	23 - 25	> 25
N	145	61	24	13	18	10	4	1				
NNE	134	54	21	11	23	4	3	3	2		1	
NE	124	46	17	14	5	5	1					1
ENE	101	31	12	7	11	2	1					
E	83	34	11	2	7	2						
ESE	85	20	11	7	4							
SE	82	28	11	5	6	1						
SSE	98	31	15	11	10	2						
S	132	48	15	5	7	1						
SSW	203	65	26	11	14		2			1		
SW	219	71	33	14	16	5						
WSW	160	61	31	16	15	2						
W	141	37	12	4	5		1					
WNW	138	44	15	11	8	2	2					
NW	137	37	13	9	14	2						
NNW	148	52	20	15	14	3	1					
AVERAGE DURATION HOURS	1.0	2.0	3.0	4.0	5.5	8.8	11.6	14.7	17.5	20.0	24.0	28.0
MAXIMUM HOURS	1	2	3	4	7	10	13	16	18	20	24	28

NUMBER HOURS OF MISSING WIND DIRECTIONS: 88

*PERSISTENCE IS DEFINED AS A DELTA T EXISTING WITHIN A DEFINED WIND DIRECTION SECTOR AND IS NOT CONSIDERED TO BE INTERRUPTED IF IT DEPARTS FROM THAT DELTA T VALUE FOR UP TO 1 HOUR AND THEN RETURNS, OR IF THERE IS ONE HOUR OF MISSING DATA FOLLOWED BY A CONTINUED DELTA T VALUE. TWO OR MORE CONSECUTIVE HOURS OF LOST DATA ARE NOT INCLUDED IN THE PERSISTENCE DETERMINATION BUT ARE INDICATED AS "MISSING WIND DIRECTIONS".

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TABLE 2.3.6-3E
WIND DIRECTION PERSISTENCE DATA *
HARRIS ON-SITE METEROLOGICAL FACILITY
JANUARY 14, 1976 TO DECEMBER 31, 1978
STABILITY CLASS E

LOWER LEVEL WIND DIRECTION	NUMBER OF OCCURRENCES - WIND DIRECTION PERSISTENCE (HOURS)											
	1	2	3	4	5 - 7	8 - 10	11 - 13	14 - 16	17 - 19	20 - 22	23 - 25	> 25
N	153	35	20	10	14	3						
NNE	127	51	24	4	13	5						
NE	124	31	17	5	10	4	1	1				
ENE	123	22	8	5	5	1	2					
E	99	21	9	4	9	2						
ESE	100	20	5	2	5							
SE	109	27	9	3	1							
SSE	147	31	18	10	10	3						
S	176	59	39	16	23	1	1		1			
SSW	226	66	41	22	24	11		1				
SW	235	41	22	11	13	2						
WSW	126	27	24	7	8	1						
W	116	25	10	3	3		1					
WNW	120	29	12	3	4	1						
NW	117	34	10	8	11	2	1					
NNW	127	33	16	5	6	4						
AVERAGE DURATION HOURS	1.0	2.0	3.0	4.0	5.6	8.5	11.5	15.0	18.0	0.0	0.0	0.0
MAXIMUM HOURS	1	2	3	4	7	10	13	15	18	0	0	0

NUMBER HOURS OF MISSING WIND DIRECTIONS: 103

*PERSISTENCE IS DEFINED AS A DELTA T EXISTING WITHIN A DEFINED WIND DIRECTION SECTOR AND IS NOT CONSIDERED TO BE INTERRUPTED IF IT DEPARTS FROM THAT DELTA T VALUE FOR UP TO 1 HOUR AND THEN RETURNS, OR IF THERE IS ONE HOUR OF MISSING DATA FOLLOWED BY A CONTINUED DELTA T VALUE. TWO OR MORE CONSECUTIVE HOURS OF LOST DATA ARE NOT INCLUDED IN THE PERSISTENCE DETERMINATION BUT ARE INDICATED AS "MISSING WIND DIRECTIONS".

SHNPP ER

TABLE 2.3.6-3F
WIND DIRECTION PERSISTENCE DATA *
HARRIS ON-SITE METEROLOGICAL FACILITY
JANUARY 14, 1976 TO DECEMBER 31, 1978
STABILITY CLASS F

LOWER LEVEL WIND DIRECTION	NUMBER OF OCCURRENCES - WIND DIRECTION PERSISTENCE (HOURS)											
	1	2	3	4	5 - 7	8 - 10	11 - 13	14 - 16	17 - 19	20 - 22	23 - 25	< 25
N	113	28	14	6	6	1						
NNE	111	19	9	5	1							
NE	99	20	5	4	3							
ENE	68	19	10		3	1						
E	82	12	5	1	2							
ESE	97	15	3	1	1							
SE	82	10	1	4								
SSE	111	24	5	3	4							
S	121	45	14	9	5	1						
SSW	127	41	15	14	8	1	1					
SW	105	29	16	8	3	1						
WSW	90	19	6	5	3							
W	75	12	4	4								
WNW	70	14	3	1								
NW	82	7	3		1							
NNW	95	20	9	4	1							
AVERAGE DURATION HOURS	1.0	2.0	3.0	4.0	5.4	9.0	11.0	0.0	0.0	0.0	0.0	0.0
MAXIMUM HOURS	1	2	3	4	7	10	11	0	0	0	0	0

NUMBER HOURS OF MISSING WIND DIRECTIONS: 51

*PERSISTENCE IS DEFINED AS A DELTA T EXISTING WITHIN A DEFINED WIND DIRECTION SECTOR AND IS NOT CONSIDERED TO BE INTERRUPTED IF IT DEPARTS FROM THAT DELTA T VALUE FOR UP TO 1 HOUR AND THEN RETURNS, OR IF THERE IS ONE HOUR OF MISSING DATA FOLLOWED BY A CONTINUED DELTA T VALUE. TWO OR MORE CONSECUTIVE HOURS OF LOST DATA ARE NOT INCLUDED IN THE PERSISTENCE DETERMINATION BUT ARE INDICATED AS "MISSING WIND DIRECTIONS".

TABLE 2.3.6-30
WIND DIRECTION PERSISTENCE DATA *
HARRIS ON-SITE METEROLOGICAL FACILITY
JANUARY 14, 1976 TO DECEMBER 31, 1978
STABILITY CLASS G

LOWER LEVEL WIND DIRECTION	NUMBER OF OCCURRENCES - WIND DIRECTION PERSISTENCE (HOURS)											
	1	2	3	4	5 - 7	8 - 10	11 - 13	14 - 16	17 - 19	20 - 22	23 - 25	< 25
N	198	55	28	11	11	2	1					
NNE	206	44	37	17	4							
NE	218	53	16	15	3							
ENE	200	35	27	6	2							
E	190	31	18	5	1							
ESE	165	27	8	3	2							
SE	140	17	10		3							
SSE	128	20	6	3	2							
S	150	30	12	3	3	1						
SSW	163	27	15	7	2							
SW	135	31	19	6	3							
WSW	161	15	6	4	6							
W	131	12	6	1	1	1						
WNW	126	9	4	1	2							
NW	125	16	11	3	1							
NNW	171	21	17	1	6	1						
AVERAGE DURATION HOURS	1.0	2.0	3.0	4.0	5.7	8.6	11.0	0.0	0.0	0.0	0.0	0.0
MAXIMUM HOURS	1	2	3	4	7	10	11	0	0	0	0	0

NUMBER HOURS OF MISSING WIND DIRECTIONS: 67

*PERSISTENCE IS DEFINED AS A DELTA T EXISTING WITHIN A DEFINED WIND DIRECTION SECTOR AND IS NOT CONSIDERED TO BE INTERRUPTED IF IT DEPARTS FROM THAT DELTA T VALUE FOR UP TO 1 HOUR AND THEN RETURNS, OR IF THERE IS ONE HOUR OF MISSING DATA FOLLOWED BY A CONTINUED DELTA T VALUE. TWO OR MORE CONSECUTIVE HOURS OF LOST DATA ARE NOT INCLUDED IN THE PERSISTENCE DETERMINATION BUT ARE INDICATED AS "MISSING WIND DIRECTIONS".

TABLE 2.3.6-3H
WIND DIRECTION PERSISTENCE DATA *
HARRIS ON-SITE METEROLOGICAL FACILITY
JANUARY 14, 1976 TO DECEMBER 31, 1978
SUMMARY

LOWER LEVEL WIND DIRECTION	NUMBER OF OCCURRENCES - WIND DIRECTION PERSISTENCE (HOURS)											
	1	2	3	4	5 - 7	8 - 10	11 - 13	14 - 16	17 - 19	20 - 22	23 - 25	< 25
N	396	168	101	50	84	30	14	2	3	1		
NNE	440	153	95	66	62	20	7	3	4	1	1	
NE	463	130	65	41	47	19	7	1	3			1
ENE	399	110	60	31	39	6	7		1			
E	375	89	58	25	22	11	1	1				
ESE	361	87	43	27	22	2						
SE	358	88	36	19	20	3	1					
SSE	394	99	53	35	41	10	2					
S	434	149	86	54	62	13	4	2	1			
SSW	451	182	94	74	93	31	9	5	2			2
SW	445	158	111	61	93	27	8	2				
WSW	410	123	77	47	62	20	8	2	1	1		
W	393	97	56	25	25	7		2				
WNW	369	83	61	30	38	17	6	1	2			
NW	366	90	68	43	54	8	8	2		1		
NNW	421	107	84	45	55	16	5	3	1	1		
AVERAGE DURATION HOURS	1.0	2.0	3.0	4.0	5.7	8.8	11.7	14.9	17.7	20.8	24.0	29.6
MAXIMUM HOURS	1	2	3	4	7	10	13	16	19	22	24	30

NUMBER HOURS OF MISSING WIND DIRECTIONS: 371

*PERSISTENCE IS DEFINED AS A DELTA T EXISTING WITHIN A DEFINED WIND DIRECTION SECTOR AND IS NOT CONSIDERED TO BE INTERRUPTED IF IT DEPARTS FROM THAT DELTA T VALUE FOR UP TO 1 HOUR AND THEN RETURNS, OR IF THERE IS ONE HOUR OF MISSING DATA FOLLOWED BY A CONTINUED DELTA T VALUE. TWO OR MORE CONSECUTIVE HOURS OF LOST DATA ARE NOT INCLUDED IN THE PERSISTENCE DETERMINATION BUT ARE INDICATED AS "MISSING WIND DIRECTIONS".

TABLE 2.3.6-31
WIND DIRECTION PERSISTENCE DATA *
HARRIS ON-SITE METEROLOGICAL FACILITY
JANUARY 14, 1976 TO DECEMBER 31, 1978
STABILITY CLASS A

NUMBER OF OCCURRENCES - WIND DIRECTION PERSISTENCE (HOURS)

UPPER LEVEL WIND DIRECTION	1	2	3	4	5 - 7	8 - 10	11 - 13	14 - 16	17 - 19	20 - 22	23 - 25	< 25
N	38	22	5	8	3							
NNE	39	11	7	5	8	1						
NE	15	10	6	3	6							
ENE	12	6	4	2								
E	15	3		2	1							
ESE	12	4	3		1							
SE	6	2	1									
SSE	9	3	4									
S	23	6	4	1								
SSW	31	13	6	9	6							
SW	40	18	22	6	8	1						
WSW	40	17	8	7	6							
W	29	13	6	3								
WNW	37	16	9	7	8							
NW	33	14	10	8	2							
NNW	23	16	6	3	8	2						
AVERAGE DURATION HOURS	1.0	2.0	3.0	4.0	5.4	8.2	0.0	0.0	0.0	0.0	0.0	0.0
MAXIMUM HOURS	1	2	3	4	7	9	0	0	0	0	0	0

NUMBER HOURS OF MISSING WIND DIRECTIONS: 13

*PERSISTENCE IS DEFINED AS A DELTA T EXISTING WITHIN A DEFINED WIND DIRECTION SECTOR AND IS NOT CONSIDERED TO BE INTERRUPTED IF IT DEPARTS FROM THAT DELTA T VALUE FOR UP TO 1 HOUR AND THEN RETURNS, OR IF THERE IS ONE HOUR OF MISSING DATA FOLLOWED BY A CONTINUED DELTA T VALUE. TWO OR MORE CONSECUTIVE HOURS OF LOST DATA ARE NOT INCLUDED IN THE PERSISTENCE DETERMINATION BUT ARE INDICATED AS "MISSING WIND DIRECTIONS".

TABLE 2.3.6-3J
WIND DIRECTION PERSISTENCE DATA *
HARRIS ON-SITE METEROLOGICAL FACILITY
JANUARY 14, 1976 TO DECEMBER 31, 1978
STABILITY CLASS B

UPPER LEVEL WIND DIRECTION	NUMBER OF OCCURRENCES - WIND DIRECTION PERSISTENCE (HOURS)											
	1	2	3	4	5 - 7	8 - 10	11 - 13	14 - 16	17 - 19	20 - 22	23 - 25	< 25
N	39	11	4		1							
NNE	48	6	3	2	1							
NE	32	8	3	1	1							
ENE	21	5	1									
E	20	4	1									
ESE	15	4	1									
SE	9	2										
SSE	20	2		1								
S	18	7	1	1	1							
SSW	41	11	4	1	3							
SW	66	12	5	4								
WSW	47	14	3	2	2							
W	32	4	5									
WNW	49	18	6	3	3							
NW	44	9	4	3	1							
NNW	42	4	2									
AVERAGE DURATION HOURS	1.0	2.0	3.0	4.0	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAXIMUM HOURS	1	2	3	4	6	0	0	0	0	0	0	0

NUMBER HOURS OF MISSING WIND DIRECTIONS: 4

*PERSISTENCE IS DEFINED AS A DELTA T EXISTING WITHIN A DEFINED WIND DIRECTION SECTOR AND IS NOT CONSIDERED TO BE INTERRUPTED IF IT DEPARTS FROM THAT DELTA T VALUE FOR UP TO 1 HOUR AND THEN RETURNS, OR IF THERE IS ONE HOUR OF MISSING DATA FOLLOWED BY A CONTINUED DELTA T VALUE. TWO OR MORE CONSECUTIVE HOURS OF LOST DATA ARE NOT INCLUDED IN THE PERSISTENCE DETERMINATION BUT ARE INDICATED AS "MISSING WIND DIRECTIONS".

TABLE 2.3.6-3K
WIND DIRECTION PERSISTENCE DATA *
HARRIS ON-SITE METEROLOGICAL FACILITY
JANUARY 14, 1976 TO DECEMBER 31, 1978
STABILITY CLASS C

UPPER LEVEL WIND DIRECTION	NUMBER OF OCCURRENCES - WIND DIRECTION PERSISTENCE (HOURS)											
	1	2	3	4	5 - 7	8 - 10	11 - 13	14 - 16	17 - 19	20 - 22	23 - 25	< 25
N	62	15	3				1					
NNE	53	6		3								
NE	42	6	2		1							
ENE	35	7										
E	29	4	1									
ESE	19	2	4									
SE	11	4	2									
SSE	22	6	4	1								
S	37	9	5	1	1							
SSW	84	12	2	3								
SW	80	15	3	4								
WSW	69	14	8	3	2							
W	51	10	2	1								
WNW	55	6	5	2								
NW	62	14	4									
NNW	65	10	2	1								
AVERAGE DURATION HOURS	1.0	2.0	3.0	4.0	5.0	0.0	11.0	0.0	0.0	0.0	0.0	0.0
MAXIMUM HOURS	1	2	3	4	5	0	11	0	0	0	0	0

NUMBER HOURS OF MISSING WIND DIRECTIONS: 7

*PERSISTENCE IS DEFINED AS A DELTA T EXISTING WITHIN A DEFINED WIND DIRECTION SECTOR AND IS NOT CONSIDERED TO BE INTERRUPTED IF IT DEPARTS FROM THAT DELTA T VALUE FOR UP TO 1 HOUR AND THEN RETURNS, OR IF THERE IS ONE HOUR OF MISSING DATA FOLLOWED BY A CONTINUED DELTA T VALUE. TWO OR MORE CONSECUTIVE HOURS OF LOST DATA ARE NOT INCLUDED IN THE PERSISTENCE DETERMINATION BUT ARE INDICATED AS "MISSING WIND DIRECTIONS".

TABLE 2.3.6-3L
WIND DIRECTION PERSISTENCE DATA *
HARRIS ON-SITE METEROLOGICAL FACILITY
JANUARY 14, 1976 TO DECEMBER 31, 1978
STABILITY CLASS D

UPPER LEVEL WIND DIRECTION	NUMBER OF OCCURRENCES - WIND DIRECTION PERSISTENCE (HOURS)											
	1	2	3	4	5 - 7	8 - 10	11 - 13	14 - 16	17 - 19	20 - 22	23 - 25	< 25
N	126	51	18	14	24	7	6	1				
NNE	119	54	31	12	27	7	3		1			1
NE	118	34	19	7	16	4	1	1	1		1	
ENE	107	36	25	5	8	2						
E	77	28	13	7	6	2						
ESE	79	25	12	3	3	3						
SE	89	28	6	7	5		1					
SSE	88	34	15	7	14	1	2					
S	122	49	19	11	4	1						
SSW	181	65	25	16	17		1	1				
SW	182	71	41	19	23	2		1				
WSW	161	60	22	18	12	3						
W	139	31	19	4	4							
WNW	128	44	15	5	6	2	1		1			
NW	126	33	11	20	10	4						
NNW	126	44	23	6	12	3	1		1			
AVERAGE DURATION HOURS	1.0	2.0	3.0	4.0	5.5	8.6	11.3	14.5	17.7	0.0	24.0	34.0
MAXIMUM HOURS	1	2	3	4	7	10	13	15	19	0	24	34

NUMBER HOURS OF MISSING WIND DIRECTIONS: 101

*PERSISTENCE IS DEFINED AS A DELTA T EXISTING WITHIN A DEFINED WIND DIRECTION SECTOR AND IS NOT CONSIDERED TO BE INTERRUPTED IF IT DEPARTS FROM THAT DELTA T VALUE FOR UP TO 1 HOUR AND THEN RETURNS, OR IF THERE IS ONE HOUR OF MISSING DATA FOLLOWED BY A CONTINUED DELTA T VALUE. TWO OR MORE CONSECUTIVE HOURS OF LOST DATA ARE NOT INCLUDED IN THE PERSISTENCE DETERMINATION BUT ARE INDICATED AS "MISSING WIND DIRECTIONS".

TABLE 2.3.6-3H
WIND DIRECTION PERSISTENCE DATA *
HARRIS ON-SITE METEROLOGICAL FACILITY
JANUARY 14, 1976 TO DECEMBER 31, 1978
STABILITY CLASS E

UPPER LEVEL WIND DIRECTION	NUMBER OF OCCURRENCES - WIND DIRECTION PERSISTENCE (HOURS) 1	2	3	4	5 - 7	8 - 10	11 - 13	14 - 16	17 - 19	20 - 22	23 - 25	< 25
N	124	34	9	12	15	4						
NNE	97	36	16	13	16	5						
NE	110	34	19	11	11	5	2	1				
ENE	74	20	13	10	9	3		1				
E	90	26	9	4	9	2						
ESE	71	19	11	7	5							
SE	80	26	5	4	3							
SSE	104	36	22	7	17	2						
S	144	51	37	21	28	5	1					
SSW	189	71	34	24	30	15	2	1				
SW	201	44	21	16	13	3						
WSW	131	43	21	5	13		1					
W	111	27	6	6	5		1					
WNW	100	32	14	10	2	1						
NW	82	26	13	6	15	2	1					
NNW	118	28	16	5	6	4						
AVERAGE DURATION HOURS	1.0	2.0	3.0	4.0	5.6	8.6	11.7	15.3	0.0	0.0	0.0	0.0
MAXIMUM HOURS	1	2	3	4	7	10	13	16	0	0	0	0

NUMBER HOURS OF MISSING WIND DIRECTIONS: 32

*PERSISTENCE IS DEFINED AS A DELTA T EXISTING WITHIN A DEFINED WIND DIRECTION SECTOR AND IS NOT CONSIDERED TO BE INTERRUPTED IF IT DEPARTS FROM THAT DELTA T VALUE FOR UP TO 1 HOUR AND THEN RETURNS, OR IF THERE IS ONE HOUR OF MISSING DATA FOLLOWED BY A CONTINUED DELTA T VALUE. TWO OR MORE CONSECUTIVE HOURS OF LOST DATA ARE NOT INCLUDED IN THE PERSISTENCE DETERMINATION BUT ARE INDICATED AS "MISSING WIND DIRECTIONS".

TABLE 2.3.6-3N
WIND DIRECTION PERSISTENCE DATA *
HARRIS ON-SITE METEROLOGICAL FACILITY
JANUARY 14, 1976 TO DECEMBER 31, 1978
STABILITY CLASS F

UPPER LEVEL WIND DIRECTION	NUMBER OF OCCURRENCES - WIND DIRECTION PERSISTENCE (HOURS)											
	1	2	3	4	5 - 7	8 - 10	11 - 13	14 - 16	17 - 19	20 - 22	23 - 25	< 25
N	79	19	13	8	2	1						
NNE	66	23	4	5	3							
NE	67	15	9	3	3							
ENE	50	18	5	3	1							
E	54	17	11	2	2	2						
ESE	64	15	7		3							
SE	53	15	1	1	2							
SSE	73	23	8	4	1							
S	88	36	11	11	10	1						
SSW	106	52	16	13	16	4						
SW	102	44	11	18	7	5	1					
WSW	100	34	10	6	7							
W	73	18	7	4	5							
WNW	68	9	9	3	1							
NW	77	9	4		1							
NNW	70	18	7	4	2							
AVERAGE DURATION HOURS	1.0	2.0	3.0	4.0	5.6	8.3	11.0	0.0	0.0	0.0	0.0	0.0
MAXIMUM HOURS	1	2	3	4	7	9	11	0	0	0	0	0

NUMBER HOURS OF MISSING WIND DIRECTIONS: 16

*PERSISTENCE IS DEFINED AS A DELTA T EXISTING WITHIN A DEFINED WIND DIRECTION SECTOR AND IS NOT CONSIDERED TO BE INTERRUPTED IF IT DEPARTS FROM THAT DELTA T VALUE FOR UP TO 1 HOUR AND THEN RETURNS, OR IF THERE IS ONE HOUR OF MISSING DATA FOLLOWED BY A CONTINUED DELTA T VALUE. TWO OR MORE CONSECUTIVE HOURS OF LOST DATA ARE NOT INCLUDED IN THE PERSISTENCE DETERMINATION BUT ARE INDICATED AS "MISSING WIND DIRECTIONS".

TABLE 2.3.6-30
WIND DIRECTION PERSISTENCE DATA *
HARRIS ON-SITE METEROLOGICAL FACILITY
JANUARY 14, 1976 TO DECEMBER 31, 1978
STABILITY CLASS G

UPPER LEVEL WIND DIRECTION	NUMBER OF OCCURRENCES - WIND DIRECTION PERSISTENCE (HOURS)											
	1	2	3	4	5 - 7	8 - 10	11 - 13	14 - 16	17 - 19	20 - 22	23 - 25	< 25
N	65	19	18	7	6							
NNE	68	26	11	7	7	2						
NE	56	26	12	5	7	2						
ENE	68	22	13	4	9	1						
E	44	28	11	3	6	1						
ESE	41	25	15	4	6							
SE	68	26	11	5	2							
SSE	56	32	16	10	12							
S	82	36	17	16	12		1					
SSW	95	53	26	22	22	6						
SW	113	56	26	18	16	3						
WSW	69	50	37	28	27	9	2					
W	97	29	22	11	5	1						
WNW	92	31	16	8	9	1						
NW	90	32	15	11	3	1						
NNW	70	36	16	9	8	1						
AVERAGE DURATION HOURS	1.0	2.0	3.0	4.0	5.6	8.5	11.6	0.0	0.0	20.0	0.0	0.0
MAXIMUM HOURS	1	2	3	4	7	10	12	0	0	20	0	0

NUMBER HOURS OF MISSING WIND DIRECTIONS: 38

*PERSISTENCE IS DEFINED AS A DELTA T EXISTING WITHIN A DEFINED WIND DIRECTION SECTOR AND IS NOT CONSIDERED TO BE INTERRUPTED IF IT DEPARTS FROM THAT DELTA T VALUE FOR UP TO 1 HOUR AND THEN RETURNS, OR IF THERE IS ONE HOUR OF MISSING DATA FOLLOWED BY A CONTINUED DELTA T VALUE. TWO OR MORE CONSECUTIVE HOURS OF LOST DATA ARE NOT INCLUDED IN THE PERSISTENCE DETERMINATION BUT ARE INDICATED AS "MISSING WIND DIRECTIONS".

TABLE 2.3.6-3P
WIND DIRECTION PERSISTENCE DATA *
HARRIS ON-SITE METEROLOGICAL FACILITY
JANUARY 14, 1976 TO DECEMBER 31, 1978
SUMMARY

UPPER LEVEL WIND DIRECTION	NUMBER OF OCCURRENCES – WIND DIRECTION PERSISTENCE (HOURS)											
	1	2	3	4	5 – 7	8 – 10	11 – 13	14 – 16	17 – 19	20 – 22	23 – 25	< 25
N	197	113	67	50	79	24	15	5	3			1
NNE	199	123	69	36	76	37	8	6	2			1
NE	225	100	52	34	52	24	10	2	6		1	
ENE	195	84	55	23	48	12	6	2	1			
E	135	83	46	23	35	13	4	2				
ESE	169	76	55	29	33	4	3					
SE	184	83	30	28	27	6	1					
SSE	181	97	60	34	73	13	4		1	1		
S	231	137	85	60	93	15	13	3				
SSW	252	149	94	72	137	44	17	11	2	2	1	2
SW	332	155	111	66	108	47	15	4	4			
WSW	241	156	102	60	99	38	17	2	1			
W	319	122	61	33	48	9	2	2				1
WNW	248	92	66	38	52	23	10	2	2	1		
NW	249	97	54	54	62	15	5	3	2			
NNW	235	114	87	36	50	21	5	4	1			
AVERAGE DURATION HOURS	1.0	2.0	3.0	4.0	5.7	8.7	11.6	14.8	17.7	20.7	23.5	32.2
MAXIMUM HOURS	1	2	3	4	7	10	13	16	19	22	24	37

NUMBER HOURS OF MISSING WIND DIRECTIONS: 374

*PERSISTENCE IS DEFINED AS A DELTA T EXISTING WITHIN A DEFINED WIND DIRECTION SECTOR AND IS NOT CONSIDERED TO BE INTERRUPTED IF IT DEPARTS FROM THAT DELTA T VALUE FOR UP TO 1 HOUR AND THEN RETURNS, OR IF THERE IS ONE HOUR OF MISSING DATA FOLLOWED BY A CONTINUED DELTA T VALUE. TWO OR MORE CONSECUTIVE HOURS OF LOST DATA ARE NOT INCLUDED IN THE PERSISTENCE DETERMINATION BUT ARE INDICATED AS "MISSING WIND DIRECTIONS".

2.4 HYDROLOGY

2.4.1 INTRODUCTION

The Shearon Harris Nuclear Power Plant is located in the Buckhorn Creek basin, as shown on Figure 2.4.1-1. Buckhorn Creek is a tributary of the Cape Fear River, as shown on Figures 2.4.1-2 and 2.4.1-3. Buckhorn Creek and the Cape Fear River are the sources of surface water for the Main and Auxiliary Reservoirs for plant operation. Details of the Cape Fear River drainage basin and its relationship to Buckhorn Creek are shown on Figure 2.4.1-3.

The principal source of water for SHNPP is the Main Reservoir, which is impounded by an earth dam located on Buckhorn Creek just below its confluence with White Oak Creek. In addition to natural runoff, the water inventory in the reservoir system is augumented by pumping from the Cape Fear River. Preexisting ponds and impoundments (shown on Figure 2.4.1-4), which were located within the boundary of the plant site, are not used for plant operation; none were located within the boundary of the plant island. Those which were located in the reservoir areas have been inundated by filling the reservoirs.

In addition to the Main Reservoir, an adjoining and independent Auxiliary Reservoir was constructed for emergency core cooling purposes. The Auxiliary Reservoir is on Tom Jack Creek near the plant. Buckhorn Creek's five tributaries (Tom Jack Creek, Thomas Creek, Little White Oak Creek, White Oak Creek, and Cary Creek) have been impounded by the Main Dam. A nameless tributary of Little White Oak Creek is located on the western half of the plant island, where grading raised the plant elevation to 260 ft. msl. The plant will not be subjected to flooding, since the design grade is well above the maximum water levels caused by the Probable Maximum Flood on the streams and reservoirs.

An outline of the small watersheds near the plant site is presented on Figure 2.4.1-4; this figure shows the small drainage areas and their divides before construction of the project. Comparison of Figure 2.4.1-4 with Figure 2.4.1-5 shows that construction of the project has not materially changed the drainage pattern.

Rivers, creeks, lakes, reservoirs, and ponds existing within a 5-mile and 25-mile radius of the plant site are shown on Figures 2.4.1-6 and 2.4.1-7, respectively.

The plant site is located in an area that has very little groundwater; groundwater is discussed in Section 2.4.3. Radionuclide release from the plant and possible groundwater pathways are discussed in Section 2.4.4. Users of surface water and groundwater are discussed in Section 2.4.5.

2.4.2 SURFACE WATER HYDROLOGY

2.4.2.1 Introduction

Waterways and bodies of water within a 50-mile radius of the plant site (Figure 2.4.2-1) which could receive liquid releases from the SHNPP are only those downstream of the site, via Buckhorn Creek and the Cape Fear River. The Cape Fear River basin, for a distance of 50 mi. downstream from the site, is characterized by transition from the Piedmont area to the Coastal Plain. The low water profile of the Cape Fear River drops about 125 ft. from Buckhorn Dam at river mile 192 to Lock and Dam No. 3 at river mile 123, a gradient of 1.8 ft./mi. The terrain changes from rolling hills and a relatively narrow river valley near the site to nearly flat terrain below the confluence of Little River.

2.4.2.2 Cape Fear River

The Cape Fear River basin (Figure 2.4.1-3) is oblong in shape; its greatest width is about 60 mi. and its length is about 200 mi. The Cape Fear River is formed by the confluence of the Deep and Haw Rivers. It flows generally southeast about 198 mi. and empties into the Atlantic Ocean at Cape Fear, approximately 28 mi. below Wilmington, North Carolina. The basin has a total area of 9,136 sq. mi., of which 3,127 sq. mi. are located above the confluence of the Deep and Haw Rivers.

The lower Cape Fear River is an estuary; the tidal reach of the river extends to Lock and Dam No. 1 (at river mile 67), which is about 39 mi. above Wilmington. The river is navigable to Fayetteville, with a channel width of generally 400 ft. and depth ranging from 30 to 35 ft. from the Atlantic Ocean to Wilmington.

The average width of the Cape Fear River flood plain is approximately 2.2 mi. The difference between high and low stages is 69 ft. at Fayetteville and 44 ft. at Lock No. 2. The maximum flood flow of 150,000 cfs occurred on September 19, 1945 at Lillington.

The monthly average flows of the Cape Fear River at Buckhorn Dam, shown in Table 2.4.2-1, were obtained from the records at Lillington by a drainage area ratio of 3,196 sq. mi. at Buckhorn Dam to 3,440 sq. mi. at Lillington.

Historical low flows were derived for the Cape Fear River at Buckhorn Dam from the Lillington data, and are presented in Table 2.4.2-2. Figure 2.4.2-2 shows the flow duration curve at Buckhorn Dam, and Figure 2.4.2-3 presents the low flow frequency analysis. The minimum daily flow of 10 cfs occurred on October 14, 1954; the seven consecutive day ten-year low flow is 72 cfs at Buckhorn Dam.

The flow duration curve shown on Figure 2.4.2-2 does not take into consideration the effect of the U. S. Army Corps of Engineers comprehensive plan of development of water resources for the Cape Fear River basin (Reference 2.4.2-1). The completion of the proposed dams will furnish a minimum continuous flow of 600 cfs at Lillington; consequently the 600 cfs flow will be equalled or exceeded 100 percent of the time (except in years of severe drought). In addition, flood peaks will be substantially reduced because of the retention capacity of the reservoirs.

2.4.2.2.1 Tributaries

The Cape Fear River has many tributary creeks, including approximately 30 that are more than three miles in length, in the area downstream of Buckhorn Dam. There are three major tributaries (Upper Little River, Little River, and Rockfish Creek) which drain the western portion of the basin. Most of the eastern part is drained by tributaries of the Black River, which enters the Cape Fear River at river mile 44, and is not within the region of influence of the SHNPP. There is only one small impoundment of concern, formed by Buckhorn Dam just upstream from the mouth of Buckhorn Creek. The maximum storage is 1600 ac.-ft., and it was used for hydroelectric power generation from 1908 until 1962. This Cape Fear River impoundment is the source of make-up water for the SHNPP reservoir system. Any release from the SHNPP would affect only the Cape Fear River below Buckhorn Dam and the lower reaches of its tributaries. However, under flood conditions, backwater could extend further upstream. Table 2.4.2-3 lists the tributaries, the locations of their confluence with the Cape Fear River, and the estimated extent of backwater flooding during the flood of September 19, 1945, the largest one ever recorded (Reference 2.4.2-1).

Table 2.4.2-4 gives important flow characteristics for all of the USGS gaging stations within the area of interest (References 2.4.2-2 and 2.4.2-3).

The Cape Fear River has two major tributaries above Buckhorn Dam, the Haw and Deep Rivers, both of which originate in Forsyth County, North Carolina. The Deep River has a total length of 116 mi. and a drainage area of 1,422 sq. mi. The Haw River is about 90 mi. in length and drains approximately 1,705 sq. mi. Both rivers originate at elevations of about 1,000 ft. msl and have numerous falls and rapids; the Haw River has the steepest gradient. The elevation of the junction of the two rivers is about 158 ft. msl.

Buckhorn Creek is a tributary of the Cape Fear River; its confluence with the Cape Fear is just downstream of Buckhorn Dam, as shown on Figure 2.4.1-1.

2.4.2.2.2 Dams, Reservoirs, and Locks on the Cape Fear River

There are a number of regulating structures and reservoirs on the Cape Fear River. The locations of these structures and reservoirs are shown on Figure 2.4.1-3. Lock and Dam Nos. 1, 2, and 3 are located at river mile points 67, 99, and 123, respectively. Buckhorn Dam is at river mile 192, and its spillway crest is at Elevation 158.18 ft. msl.

In addition to the existing Lockville Dam and Carbonton Dam on the lower reach of the Deep River, the U. S. Army Corps of Engineers has proposed a comprehensive plan of development of water resources for the Cape Fear River basin; a summary of this plan is shown in Table 2.4.2-5.

2.4.2.2.3 Streamflow Analysis

Since the Cape Fear River is a major source of makeup water for the Main Reservoir, the record of flows of this river at Lillington were analyzed to

$\frac{\partial}{\partial X}$ = partial derivative with respect to X

$\frac{\partial}{\partial Y}$ = partial derivative with respect to Y

The wind stress is computed by the following formulae: (Reference 2.4.2-5)

$$T_{sx}/\sigma = 1.1 \times 10^{-6} W^2 \cos \alpha$$

$$T_{sy}/\sigma = 1.1 \times 10^{-6} W^2 \sin \alpha$$

where: W = wind speed

α = angle of wind direction

The current velocity is computed from stream functions as follows:

$$X - \text{component of current velocity} = U = \frac{-1}{H}\frac{\partial \Psi}{\partial Y}$$

$$Y - \text{component of current velocity} = V = \frac{1}{H}\frac{\partial \Psi}{\partial X}$$

The current speed and direction in terms of angle counterclockwise from the east direction are, respectively,

$$W = \sqrt{U^2 + V^2}$$

and

$$\theta = \text{TAN}^{-1} \frac{V}{U}$$

Due to its small size, wind induced currents in the Auxiliary Reservoir will be insignificant.

2.4.2.3.2.4 Reservoir Temperatures

Seasonal surface water temperature variation of the reservoirs was analyzed according to typical energy balance methods; the analysis used the meteorological data shown in Table 2.4.2-20. By taking into accoun the conservation of energy, the major heat transfer mechanisms between the reservoirs and the atmosphere were developed to calculate natural equilibrium temperatures. The major heating processes include solar and atmospheric radiation, and the significant cooling processes include reflected radiation, emitted radiation, conduction, and evaporation. Streamflow through the reservoirs and Cape Fear River makeup water are not significant in the annual energy budget. Since cooling tower blowdown is from the cold water basin, it does not have a significant effect outside of the designated mixing zone.

Calculated natural equilibrium temperatures for the reservoirs range from approximately 39 F in the winter to approximately 82 F in the summer. Monthly temperatures are shown in Table 2.4.2-20. Monthly cooling tower blowdown temperatures are shown in Table 5.1.2-1.

2.4.2.3.2.5 Reservoir Morphometry

The Main Reservoir has a surface area of approximately 6.5 sq. mi. and an overall shoreline length of about 40 miles at the normal operating level of Elevation 220 ft. msl. Since the reservoir is formed by backwater inundation into downstream reaches of several tributary streams, its overall shape is dendritic. The reservoir is generally narrow with a slightly wider region at the main trunk area. The width varies between approximately 1000 and 4000 ft. There are seven major branches with lengths ranging from 1 to 4 mi.

The reservoir bottom is relatively flat at the main trunk area with elevations varying from 175 ft. msl at the downstream (south shore) end to 195 ft. msl at the upstream (north shore) region. The northern portion of the main trunk has a nearly constant depth of about 35 ft. and a steep shoreline on the east side. The depth, however, becomes variable toward the west shore, where the bottom slope is approximately 1 in 40. The southern portion of the main trunk is flat, with an average depth of about 45 ft. Bottom contours as well as shoreline configuration are shown on Figure 2.4.2-24.

At the normal operation level of Elevation 252 ft. msl, the surface area of the Auxiliary Reservoir is approximately 0.55 sq. mi. and the average depth is about 20 ft. There are about seven miles of shoreline. The reservoir consists of three branches, each roughly one mile in length and 1000 ft. in width. The bottom cross sections are generally V-shaped, sloping on the order of 1 in 15 toward the shores. Bottom contours and shoreline configuration are shown on Figure 2.4.2-24.

2.4.2.3.2.6 Reservoir Sedimentation

To estimate the effect of sedimentation on the Main Reservoir bottom and shoreline configuration, a conservative sediment rating formula was deduced from sediment sampling data of Buckhorn Creek (Reference 2.4.2-6) by a regression analysis, using the equation:

$$SD = 0.0163\ Q^{1.56}$$

in which SD = daily sediment load, including suspended and bed materials, in Tons/Day

and Q = daily streamflow of Buckhorn Creek at Corinth, N.C., in cfs.

To estimate the total sediment load for the plant life of forty years, synthetic daily streamflows of Buckhorn Creek at Corinth, North Carolina, were generated for the same time period. The synthetic generation utilized five years (1972-1977) of daily streamflow records of Buckhorn Creek, and thirty-eight years (1940-1977) of monthly streamflow records of the nearby Middle Creek (Section 2.4.2.3.1). Two models by HEC (U. S. Army Corps of

TABLE 2.4.2-21

AUXILIARY RESERVOIR OPERATION - LOSS OF ALL OTHER WATER SOURCES
SIMULTANEOUS ACCIDENT CONDITION IN ONE UNIT
AND NORMAL SHUTDOWN OF THREE UNITS

Time After Accident mo	Inst. Heat Rejection 10^6 Btu/hr	Avg. For Period 10^6 Btu/hr	Effective Area 10^6 sf	Unit Load Btu/sf/hr	Forced Evap. Rate in/mo	Forced During in	Evap. Period ac. ft.	Worst Natural Evap. During Period in	ac. ft.	Total Storage Use In Period ac. ft.	Summation of Storage Use ac. ft.	Residual Storage At End of Period ac. ft.	Water Level In Auxiliary Pond at End of Period ft.
0.0	1270											4400	250.0
		600	9.31	64.5	5.87	1.47	26	2.3	58	84	84		
0.25	257											4316	249.7
		243	9.15	26.6	2.27	0.57	10	2.3	58	68	152		
0.25	257											4248	249.4
		223	8.97	24.9	2.04	0.51	9	2.3	58	67	219		
0.50	229											4181	249.3
		214	8.92	24.0	2.04	0.51	9	2.3	58	67	286		
0.75	217											4114	249.0
		205	8.85	23.2	2.13	1.07	19	4.25	106	125	411		
1.00	210											3989	248.4
		195	8.72	22.4	1.92	0.96	17	4.25	106	123	534		
1.50	199											3866	249.1
		187	8.60	21.7	1.73	0.87	16	4.10	103	119	653		
2.00	190											3747	247.8
		180	8.50	21.2	1.62	0.81	14	4.10	103	117	770		
2.50	183											3630	247.2
		175	8.29	21.1	1.56	0.78	14	3.89	97	111	881		
3.00	177											3519	246.9
		170	8.20	20.7	1.62	0.81	14	3.89	97	111	992		
3.50	173											3408	246.5
4.00	167												

2.4.3.2.1 Hydraulic Characteristics

a) Overburden

The plant area is covered with residual soils derived from the underlying rocks. The numerous soil borings drilled in the plant island area as well as in the Auxiliary Reservoir area, confirm the existance of up to about 15 ft. of clayey soil and saprolite overlying the Triassic rocks. The excavation and mapping of trenches in the plant area, as well as the excavation and borings for the site fault investigation (Reference 2.4.3-2) also indicate the preponderance of clayey and silty loam soils.

The U. S. Soil Conservation Service soil survey of Wake County, 1970, classified the site soils as the Creedmoor-White Store Association (Reference 2.4.3-3). Some typical engineering properties of the Creedmoor-White Store soil series, as mapped in the site area and taken from the U. S. Soil Conservation Service soil survey of Wake County, 1970, are listed below. They indicate that the Creedmoor-White Store soil conditions are relatively impervious. The surficial clay and saprolite zones prevent ready recharge to the rocks below them, as indicated by the general dry state of these rocks (Reference 2.4.3-2).

CREEDMOOR-WHITE STORE ASSOCIATION
CREEDMOOR SOIL SERIES (Typical Profile)

DEPTH (in.)	TEXTURE	PERCENTAGE PASSING SIEVE No. 200 (0.074 mm)	PERMEABILITY (in. per hr.)	SHRINK-SWELL POTENTIAL
0-12	Sandy loam	30-45	2.0 - 6.3	Low
12-29	Clay loam	35-85	0.63 - 2.0	Moderate
29-58	Clay	70-95	0.2	High
58-96	Clay	35-90	0.2	Moderate

b) Triassic Rocks

The plant site and peripheral lands are underlain by Newark Group rocks (Triassic) which are the only source of groundwater at the site. They consist of claystone, shale, siltstone, sandstone, conglomerate, and fanglomerate. An exception to this lithology is the intrusion of thin diabase dikes in the rock; these dikes were mapped in connection with the fault investigation in the plant and the Auxiliary Dam areas (Reference 2.4.3-2 and 2.4.3-4). The diabase rock is weathered near the surface and is unweathered below depths of about 20 ft.

The primary permeability of Triassic rocks is very low and the rocks appear to be essentially dry. Some lenses of relatively higher permeability rock exist within the Triassic rocks; however, they are not extensive and are surrounded by materials of relatively lower permeability. The Triassic rocks have fractures that have resulted from stress releases. These fractures provide secondary permeability in the rocks and are filled with water below the water table. The fractures are common to depths of about 100 ft., but become less prevalent and tight below that depth. Below about 400 ft., the fractures are closed and sealed to water flow (as shown by tests and experience gained through private well drilling in the area). Recharge in the area occurs by percolation of precipitation through the overburden. Most of the precipitation, however, is either lost back to the atmosphere through evapo-transpiration or becomes surface runoff. The predominance of surface and near-surface deposits with extremely low permeabilities results in rapid runoff of precipitation. Therefore, natural recharge to the aquifer occurs at a very low rate.

The precipitation which percolates downward is confined laterally by the diabase dikes and vertically by the absence of open fractures or joints at depth in the Triassic rocks. Numerous attempts to develop groundwater supplies from the Triassic rocks have been unsuccessful since these rocks are tight and relatively dry. However, groundwater is developed in the Triassic basin from hornsfels zones adjacent to diabase dikes. The relationship of dikes and fractures to groundwater flow is illustrated diagrammatically on Figure 2.4.3-2.

Even though Triassic rocks constitute the major aquifer within the site environs, the aquifer exhibits very low permeability for groundwater storage and movement. Of the 57 wells with an average depth of 158 ft. constructed in the Triassic formation in western Wake County, 16 percent yield less than 1 gpm with the average production at 5 gpm. Such relatively low permeability indicates that the Triassic formation is the lowest productive aquifer in the region (Reference 2.4.3-4). Numerous borings carried out for soil and geologic information in the plant site and reservoir areas confirm the very low permeability of the Triassic formation.

Six site wells located in the proximity of the diabase dikes yielded specific capacity values from 24 hour driller's tests that ranged from 0.16 gpm/ft. to 0.59 gpm/ft. These specific capacity values correspond to transmissivity values of about 40 $ft.^2$/day to 130 $ft.^2$/day (Reference 2.4.3-5).

2.4.3.2.2 Onsite Use of Groundwater

Seven wells were completed during 1973 and are being used during the construction phase. Additionally, eight new wells were developed in the proximity of diabase dikes during 1977-1979. Site wells are listed in Table 2.4.3-4 and are shown on Figure 2.4.3-5. Groundwater is being used at the site during the construction phase for (1) concrete batch plant and concrete placement, (2) office and plant use, and (3) grouting. Groundwater is not expected to be used for plant operation after the plant potable water system is installed. The estimated plant water requirements projected through the year 1982 are shown in Table 2.4.3-5.

Carolina Power & Light Company is the principal user of groundwater within two miles of the plant; there are only two domestic users within two miles of the plant, and both are up-gradient near the 7,000 ft. radius boundary.

TABLE 2.4.3-1

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

SUMMARY OF WATER-BEARING PROPERTIES OF
MAPPED LITHOLOGIC UNITS IN DURHAM, N.C. AREA

MAP UNIT	NUMBER OF WELLS	AVERAGE DEPTH (FEET)	RANGE IN DEPTH	YIELD (GALLONS PER MINUTE) AVERAGE	PER FOOT OF WELL	PER FOOT OF UNCASED HOLE
Metavolcanic Unit	317	94.8	0-600	9.6	0.10	0.15
Argillite-Graywacke Unit	77	102.4	0-283	7.3	0.07	0.12
Triassic Unit	110	115.3	0-300	7.2	0.06	0.08
Granite Unit	61	82.5	0-400	8.2	0.10	0.18
Granodiorite Unit	22	86.7	0-400	10.0	0.12	0.20
Hornblende Gneiss Unit	11	60.7	-	4.0	0.07	-
Mica Gneiss and Schist Unit	4	134.0	-	8.8	0.07	-

NOTE: Data from Groundwater Bulletin Number 7, N. C. Department of Water Resources, May, 1966.

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CHAPTER 3 LIST OF FIGURES (Cont'd)

3.0 THE STATION

3.1 EXTERNAL APPEARANCE

Major plant island structures include four Containment Buildings; two Reactor Auxiliary Buildings, each serving two units; two Turbine Buildings, each housing two turbine-generators; one Waste Processing Building; a Service Building; one Fuel Handling Building; and four natural draft Cooling Towers. Figure 3.1-1 shows the SHNPP site plan. A pictorial representation of the plant is provided by Figure 3.1-2 and the plant profile is illustrated by Figures 3.1-3 and 3.1-4.

The Containment and Reactor Auxiliary Buildings have an as-poured natural concrete exterior finish, while the Fuel Handling Building has siding with an exterior finish that is compatible with the environment. In addition, the exposed steel areas of the Turbine Building are painted gray to harmonize with the other buildings. The plant profile is dominated by the four natural draft Cooling Towers, each approximately 520 ft. high. The Cooling Towers have an as-poured natural concrete surface.

The site area is a rolling, wooded, rural area dissected by small streams in the Piedmont region of North Carolina. The SHNPP site is approximately 10,800 acres, of which about 4,000 acres are inundated to form the Main Reservoir. The plant area was graded to approximate Elevation 260 ft. MSL. The surrounding terrain was undisturbed as far as possible. In general, the terrain rises to the north of the plant. The Main Reservoir is to the south, east, and west of the plant.

Appropriate planting and seeding will be used to integrate the plant components into the environmental setting. A number of intrinsic aesthetic impacts are associated with the reservoirs and the Cooling Tower complex, as discussed in Chapter 5.

The location and elevation of release points for gaseous wastes are identified in Table 3.1-1. Figure 3.1-5 shows the location of these release points relative to the site plan. The liquid release point (Cooling Tower blowdown line) is shown on Figure 2.4.1-1.

TABLE 3.1-1 (Continued)

PLANT AIRBORNE EFFLUENT RELEASE POINTS(1)

RELEASE POINT NO.	RELEASE POINT ELEV. (FT.MSL)	RELEASE POINT EL. ABOVE GRADE(3) (FT.)	DISTANCE TO NEAREST RESTRICTED AREA BOUNDARY (FT.)	BUILDING	UNIT NO.	SYSTEM	CFM(2) PER SYSTEM	TOTAL CFM PER POINT	SIZE & SHAPE OF ORIFICE	APPROX VELOCITY (FPM)
3A	296	36	435	Turbine Bldg.	1	Combined Effluent from Condensate Polishers Cubicles and Mech. Vac. Pumps Effluent Treat. Sys.	22,650	22,650	Dia. - 44 In. Circular	2145
3B					2	Combined Effluent from Condensate Polishers Cubicles and Mech. Vac. Pumps Effluent Treat. System	22,650	22,650	Dia. - 44 In. Circular	2145
4A	296	36	435	Turbine Bldg.	3	Combined Effluent from Condensate Polishers Cubicles and Mech. Vac. Pumps	22,650	22,650	Dia. - 44 In. Circular	2145
4B					4	Combined Effluent from Condensate Polishers Cubicles and Mech. Vac. Pumps Effluent Treat. Sys.	22,650	22,650	Dia. - 44 In. Circular	2145
5	321	61	335	Waste Processing Bldg.	1-4	Office Area Exhaustion Gen. Area Exh. Fan Filter Exh. System Office Area Economizer Fan	2,700 5,500 130,800 16,000			

3.2 REACTOR AND STEAM ELECTRIC SYSTEM

Each of the four Shearon Harris Nuclear Power Plant units consists of one Westinghouse pressurized water reactor, three steam generators, one turbine generator, a heat dissipation system, and associated auxiliaries and engineered safeguards. The reactor, the steam generators, and the other components of the nuclear steam supply system (NSSS) are designed and supplied by Westinghouse Electric Corporation. Each NSSS will be designed for an initial licensed power output of 2,785 MWt, which includes 10 MWt from the reactor coolant pumps. The ultimate output from each NSSS is expected to be 2,910 MWt, including 10 MWt from the reactor coolant pumps. The turbine generator, a multiflow, 1,800 rpm tandem compound unit initially delivering approximately 951 Mwe, is also supplied by Westinghouse. The architect-engineer for the plant is Ebasco Services, Inc. The in-plant power consumption is approximately 83 Mwe resulting in an initial net rating for each unit of approximatately 868 Mwe.

The reactor is fueled with uranium dioxide sintered fuel pellets in sealed zircaloy-4 fuel rod tubes. There are 157 fuel assemblies, each with a 17 x 17 rod array consisting of 264 fuel rods, 24 guide thimbles, and one position for incore instrumentation. The initial core consists of three regions. Region 1 is 2.1 weight percent (U235/U238) enriched; Region 2 is 2.6 weight percent enriched; and Region 3, the outermost core region, is 3.1 weight percent enriched. The core will be refueled at approximately annual intervals.

Turbine heat rates for various station loads are shown in Table 3.2-1. It should be noted that a dual pressure condenser is being installed. These heat rates are based on 4.05 and 2.83 in. HgA for the high pressure and low pressure zones, respectively. Operating back pressures are expected to range from highs of 4.15/2.95 in. HgA to lows of 2.45/1.73 in. HgA.

The plant is designed for an operating life of 40 years.

Dam, and overflow from the Auxiliary Reservoir. An additional contribution to net volume derives from direct rainfall on the reservoir surface. As indicated previously, percolation, natural and forced evaporation, and pumped makeup water from the Main Reservoir to the Auxiliary Reservoir account for the primary losses from the Main Reservoir conservation storage.

To evaluate the fluctuation of inflow and outflow rates, as well as the net storage volume (or reservoir stage), a reservoir operation study was conducted for the Main Reservoir for a four-year period from April 1973 through March, 1977. This study is discussed in Section 2.4 of this report.

Figures 2.4.2-9 through 2.4.2-11 show the duration curves for the Main Reservoir inflow rate, outflow rate, and stage. Rates of natural and forced evaporation, as well as the rate of percolation loss used in this study, are shown in Table 2.4.2-19 for various months of the year. They are derived based on data shown in Table 2.4.2-20 and the reservoir water surface areas. On-site gaging records have been utilized for direct rainfall data.

In computing the volume of makeup water from the Cape Fear River, the withdrawal restrictions previously described in Section 2.4 are considered. The computed range of fluctuation of the Main Reservoir levels is only 7.3 ft., with minimum and maximum levels respectively at Elevations 214.7 ft. msl and 222 ft. msl for the four-year study. The mean inflow and outflow rates are 120 and 35 cfs, respectively.

A similar study was carried out for the Auxiliary Reservoir. Here the inflow involves only streamflow from the upstream drainage area of the Auxiliary Reservoir and make-up water from the Main Reservoir. There is no forced evaporation during normal operation. The results of this study are shown in Figures 2.4.2-12 through 2.4.2-14. Rates of evaporation and percolation losses are listed in Table 2.4.2-19. Due to a large surface area, which is about 20 percent of the tributary watershed area, and a relatively long discharge spillway crest (170 ft.) which passes floods quickly with only slight damping, the reservoir level generally stays between Elevations 250 ft. msl and 252.5 ft. msl, with 2.5 ft. of expected range of fluctuation during normal operation. The mean inflow and outflow rates are 2 and 1 cfs, respectively. The starting water level is assumed to be at the normal operating level of Elevation 252 ft. msl.

A schematic indicating the elements and their directions involved in the computation of inflows and outflows for the Main and the Auxiliary Reservoirs is shown on Figure 2.4.2-15.

The stage-duration curve for the Main Reservoir is shown on Figure 2.4.2-11. The Main Reservoir level for a typical year will have approximately a 1.5-foot drawdown. This potential drawdown probably would occur in October and November and is not expected to have any effect on the aquatic communities in the reservoir.

The ten-year frequency drought drawdown of approximately 4 to 5 ft. would occur in the months of October through December. A drawdown of this extent would uncover approximately 750 to 800 acres of the reservoir. Such a drawdown should have little or no detrimental effects on fish populations.

As for the benthic population, there may be a numerical and diversity loss of some of the representatives of the Ephemeroptera, Plecoptera, Trichoptera, Amphipoda, and Gastropoda due to a drawdown associated with the ten-year frequency drought. However, representatives of several species of aquatic flies (larval stage) and worms may burrow in the exposed substrate, survive for several months, and recolonize littoral areas when the reservoir returns to normal pool.

Radwaste Systems are discussed in Section 3.5 and the effects of the discharge are described in Section 5.2.

The chemical waste system effluents are described in Section 3.6, and the evaluation of the effects of the discharge are discussed in Section 5.3. The flow between the chemical systems is shown on Figure 3.3-1 and the quantities are in Table 3.3-1.

The sanitary wastewater will be treated by two 25,000 gpd package treatment plants. The plants are described in Section 3.7 and the evaluation of the effects of the discharge are discussed in Section 5.4. NPDES effluent limits are contained in Appendix B. Potable water for plant use will be withdrawn from the Main Reservoir.

3.4.2 CIRCULATING WATER SYSTEM

The closed loop Circulating Water System for each unit shown in Figures 3.4.2-1 and 3.4.2-2 provides the main condenser with a continuous supply of cooling water for removing the heat rejected by the Turbines. The system is designed to operate continuously throughout the year under various ambient weather conditions. The CWS for each unit utilizes the following major components in its cycle:

a) Main condenser

b) Natural draft hyperbolic Cooling Tower to serve as the heat sink

c) Cooling tower basin

d) Three 33 1/3 percent capacity circulating water pumps

e) Chlorination system for circulating water treatment

f) Cooling tower makeup and blowdown water system

The total circulating water requirements are 483,000 gpm (1076 cfs) for each unit or a total of 1,932,000 gpm (4300 cfs) for the entire plant.

3.4.2.1 System Description

The three 33 1/3 percent capacity circulating water pumps each rated at 161,000 gpm and 68 ft. total dynamic head take suction from each cooling tower basin and deliver the water to the condenser water boxes through two 120 in. diameter reinforced concrete pipes. After passing through the condenser tubes, the heated circulating water leaves the condenser outlet water boxes and return through two 120 in. diameter reinforced concrete pipes to the cooling tower hot water distribution system. From there, the water will cascade down the lattice of fill material in the Cooling Tower. This cools the water by dissipating heat to the atmosphere by conduction and evaporation. The cooled water collects at the bottom of the Cooling Tower. The water then flows by gravity through the basin into the circulating water pump chamber.

Under conditions of full load, each unit transfers approximately 6.7×10^9 Btu/hr. of heat to the CWS, resulting in an approximate increase of 26F in the temperature of the water as it passes through the condenser. There is no physical contact between the condensing steam and the circulating water. Furthermore, since the steam side of the condenser operates at a vacuum under normal conditions, the possibility of steam side materials leaking into the circulating water is remote.

Heat dissipated to the atmosphere in the Cooling Tower will vary with the plant load. The only heated water discharged to the Main Reservoir will be from blowdown of the Cooling Towers to control dissolved solids in the closed cycle system. The blowdown will be at a maximum rate of 60 MGD for 4-unit operation and is taken from the coolest water in the system. The comparative maximum blowdown rates are 15 MGD for one-unit operation, 30 MGD for two-unit operation, and 45 MGD for three-unit operation. This water will range from approximately 7F above the ambient Main Reservoir temperature in July, to approximately 28F above ambient in December.

3.4.2.2 Total Consumptive Water Use

The total consumptive water use in the operation of the Cooling Towers and other waste systems, varying throughout the year, are 106 cfs under average meteorological conditions and 125 cfs under extremely adverse meteorological conditions with the plant operating at 100 percent capacity.

3.4.2.3 Design, Size and Location of Cooling Towers

The SHNPP has four natural draft hyperbolic Cooling Towers, one per unit. Each Cooling Tower is approximately 410 ft. in diameter at the basin and about 520 ft. high. Other design parameters are given in Table 3.4.2-1.

3.4.2.4 Chemical Characteristics of Cooling Towers

A chlorination system is utilized to control the growth of algae in the SHNPP units' condensers and the circulating water pipes. The chlorine requirements are expected to be approximately 3-5 ppm. The system normally operates for only two 30-minute cycles per day. Chlorine residual in the water in the cooling tower basin is controlled so that its concentration does not exceed 0.5 ppm in the Cooling Tower blowdown. Residual chlorine in the blowdown water averages less than 0.2 ppm.

Consequently, the blowdown rate of 60 MGD will have minimal effects, if any, on aquatic populations from the standpoint of chlorine discharges.

The impacted area is estimated at 5 acres. Also, little, if any, fouling in the plant heat exchangers is expected. The pH of the circulating water is controlled by the addition of sulphuric acid or sodium hydroxide as needed.

3.4.2.5 Drift and Drizzle of Cooling Towers

A very small fraction of the cooling water circulating through the Cooling Towers is carried as small droplets in the rising air which leaves the cooling tower top. This drift rate fraction (defined as kilograms (kg) of salt per second leaving the cooling tower top divided by the kg of salt per second circulation through the tower heat exchange section) will average about 2×10^{-5} (or 0.002 percent). The drift is dispersed at an elevated point and on most days of light wind, the moist plume will continue to rise so that little or no ground fogging or icing will occur. Total evaporation and drift rate from the cooling towers is estimated at 35,000 gpm for four units. Expected evaporative water losses are shown in Table 3.4.2-2.

3.4.2.6 Reasons for Selecting Cooling Towers

The original design of the cooling system for the SHNPP consisted of a 10,000 acre cooling lake. However, a regulatory decision by the State of North Carolina made this alternative unavailable. Therefore, Cooling Towers became respectively. The normal water depth in the structure is 23 ft., and high and low depths are 38.5 ft. and 21.15 ft., respectively.

For screens serving the large pumps, the maximum flow through one screen, at normal water level, and assuming its redundant screen is blocked, is 114 cfs at 0.90 fps. Under low water level conditions the similar values are 114 cfs and 0.98 fps. For screens serving the small pumps, the maximum flow at normal water level is 45 cfs and 0.35 fps and at low water level it is 45 cfs at 0.39 fps.

Large debris accumulated at the course screens is removed by a manually operated trash rake. The trash rake travels on rails across the intake structure above the trash racks and is lowered to remove debris from the water at the face of the trash racks as required. Trash is lifted to the top deck of the intake structure and is deposited in strainer baskets at either end of the structure.

The traveling screens are equipped with baskets fixed to the face of the screen that remove debris from the water as the screen revolves. The debris is automatically washed from the baskets as they pass above the top deck of the intake structure where troughs carry the debris and wash water to the strainer baskets at either side of the structure.

Water level controls on the reservoirs are minimal; only the low level release gates and valves have to be controlled initially. The Cape Fear River pumping station requires motor, valve, screen, and backwash controls. Instrumentation for the Main Reservoir consists of reservoir water level indicators, low level release indicators, valve and gate position indicators, and temperature sensors.

3.4.2.9 Cooling Tower Makeup System

Due to the loss of water caused by natural evaporation, drift, and blowdown requirements, continuous makeup water is provided to the plant's cooling system by means of cooling tower makeup systems. The cooling tower makeup system consists of cooling tower makeup pumps, a common header, a dual strainer system, piping, and a Cooling Tower Make-up Water Intake Channel from the Main Reservoir.

There is one cooling tower makeup pump per unit with one spare for every two units. The six cooling tower makeup pumps are located in the Emergency Service Water and Cooling Tower Makeup Water Intake Structure. The total of six cooling tower makeup pumps are divided into two sets of three pumps each. Each set is headed together to supply a pair of Cooling Towers. With four units operating at maximum makeup rates, only two of the three pumps will be operating simultaneously; or, on a plant basis, four out of six. Any four of the six pumps will supply the amount of makeup water required for the Circulating Water System. Each pump is sized for 26,000 gpm and a total dynamic head of approximately 135 ft. The withdrawal requirements for one-, two-, three-, and four-unit operation are about 46 cfs, 92 cfs, 138 cfs, 184 cfs, respectively.

The cooling tower makeup pumps also supply makeup water to the plant water treatment facility at the rate of 1200 gpm (4 units). This is included in the above rating of the pumps.

Each cooling tower makeup pump is located in a separate bay of the intake structure. Each bay is provided with, in the direction of water flow, a course screen, stop log guides, a traveling screen, and guides for two fine screens. Details of the structure can be seen on Figures 3.4.2-10 through 3.4.2-13.

Each course screen measures 10 ft. 2 in. wide and extends from the floor of the intake structure to the underside of the top deck, a distance of 70 ft. The detailed dimensions of the course screens are the same as those at the Cape Fear River intake structure.

Each traveling screen measures 9 ft. wide and is similar in other dimensions and materials to those described above for the Cape Fear River makeup intake structure. The fine screens have overall dimensions of 10 ft. 2 in. by 70 ft., and are otherwise similar to the fine screens of the Cape Fear River makeup intake structure, in both dimension and purpose. As in the Cape Fear River makeup intake structure, stop logs serve to facilitate maintenance of equipment in the bays.

The intake structure is designed for a normal water level of Elevation 220 ft. MSL, and high and low levels of Elevation 255 ft. MSL and 205.7 ft. MSL, respectively. (Although designed for a high water level of Elevation 255 ft. MSL, the maximum expected water level is approximately Elevation 240 ft. MSL.) The normal water depth in the structure is 30 ft., and high and low depths are 50 ft. and 15.7 ft., respectively. The maximum flow through a screen, at normal water level, is 67 cfs at 0.40 fps. Under low water level conditions the similar values are 63 cfs and 0.73 fps. Trash removal from the traveling screens is similar to that described for the Cape Fear River makeup intake structure.

Trash removed at both intake structures will be deposited in a landfill located on site.

Environmental Report Section 5.1.3.4 addresses the impact of the plant intake on the aquatic community. As stated in that section, the design criteria for the normally operating intake structures included a requirement that the intake velocities not exceed 0.5 fps at low water levels. This criteria is met for both intakes discussed above at the position of the stop log guides in the structures.

The location of the cooling tower makeup structure is shown in Figure 3.4.2-3. Details of the Cooling Tower Makeup Water Intake Channel and ESW and Cooling Tower Make-Up Intake Structure are shown on Figures 3.4.2-10, 3.4.2-11, 3.4.2-12, 3.4.2-13, and 3.4.2-14.

3.4.2.10 Dams and Dikes

There are three such structures: the Main Dam, the Auxiliary Reservoir Dam and the Auxiliary Reservoir Separating Dike.

The Main Dam is an earth-rockfill structure and the Auxiliary Reservoir Dam and the Auxiliary Reservoir Separating Dike are earth-random rockfill structures all designed to use locally available materials. Each dam has a cross section consisting of a central impervious core flanked by transition filter zones and compacted rock or random rockfill shells. The Auxiliary Reservoir Separating Dike has a cross section consisting of a central impervious core flanked by a random rockfill shell. The slopes of the structures are protected with riprap placed on crushed rock bedding where necessary.

The Main Dam has a maximum height above the stream bed of about 90 ft., and contains approximately 550,000 cu. yd. of compacted earth materials. The Auxiliary Reservoir Dam, which is a part of the Emergency Core Cooling System is an earth-fill structure about 3,700 ft. long including the spillway section. The dam has a maximum height of about 50 ft. above the stream bed and will contain approximately 600,000 $yd.^3$ of compacted earth materials.

The foundation materials for the Main Dam and Spillway and the Cape Fear River to Main Reservoir makeup system are granite. The Main Dam core and shell and the Auxiliary Reservoir Dam core are founded on rock. A portion of the Auxiliary Reservoir Dam shell is founded on rock. The foundation materials of the Auxiliary Reservoir structures and the intake structure from the Main Reservoir are the Triassic claystones, sandstones, shales, and siltstone. Both the Main and Auxiliary Reservoir Dams are constructed to withstand the design basis earthquake.

3.4.2.11 Essential Features of Interior Flow Patterns in Regard to the Cooling Reservoir

The Auxiliary Reservoir performs its function as the ultimate heat sink in the event of a loss of service water from the Cooling Towers. During Emergency Service Water System Operation, service water is drawn from and discharged to the Auxiliary Reservoir. The emergency service water is carried to the Emergency Service Water and Cooling Tower Makeup Intake Structure by gravity through the Emergency Service Water Intake Channel and Emergency Service Water Intake Screening Structure. The thermal effluents released during the emergency operating mode are discharged into the Auxiliary Reservoir through the Emergency Service Water Discharge Channel. The intake and discharge channels are separated by the Auxiliary Reservoir Separating Dike in order to prevent the thermal effluents from being withdrawn immediately after being discharged. The thermal effluents will ultimately be returned to the Emergency Service Water Intake Channel via the Auxiliary Reservoir Channel. As is seen from Figure 3.4.2-3, this arrangement provides for maximum recirculation of the thermal effluents within the Auxiliary Reservoir, and maximum efficiency of the heat sink.

The Main Reservoir functions as the ultimate heat sink only in the unlikely event that the Auxiliary Reservoir is not available. Under this circumstance, emergency service water is carried to the Emergency Service Water and Cooling Tower Makeup Intake Structure through the Cooling Tower Makeup Water Intake Channel from the Main Reservoir. The thermal effluents released are discharged into the Auxiliary Reservoir and then over the Auxiliary Reservoir Dam Spillway into the Main Reservoir.

The circulation path thus established is longer than the corresponding path established when only the Auxiliary Reservoir is utilized and therefore it provides more than adequate cooling.

3.4.3 SERVICE WATER SYSTEM

The Service Water System for each unit provides redundant cooling water to those components necessary for safety either during normal operation or under accident conditions. It also supplies cooling water to various other heat loads in the primary and secondary portions of each unit including the Component Cooling Water System. There are two separate modes of operation of the Service Water System--normal operation and emergency operation.

a) Normal Operation

Normal operation consists of using the unit's circulating water when the Cooling Tower and all associated components are operative. Each pair of Cooling Towers (Units 1 & 2 and Units 3 & 4) are interconnected to provide backup shutdown cooling in the event that one Cooling Tower is not available to perform the heat transfer function.

b) Emergency Operation

Emergency operation consists of using the Auxiliary Reservoir or Main Reservoir if the unit's Cooling Tower or designated backup Cooling Tower and their associated components are not available for service. The Auxiliary Reservoir is the preferred source of cooling water under these conditions. The Main Reservoir serves as a backup source of water in the unlikely event of the loss of water from the Auxiliary Reservoir.

3.4.3.1 System Description

The Service Water System for each unit shown on Figures 3.4.2-1 and 3.4.2-2 consists of two 100 percent normal service water pumps, two 100 percent emergency service water pumps, two 100 percent service water booster pumps, associated piping, valves, and instrumentation. The system is designed such that during unit start-up and normal operation, service water requirements are met by one of the normal service water pumps taking suction from either of the two adjacent Cooling Towers. Each pair of Cooling Towers are interconnected to provide this provision. The pump furnishes all normal operating service water requirements for the unit through one single supply line. This supply line provides water to the component cooling heat exchangers, the containment fan coolers, and the HVAC equipment located in the Reactor Auxiliary and Waste Process Buildings and normal Turbine Building heat loads. The total service water requirements per unit are shown in Table 3.4.3-1.

During normal operation, the heated service water is discharged into the unit's circulating water downstream of the condenser. The normal operation of the Service Water System is designed to provide water at a temperature less than the maximum design temperature of 95F. The normal service water system heat load is 131.6 x 10^6 Btu/hr. Maximum service water system heat loads following a safe shutdown of one unit and during LOCA are shown in Tables 3.4.3-2 and 3.4.3-3, respectively.

Under emergency conditions when both Cooling Towers become inoperative, the supply is switched to the emergency service water pumps taking suction from the Emergency Service Water Intake Structure supplied by the Auxiliary

Reservoir. Under this condition, the Turbine Building loads are isolated and the unit is maintained or brought to shutdown condition.

The Main Reservoir serves as a backup supply of water for the Auxiliary Reservoir if water from that source is not available. Valving is provided to switch suction from the Auxiliary to the Main Reservoir. Water from the Main Reservoir is taken from the Main Reservoir via the Cooling Tower Makeup Water Intake Channel. Service water from the Main Reservoir is returned to the Auxiliary Reservoir.

Water from both the Main and Auxiliary Reservoirs passes through the traveling screens. Concrete walls separate the intake into bays. Each emergency service water system pump is located in a separate bay with separate screens, and each pump discharges into a separate pipeline.

spent fuel pool water via transfer tube and fuel transfer canal. After refueling, the spent fuel pool is isolated and the water in the refueling cavity is returned to the refueling water storage tank. This series of events determines the total activity to the spent fuel pool. The specific activities of the radionuclides given in Table 3.5.1-5 are based upon a volume of 960,250 gallons. The initial radioactivity level will be reduced by decay during refueling and by operation of the Spent Pool Cooling and Cleanup System.

Based on a spent fuel pool volume of 398,000 gallons, a processing rate of 325 gallons per minute through the Spent Fuel Pool Cleanup System, and a combined decontamination factor of 2 for Cs, Rb, and 10 for all others for the filter and demineralizer, the cleanup rate for Cs, Rb and other particulate radionuclides is 0.59 and 1.06 cycles per day, respectively.

The fuel pool activities under normal operating conditions are also presented in Table 3.5.1-5. These values are obtained using the method described for design basis values with the exception that normal primary coolant activities presented in Table 3.5.1-1 are used instead of design basis primary coolant activities.

As discussed in Section 9.1 of the FSAR, the fuel storage pools will be used for storage of PWR and BWR spent fuel shipped from other nuclear plants on the CP&L system. Since this fuel will have been out of the reactor for a minimum of 90 days prior to being shipped to SHNPP, it will not contribute significantly to the fuel pool activities calculated above.

3.5.1.7 Leakage Sources

Systems containing radioactive liquids are potential sources of leakage to the environment. Table 3.5-1-6 provides a listing of assumed leakage values from valves and pumps. Leakage of primary coolant into the containment building atmosphere, which is ultimately exhausted to the environment at times of containment purge, is assumed to be one percent per day of the primary coolant noble gas activity and .001 percent per day of the iodine activity in the primary coolant. An additional potential source of gaseous discharge is coolant leakage (via the CVCS and BRS) into the Reactor Auxiliary Building.

A leakage rate for each unit of 160 lb./day of a mixture of hot and cold primary coolant leakage is assumed, with an iodine and noble gas partition factor of .0075 and 1.0 respectively. The liquid from these leakage sources is collected and processed in the Liquid Waste Management System which is described in Section 3.5.2.

Primary to secondary leakage can result in the buildup of radionuclides in the secondary coolant and Steam Generator Blowdown System (SGBS). Under normal operation a leakage rate of 100 lb./day is assumed. The activity can ultimately result in discharge of small amounts of liquid and gaseous wastes to the environment. The discharge of liquid waste can result from liquid leakage to the turbine building sump and the release of portions of processed blowdown. It is assumed that leakage to the turbine building sump is five gpm and that all of steam generator blowdown is processed and returned to the secondary coolant system.

Gaseous releases from the secondary side can result from main steam leakage, the gland seal system exhaust and the discharge of noncondensible gases from the SGBS flash tank. Overall main steam leakage is assumed to be approximately 1700 lb./hr. and originates from many sources, each too small to identify. Turbine gland seal steam flow is sent to a gland steam condenser resulting in negligible discharges. Since all noncondensible gases from the SGBS flash tank are vented to the condenser, these releases are also negligible.

The above leakage rates and partition coefficients are based on the recommendations and experience presented in NUREG-0017.

Releases inside the plant are handled by the appropriate ventilation system. Containment air purification and cleanup systems are described in Section 9.4.5 of the FSAR. Reactor Auxiliary Building and Turbine Building Area Ventilation Systems are discussed in Section 9.4 of the FSAR and continuous radiation monitors are discussed in Section 12.3.4 of the FSAR.

3.5.1.8 Spent Resin Volumes

The spent demineralizer resin supplied to the Solid Waste Management System from demineralizers in the Nuclear Steam Supply System is presented in Table 3.5.1-7. The information is based on plant experience as further outlined in Reference 3.5.1-3.

3.5.1.9 Source Term Data

Data needed for radioactive source term calculations required by Regulatory Guide 4.2 are contained in Appendix A of this report.

TABLE 3.5.1-1 (Cont'd)

NORMAL OPERATIONAL PRIMARY AND SECONDARY COOLANT ACTIVITIES
(μCi/gm)

Nuclide	Primary Coolant	Secondary Water	Coolant Steam
Y-91m	4.29×10^{-4}	1.38×10^{-8}	1.38×10^{-11}
Y-91	6.72×10^{-5}	1.86×10^{-9}	1.86×10^{-12}
Y-93	3.83×10^{-5}	7.88×10^{-10}	7.88×10^{-13}
Zr-95	6.31×10^{-5}	2.47×10^{-9}	2.47×10^{-12}
Nb-95	5.26×10^{-5}	2.48×10^{-9}	2.48×10^{-12}
Mo-99	8.99×10^{-2}	2.60×10^{-6}	2.60×10^{-9}
To-99m	5.50×10^{-2}	2.63×10^{-6}	2.63×10^{-9}
Ru-103	4.73×10^{-5}	1.24×10^{-9}	1.24×10^{-12}
Ru-106	1.05×10^{-5}	2.47×10^{-10}	2.47×10^{-13}
Rh-103m	5.35×10^{-5}	2.70×10^{-9}	2.70×10^{-12}
Rh-106	1.20×10^{-5}	7.12×10^{-10}	7.12×10^{-13}
Te-125m	3.05×10^{-5}	6.19×10^{-10}	6.19×10^{-13}
Te-127m	2.94×10^{-4}	6.18×10^{-9}	6.18×10^{-12}
Te-127	9.59×10^{-4}	2.40×10^{-8}	2.40×10^{-11}
Te-129m	1.47×10^{-3}	3.72×10^{-8}	3.72×10^{-11}
Te-129	1.90×10^{-3}	7.77×10^{-8}	7.77×10^{-11}
Te-131m	2.72×10^{-3}	6.85×10^{-8}	6.85×10^{-11}
Te-131	1.32×10^{-3}	3.08×10^{-8}	3.08×10^{-11}
Te-132	2.88×10^{-2}	6.45×10^{-7}	6.45×10^{-10}
Ba-137m	1.92×10^{-2}	1.58×10^{-6}	1.58×10^{-9}
Ba-140	2.32×10^{-4}	6.24×10^{-9}	6.24×10^{-12}
La-140	1.62×10^{-4}	4.68×10^{-9}	4.68×10^{-12}
Ce-141	7.37×10^{-5}	2.48×10^{-9}	2.48×10^{-12}
Ce-143	4.34×10^{-5}	6.79×10^{-10}	6.79×10^{-13}
Ce-144	3.47×10^{-5}	1.23×10^{-9}	1.23×10^{-12}
Pr-143	5.27×10^{-5}	1.25×10^{-9}	1.25×10^{-12}
Pr-144	3.96×10^{-5}	3.21×10^{-9}	3.21×10^{-12}
Np-239	1.29×10^{-3}	3.93×10^{-8}	3.93×10^{-11}

3.5.2 LIQUID RADWASTE SYSTEMS

The Liquid Waste Processing System (LWPS) provides for the collection, storing, processing, and controlled release of radioactive and potentially radioactive liquids associated with the operation of the nuclear power plant. The discharge of treated wastes is controlled and monitored to ensure that any discharges are as low as are reasonably achievable (ALARA) and that they are in conformance with the requirements specified in 10CFR20 and 10CFR50.

3.5.2.1 Design Bases

3.5.2.1.1 Design Objectives and Criteria

The LWPS is designed to collect all primary plant radioactive waste water and by processing, reduce the radionuclide concentration and upgrade its quality to permit reuse or discharge to the environs. In addition, the LWPS is designed to treat occasional batches of secondary liquids should leakage or other occurrences produce radioactive liquids in the secondary system. Differences in primary and secondary system water chemistry must be considered prior to reusing liquids from these sources.

The LWPS is divided into four subsystems; the Equipment Drain Treatment System, Floor Drain Treatment System, Laundry and Hot Shower Treatment System, and the Secondary Waste Treatment System. These subsystems segregate the various types of liquid radwaste based on their source because of their composition and process requirements. The segregation is used to provide the maximum water quality and radionuclide removal prior to release of treated water to the environs.

Each subsystem services two of the four Units, except the Laundry and Hot Shower Treatment System which services all four Units. Specifically, there are two Equipment Drain Treatment Systems, two Floor Drain Treatment Systems, two Secondary Waste Treatment Systems and one Laundry and Hot Shower Treatment System.

The LWPS is designed to recycle as much of the water entering the system as practicable. This is accomplished primarily by the segregation and appropriate treatment of the various waste streams.

The bulk of the radioactive liquids discharged from the Reactor Coolant System is processed and recycled by the Boron Recovery System. Aerated wastes and other liquids are treated in the Liquid Waste Processing System by an appropriate combination of filtration, ion exchange and evaporation. Filtered particulate matter, spent ion exchange resin, and waste concentrates are collected and sent to the Solid Waste Processing System (Section 3.5.4) where they are solidified and shipped offsite for disposal. The Liquid Waste Processing System design is shown on Figures 3.5.2-1 through 3.5.2-8.

Liquid wastes from reactor coolant and its associated subsystems are separated into three main streams - 1) Recyclable Reactor Grade Stream, consisting of all tritiated effluents from equipment drains; 2) Nonrecyclable Stream, consisting of nonreactor grade water sources, collected and processed through either the Floor Drain Treatment Systems or the Laundry and Hot Shower

Treatment System; 3) Secondary Waste Stream, consisting of potentially radioactive effluent from the condensate polisher regeneration.

Provisions have been made to sample and analyze processed liquids before they are recycled or discharged to the environment. Based on laboratory analysis and the limitations of 10CFR20 and 10CFR50, Appendix I, these fluids will be either released under controlled conditions via the cooling tower blowdown or retained for further processing. The system is capable of processing all wastes generated during operation of the Reactor Coolant System for all four Units. The annual input waste volumes for the systems and discharge quantities are shown in Table 3.5.2-1. The system has been designed to include excess capacity, redundant equipment, and system cross-ties to allow for abnormal liquid surges and equipment malfunction.

The Exhaust System for the waste processing areas is equipped with HEPA filters and charcoal adsorbers; thus, any liquids volatilized will be filtered prior to discharge. In the event of accidental releases of liquid waste due to operator error, automatic alarms and controls prevent excessive waste release. Liquid waste tanks that operate at atmospheric pressure vent to the Waste Processing Building Ventilation System. All tank overflow connections are equipped with water traps to prevent release of volatile species inside the WPB. All waste gases which are vented from the liquid waste tanks are monitored at the point of release to the environment.

The LWPS is monitored and controlled from a central Control Room in the Waste Processing Building. Local instrumentation and controls, where necessary, are located on auxiliary racks near the equipment. Operation is a batch process; that is, operator initiation with automatic termination. All releases to the environment require operator action to initiate.

Releases to unrestricted areas of liquid effluents containing or potentially containing radioactive materials are made only from the waste evaporator condensate tanks, waste monitor tanks, treated laundry water storage tanks, and secondary waste sample tanks. These releases are monitored before discharge to the cooling tower blowdown.

The discharge valve is interlocked with a process radiation monitor and will close automatically should the radioactivity concentration in the liquid discharge exceed a preset limit. The liquid waste discharge flow volume is recorded. In addition, an interlock system is provided to automatically isolate the liquid discharge in the event that dilution flow afforded by the cooling tower blowdown falls below a preset value.

The waste quantities that must be processed are shown in Table 3.5.2-1. This table indicates the source of the influent, the volume of flow (per day and per year) and the activity of each source. Table 3.5.2-2 details the anticipated operational occurrences which were considered in the design of the LWPS for normal operation. Table 3.5.2-3 shows the evaluation of the LWPS and indicates the capabilities of the LWPS to process the waste surge flows of anticipated operational occurrences, and the redundant process equipment to handle equipment downtime. This evalulation shows that the LWPS has sufficient capability and redundancy to process surge waste flows associated with anticipated operational occurrences such as waste flows from back-to-back refuelings and equipment downtime.

3.5.2.2.2 Floor Drain Treatment System

The Floor Drain Treatment System collects and processes water from the floor drains of the Reactor Auxiliary Building, Fuel Handling Building, Waste Processing Building, Tank Building and portions of the Hot Shop. This subsystem treats the collected water by removing chemical and radioactive impurities to the extent that safe discharge to the environment is permitted. The Floor Drain Treatment System consists of two independent streams, each serving two Units. The process subsystem is shown on Figure 3.5.2-4.

Equipment for each stream serving two Units includes two floor drain tanks, two filters, a reverse osmosis unit, a waste monitor tank demineralizer, and two waste monitor tanks. The system is cross-tied to the waste evaporator in the Equipment Drain Treatment System to allow for treatment by evaporation if conditions require it.

Water is collected in one of two 25,000 gallon floor drain tanks. The two tanks have sufficient capacity to allow for surges and other abnormal inputs. After mixing and sampling, normal treatment consists of filtration and reverse osmosis. If radioactivity levels are such that this treatment would be inadequate, the reverse osmosis unit will either be supplemented by demineralization or be bypassed and the water routed to one of the waste evaporators before being returned to the waste monitor tank. Water in the waste monitor tank is sampled, routed to the condensate storage tank for reuse, discharged to the environment via the cooling tower blowdown or recycled for further treatment. All discharges to the environment will be in a controlled manner.

The Floor Drain Treatment System is isolated from drainage systems which do not carry radioactive waste. Radioactive floor drain wastes are collected separately in tanks or sumps, based upon the system classification to facilitate their treatment by the Liquid Waste Processing System.

Laboratory samples (spent and excess sample liquid) which are likely to be tritiated and/or which may contain chemicals required for analysis are not discharged or recycled but are solidified directly. These samples of relatively small volume are discarded in a separate sink which drain to the chemical drain tank. One chemical drain tank is provided for each two-Unit Liquid Waste Processing System. This tank and associated pump are shown on Figure 3.5.2-4. Low activity drains from the laboratory, such as rinse water, are routed to the floor drain tanks. The liquid wastes from the chemical drain tank which are not directly solidified are sent to the reverse osmosis concentrates evaporator.

3.5.2.2.3 Laundry and Hot Shower Treatment System

Laundry and hot shower liquid wastes collected in the Liquid Waste Processing System normally do not require treatment for removal of radioactivity. A sample will be taken and, after analysis, the results will be logged and the water discharged if the activity level is within acceptable limits. Provisions have been made, however, to process these wastes normally by filtration and reverse osmosis and demineralization when required. One laundry and hot shower system is provided for all four Units. This subsystem is shown on Figures 3.5.2-5 through 3.5.2-7 and the input volume shown in Table 3.5.2-1.

Equipment in this subsystem includes two laundry and hot shower tanks, two filters, a reverse osmosis unit, a demineralizer, two treated laundry and hot shower tanks, two reverse osmosis concentrates tanks, and two reverse osmosis concentrates evaporators.

When analysis of the water in the laundry and hot shower tank indicates treatment is required, it is then filtered and routed to a reverse osmosis unit. The permeate from the reverse osmosis unit is passed through a demineralizer and then routed to the treated laundry and hot shower tank. After sampling, the water is either recycled for further treatment or discharged. The concentrates from each of the three reverse osmosis systems are sent to a reverse osmosis concentrates tank where they are further concentrated by an evaporator. Evaporator concentrates are routed to the solidification system.

3.5.2.2.4 Secondary Waste Treatment System

The Secondary Waste Treatment System is designed to treat wastes generated from secondary or steam/condensate systems. This water will contain radioactivity only if steam generator leaks occur; however, all sources of secondary waste are considered potentially radioactive. One secondary waste treatment subsystem is designed to handle the waste from two Units. Each subsystem is divided into high conductivity and low conductivity streams. The design is shown on Figure 3.5.2-8 and the equipment is located in the south end of the Fuel Handling Building. Inputs are shown in Table 3.5.2-1.

Turbine building equipment drains, floor drains, and curbed area oil equipment and floor drains below the operating deck are collected by a common waste drainage system and directed to industrial waste sumps on the ground floor of the Turbine Building (two per unit). Drains below ground elevation, including those in the heater drain pit area, are collected in a condensate pump area sump. Both the industrial waste sumps and condensate pump area sump discharge through a radiation monitor on a common discharge header.

In the event that a high radiation level is detected in the water being discharged, an alarm will be activated in the Control Room. This radiation level is equivalent to an average 0.06 Ci./yr. release rate at 2 gpm. continuous flowrate. The sump pump discharge will then be automatically diverted through a filter and directed to the Secondary Waste Treatment System for processing and disposal.

The selection of treatments for this effluent stream is dependent upon the activity of the secondary system water. Under the postulated adverse conditions of one percent failed fuel and significant primary to secondary leakage, this source may require processing. However, under normal conditions, this potential source will be small and will require little treatment.

a trip valve in the discharge line will close automatically if there is a high activity level in the plant vent effluent.

3.5.3.1.3 Waste Gas Sources

3.5.3.1.3.1 Radioactive

Virtually all of the radioactive gas flowing into the system enters as trace contamination in high purity streams of hydrogen. The primary source of radioactive gas is the volume control tank purge. Smaller quantities are received from the recycle evaporator, the waste evaporator, the reactor coolant drain tank, and the recycle holdup tanks. The waste evaporator gas stripper is normally vented to the auxiliary building exhaust, but it will be vented to the gas system when it is used as a substitute for the recycle evaporator.

3.5.3.1.3.2 Non-Radioactive

Care is taken to minimize the addition of all gases other than those which the system can process and remove. Seemingly insignificant quantities could, in time, overload the limited storage capability of the gas decay tanks. With the present design, virtually all sources of non-removable gas have been eliminated so that the accumulation is primarily composed of impurities in the influent streams. The largest contributor to the non-radioactive gas inventory is helium generated by a boron-10 (n,α) lithium-7 reaction in the reactor core. The second largest contributor to the non-radioactive gas inventory is impurities in the bulk hydrogen and oxygen supplies. Stable and long lived isotopes of fission gases also contribute small quantities to the system gas accumulation.

Based on two Unit operation and assuming a 0.7 scfm hydrogen purge for the volume control tank of each Unit, an 80 percent plant load factor for each Unit, and 99.95 percent pure hydrogen and 99.95 percent pure oxygen, the following accumulation rates should result (totals for two Units).

Stable Fission Gases		25 scf./yr.
H_2 and O_2 Impurities		440 scf./yr.
Helium		512 scf./yr.
	Total	977 scf./yr.

At this rate of accumulation and assuming zero leakage from the GWPS, the eight normal operation gas decay tanks have a combined capacity sufficient to hold all the gaseous waste produced over more than 30 years with no releases. This assumes that the waste gas holdup tanks are operated with an initial charge of 5 psig of nitrogen and the pressure in the tanks is allowd to accumulate to 100 psig. Thus, the GWPS allows discharges to be made under favorable environmental conditions.

3.5.3.2 Building HVAC Systems

The HVAC systems for each building are discussed in detail in Section 9.4 of the SHNPP FSAR.

3.5.3.3 Gaseous Radioactive Releases

Gaseous radioactive effluent will be released in accordance with the guidelines of 10CFR20 and 10CFR50, Appendix I. The GWPS is capable of monitoring radioactive gaseous discharge to the environment to ensure that activity concentrations do not exceed predetermined limits. If a limit is exceeded, discharge will be automatically terminated.

An estimate of the normal gaseous effluent from the facility, including anticipated operational occurrences, is presented in Table 3.5.3-3. The values were obtained using the guidance of NUREG-0017, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from PWRs" (April, 1976) and the assumptions given in Table 3.5.3-3.

The tritium released through the ventilation exhaust systems during normal operation was also calculated. The exhaust quantity of tritium available for release was calculated using a functional relationship derived from measured liquid and vapor tritium releases at operating PWRs and the integrated thermal power output during the calendar year in which the release occurs. It is assumed that the tritium released through the ventilation exhaust systems is the total tritium available for release minus the tritium calculated to be released through the liquid pathway. The annual average concentrations of these normal operational effluents at the site boundary are given in Table 3.5.3-4. The concentrations are based on the highest annual average atmospheric dispersion factor, including terrain and recirculation correction factors, at the site boundary.

The potential doses caused by the release of radioactivity in the gaseous effluent are given in Table 3.5.3-5. These exposures were calculated using the guidance of Regulatory Guide 1.109 and are well within the limits of 10CFR50 Appendix I. It should be noted that Table 3.5.3-5 also demonstrates compliance with the September 4, 1975 Annex to Appendix I. Accordingly, a cost benefit analysis of compliance with Section II D of Appendix I is not provided.

Section 3.1 presents the location of all gaseous release points, and provides the height and inside dimensions of each release point along with the effluent temperature and exit velocity.

TABLE 3.5.3-1
(Two Units)
Page 1 of 3

SYSTEM AND COMPONENT CAPACITIES

1. WASTE GAS COMPRESSOR PACKAGE	
Quantity	2
Design Temperature, F	180
Design Pressure, psig	150
Operating Suction Pressure, psig	0.5 - 2.0
Design Flow (N_2 at 140 F and 100 psi discharge), scfm	40
Material	Carbon Steel
Operating Temperature, F	70-140
Operating Pressure, psig	25-100
2. CATALYTIC HYDROGEN RECOMBINER PACKAGE	
Quantity	2
Design Temperature, F	Note 1
Design Pressure, psig	150
Design Flow, scfm	50
Catalyst Bed Design Life, yrs.	40
Material	Stainless Steel
Operating Conditions, Inlet	
Temperature, F	70-140
Pressure, psig	25-100
Operating Conditions, Outlet	
Temperature, F	70-140
Pressure, psig	30

NOTE 1: Varies by component, but exceeds component operating temperature by 100 F.

Table 3.5.3-1

3. WASTE GAS DECAY TANKS

3.1 Normal Power Service Tanks

Quantity	8
Type	Vertical Cylindrical
Design Temperature, F	180
Design Pressure, psig	150
Volume, ft.^{3}	600
Material	CS

3.2 Shutdown/Startup Tanks

Quantity	2
Type	Vertical Cylindrical
Design Temperature, F	180
Design Pressure, psig	150
Volume, ft.^{3}	600
Material	CS

4. GAS DECAY TANK DRAIN PUMP

Quantity	1
Type	Canned
Design Temperature, F	180
Design Pressure, psig	150
Design Flow, gmp	10
Total TDH at Design Flow, ft.	90
NPSH Required, ft.	10
Max Operating Temperature, F	140
Max Operating Suction Pressure, psig	30
Fluid Pumped	Reactor Makeup Water
Material	Stainless Steel

TABLE 3.5.3-1

5. WASTE GAS DRAIN FILTER	
Quantity	1
Type	Backflushable
Design Temperature, F	200
Design Flow, psig	150
Design Flow, gpm	35
Pressure Loss at Design Flow	
Fouled, psig	20
Unfouled, psig	5.
Percent Retention for 25 Micron Particles	98
Material	Stainless Steel
6. GAS TRAPS	
Quantity	3
Design Temperature, F	180
Design Pressure, psig	150.
Operating Inlet Pressure, psig	
Maximum	100
Minimum	5
Design Flow, gpm	30
Material	Carbon Steel

TABLE 3.5.3-2

PROCESS PARAMETERS FOR GWPS - 90 DAY HOLDUP AND RELEASE (NOTES 1 & 2)

ITEM DESCRIPTION GAS STREAMS	TEMP F	PRESS PSIG	FLOW SCFH	N_2 + He %	H_2 %	ISOTOPIC CONCENTRATION, uC/CC (Note 3) KR85	KR85M	KR87	KR88	XE-133	XE-133M	XE-135
1. Volume Control Tank Purge (Note 5)	130	18	1.4	0	100	2.07×10^{-2}	3.10×10^{-1}	1.08×10^{-1}	4.94×10^{1}	1.44×10^{1}	3.01×10^{-1}	8.99×10^{-1}
2. Gas Decay Tank Disch.	AMB	20	40	99.9	0.1	1.24	2.22×10^{-1}	2.14×10^{-2}	2.22×10^{-1}	8.83×10^{1}	2.54	1.27
3. Compressor Suction	AMB	0.5	41.4	96.6	3.4	1.2	2.25×10^{-1}	2.43×10^{-2}	2.31×10^{-1}	8.58×10^{1}	2.46	1.26
4. Comp. Disch.	140	30	41.4	96.6	3.4	1.2	2.25×10^{-1}	2.43×10^{-2}	2.31×10^{-1}	8.58×10^{1}	2.46	1.26
5. Recombiner Disch.	140	20	40	99.9	0.1	1.25	2.33×10^{-1}	2.52×10^{-2}	2.39×10^{-1}	8.88×10^{1}	2.55	1.3
6. Misc. Vents-Evaps. RCDT. Recycle Holdup Tank Educator (Note 5)	140	0.5	REG.	0	100	0	0	0	0	0	0	0
7. Recombiner Oxygen Supply	AMB	50	0.7	0	0	0	0	0	0	0	0	0

ITEM DESCRIPTION LIQUID STREAMS	TEMP F	PRESS PSIG	FLOW GPD	ISOTOPIC CONCENTRATION, uC/CC (Note 5) KR85	KR85M	KR87	KR88	XE-133	XE-133M	XE-135
1. Waste Gas Compressor Drain	140	40	0	2.94×10^{-1}	5.49×10^{-2}	5.94×10^{-3}	5.64×10^{-2}	1.73×10^{1}	4.96×10^{-1}	2.53×10^{-1}
2. Recombiner Drain	140	30	12	2.48×10^{-1}	4.64×10^{-2}	5.02×10^{-3}	4.77×10^{-2}	1.46×10^{1}	4.2×10^{-11}	2.14×10^{-1}
3. Gas Decay Tank Drains	AMB	20	36	1.18×10^{-1}	2.1×10^{-2}	2.02×10^{-3}	2.1×10^{-2}	6.9	1.98×10^{1}	9.9×10^{-2}
4. System Drains to Vol. Control Tank	140	30-45	48	1.5×10^{-1}	2.73 x 10-2	2.77×10^{-3}	2.76×10^{-2}	8.83	2.53×10^{1}	1.28×10^{-1}

TABLE 3.5.3-2 (continued)

PROCESS PARAMETERS FOR GWPS - 90 DAY HOLDUP AND RELEASE

NOTES:

1. Basis: Type of Operation = Periodic Release of Gases

   Power Level = 2900 MWt

   Number of Units = 2

   Normal Operation Gas Decay Tanks in Rotational Use = 4

   GDT Operating Interval = 1 day

   Stripping Efficiency = 0.4

   Accumulation Period = 90 Days

2. Concentrations based on stripping fractions from Table 11.1.1-1 and reactor coolant activities from Table 11.1.2-1.

3. Concentrations in μc per cc of gas at atmospheric pressure and 140 F.

4. Parameters reflect the combined gas streams from two operating reactors.

5. Concentrations in μc per cc at room temperature.

6. NEG - Negligible

7. AMB - Ambient

3.5.4 SOLID WASTE PROCESSING SYSTEM

The Solid Waste Processing System (SWPS) collects, controls, processes, packages, handles, and temporarily stores radioactive waste generated as a result of normal operation of the plant, including anticipated operational occurrences. The SWPS prepares waste material for transportation to an off-site disposal facility. The SWPS is shared by all four units.

3.5.4.1 Design Objectives

The objectives of the SWPS are to collect wastes sent to it from the waste evaporator concentrate tank, the secondary waste evaporator concentrate tank, the chemical drain tank, the spent resin storage tank, the filter backwash system, and the volume reduction subsystem. The SWPS provides a reliable means for handling radioactive wastes while maintaining radiation exposure levels to the public and plant personnel within the permissible limits of 10CFR20 and 10CFR50. The SWPS also collects, packages, stores, and prepares for transport to an off-site burial facility any disposable solid radwaste (e.g., contaminated clothing, rags, paper, lab equipment, and supply items) generated during operation of the plant.

In order to accomplish these design objectives, the following specific criteria are satisfied:

a) The SWPS is designed to provide for the collection, processing, packaging, and storage of solid wastes resulting from plant operations without limiting the operation or availability of the plant. Types of wastes and quantities (maximum and expected volumes) given in Table 3.5.4-1 as inputs to the SWPS are accommodated in the system design.

b) The SWPS is designed to provide at least 60 days storage of spent resin in the spent resin tank during normal generation rates.

c) The SWPS storage area shall be capable of accommodating at least one full off-site waste shipment. It holds up to 1020 drums which provides 30 days of storage time.

d) The SWPS is designed to provide at least one-day storage of evaporator bottoms production during normal generation rates.

e) The SWPS is designed to provide a reliable means of remotely handling spent resins and evaporator bottoms. A reliable means is provided to remotely handle filter particulates as required. The handling of this solid radwaste will be done while maintaining the exposure levels to plant personnel within the permissible limits of 10CFR20.

f) The SWPS is designed to prevent the release of significant quantities of radioactive materials to the environs in order to keep the exposure to the public and operating personnel within the requirements of 10CFR20 and 10CFR50.

g) All radioactive waste is packaged (including the shipping container) in a manner which will allow shipment and burial in accordance with 49CFR170-179, 10CFR20, and 10CFR71.

h) The SWPS is designed to provide remote handling of 55-gallon drums. These containers are used in packaging of spent resins, filter particulates, and evaporator bottoms.

i) The SWPS is designed in accordance with seismic and quality assurance requirements of ETSB 11-1 (Rev. 1). Design of the structure housing the SWPS to Seismic Category I requirements prevents uncontrolled releases of radioactivity due to anticipated operational occurrences. Foundations and adjacent walls are designed to the Seismic Category I criteria to a height sufficient to contain the liquid inventory in the building. The SHNPP FSAR Section 3.2 lists the seismic and quality group classifications of the SWPS.

3.5.4.2 System Description

The SWPS consists of several subsystems: 1) waste collection and pretreatment subsystem; 2) waste solidification subsystem; 3) volume reduction subsystem; 4) dry waste compaction subsystem; and 5) drummed waste handling and storage subsystem. The SWPS converts liquid wastes generated during normal plant operation into solid wastes which are then suitable for off-site burial. The flow diagrams for the SWPS are on Figures 3.5.4-1 through 3.5.4-4.

The waste collection and pretreatment subsystem consists of two spent resin decanting tanks and two solidification pretreatment tanks. Liquid wastes, such as evaporator bottoms (concentrates) and chemical drains are processed in a solidification pretreatment tank. This tank is used primarily for pH adjustment and mixing. From the pretreatment tank, the wastes can be pumped directly to one of the four drumming and solidification stations or to the volume reduction subsystem. If it is processed by the volume reduction subsystem, it is pumped from it to one of two drumming stations where the free-flowing solids are added to the 55-gallon drums on top of the cement that was added to the empty drums at the cement fill station. The drums are then transported to one of the four drumming and solidification stations. At the four drumming stations, the waste is mixed and solidified. Waste from the two decant stations is added to the drums at one of the four mixing and solidification stations, unlike the volume reduction subsystem, where no liquid is added.

The dry waste compaction subsystem compresses contaminated waste such as gloves, rags, paper, etc. These wastes are collected from various areas of the plant and manually placed in 55-gallon drums. This waste is compressed to approximately one-fourth the original volume by a hydraulic compactor. No cement is added to these wastes.

At the cement filling station, the drums have the correct amount of cement added in a nonradioactive area. The drum with cement is remotely transferred to one of four drumming stations in the shielded area or to one of two volume reduction subsystem drum fill stations. At the drumming station, the drum is positioned under a drum filling nozzle. Waste is metered into the drum from exhausted, it is packaged in drums for disposal as a radioactive solid waste. The handling of radioactive wastes is described in detail in Section 3.5.

Approximately 9 kilograms of lithium (Li^7) will be used per year.

d) Sodium Chromate and Sodium Phosphate - In the closed cooling systems, a mixture of sodium chromate and sodium phosphate is used to inhibit corrosion. A concentration of about 500 ppm is maintained in these systems.

Since the systems utilizing these chemicals are closed systems, there is normally no release of these chemicals to the environment. However, during equipment maintenance, the water drained from the Closed Cooling Water Systems flows to tanks for later treatment in the Waste Mangement System, for later return to these systems for reuse or for discharge. Table 3.6.2-3 lists these and other chemicals indicating their use, frequency of use and their annual consumption.

3.6.2.3 Release of Chemicals from the Control Laboratory

SHNPP has a chemistry and radiation measurement laboratory equipped with all the chemicals and instrumentation needed for water and wastewater analyses. Some typical determinations done at the SHNPP laboratory are: alkalinity, ammonia, boron, calcium, conductance, fluoride, hydrogen, hardness, hydrazine, nitrogen, iodine, iron, lithium, oxygen, pH, silica, strontium, sulfate, temperature, color, and turbidity. CP&L may contract with an outside laboratory or use the lab at the Shearon Harris Energy and Environmental Center to measure parameters such as biochemical oxygen demand (BOD), chemical oxygen demand (COD), total solids, oil and grease, fecal coliform, and copper.

The drainage from the radio-chemical sinks and the water and wastewater analyses sinks is collected in the drain tank and treated in the Waste Management System.

3.6.3 CHEMICALS RELEASED FROM THE BIOCIDE CONTROL SYSTEM

Each unit is served by a single-shell divided water box condenser and uses the Cooling Tower to supply circulating water. Three circulating pumps are interconnected by a common discharge header serving the condenser. The effluent from the condenser is returned to the Cooling Tower.

Chlorine in the form of a chlorine solution generated from liquid chlorine in a chlorinator is applied periodically to the Cooling Tower Intake Structure and the Emergency Service Water and Cooling Tower Make-up Intake Structure to control slime growth in the condenser tubes and in the circulating water lines. Shock treating is performed two times a day using approximate 30-minute chlorination periods.

The chlorine dosage is subject to seasonal variation. During the summer months, with the increased chlorine demand, the maximum dosage of chlorine may be required whereas in the cooler winter months, a lesser dosage may suffice.

The actual operating chlorine dosage is determined by a residual chlorine test in the condenser's effluent header. The chlorine feed rate and treatment time are established to deliver up to 0.5 ppm free chlorine residual in the condenser effluent. Since only one is unit chlorinated at one time, the concentration in the cooling tower blowdown will not exceed 0.2 ppm chlorine residual when all units are operating.

3.6.4 MISCELLANEOUS CHEMICAL WASTES

a) Non-Radioactive Oil Waste - In the Turbine Building, the floor drains, curbed oil area drains, and equipment drains are combined into a common Industrial Waste System. Liquid from this system is directed to two internal industrial waste sumps, where it is pumped to the yard oil separator. In all other buildings, the equipment drains from equipment using oil as part of its function or process, as well as the floor drains in curbed oil areas, are routed to that building's oil sump. Sump pumps in all buildings in the nuclear island transport the oil waste to the turbine building industrial waste discharge header, where it combines and passes through a radiation monitor. If the waste is not radioactive, it flows to the yard oil separator. The effluent from the oil separator is released to the Storm Water Drainage System, which discharges to the Main Reservoir. Removed oil is collected in tanks for offsite treatment and disposal.

If the radiation monitor indicates radioactivity is present, the oil waste is routed to the Waste management system. the treatment of radioactive wastes is described in Section 3.5.

In the Service Building, the liquid drainage from equipment using oil is routed through equipment drains and floor drains to the internal oil separator in this building. The clear effluent is released to the Storm Water Drainage System and is subsequently discharged to the Main Reservoir. The removed oil is collected in tanks for offsite treatment and disposal.

b) Floor Drains - The Floor Drain System includes the floor drains in the Waste Processing Building, the Reactor Auxiliary Building, and the Fuel Handling Building.

Non-radioactive floor drainage is collected from the floor drain in the battery rooms and the electrical penetration and cable vault areas in the Reactor Auxiliary Building, standby diesel generator rooms, and the Turbine Building.

The floor drains in the battery rooms discharge to the local neutralizing tanks for neutralization. The waste then flows to the sanitary sewers for further disposal.

The standby diesel generator rooms are provided with floor drains which discharge into an oil sump. Two gpm sump pumps discharge the sump content to the yard oil separator which discharges oil free water to the Cooling Tower Blowdown System.

The Turbine Building is provided with floor drains to accept normal maintenance washdown wastewater, as well as any potential discharges from a piping rupture. Like other turbine building drainage wastes under normal conditions, the floor drain discharges are routed to the turbine building industrial waste sumps for discharge to the yard oil separator.

c) Preoperational Systems Hydrostatic Testing and Flushing Wastewater - Since it is not anticipated that the preoperational cleaning of systems at SHNPP will require the use of acid or caustic reagents, there will not be any metal cleaning wastes. However, during the preoperational phase, systems conveying fluids will undergo flushing and/or hydrostatic testing. Flushing consists of the high velocity flow of potable or demineralized water through these systems for the purpose of removing construction debris, dirt, etc. which might have accumulated during construction. Hydrostatic testing is a procedure used to test for leaks. An EPA approved dye will be used during the condenser hydrostatic testing procedure.

Hydrazine and ammonia are expected to be added to the flush and hydrostatic testing water. In addition, some systems might require the use of a wetting agent to complete these procedures.

The hydrostatic testing and flushing wastes for each unit are expected to be produced on a one time basis and are anticipated to produce a combined total volume of from 15 to 20 million gallons of wastewater. These wastewaters will be collected, sampled, treated as necessary to meet discharge requirements, and released to the Main Reservoir.

d) Periodic Discharge

(1) Steam Generator Blowdown - Under normal operating conditions, the steam generator blowdown is treated in the Steam Generator Blowdown System and reused by returning the water to the condenser. If under certain circumstances the steam generator blowdown is not returned to the condenser, the blowdown, if found to be non-radioactive, is conveyed to the SHNPP chemical treatment systems for treatment and disposal.

3.9 TRANSMISSION FACILITIES

The transmission facilities description as presented in Section 3.11 of the SHNPP Construction Permit Environmental Report requires no updating except for the Harris-Harnett (Erwin) 500 kV Line and the Harris-Method 230 kV Line.

The Harris-Method Line now terminates at the Cary Switching Station instead of the Method Substation as indicated in Section 3.11.8.2 of the SHNPP Construction Permit Environmental Report. This termination point is the same location as illustrated in Figure 3.11-6 of the SHNPP Construction Permit Environmental Report, and is approximately five miles shorter than the originally-proposed line. The location of this line is identified in Figure 3.9.0-1.

The Harris-Harnett Line was located after receipt of the Construction Permit for SHNPP. A complete description of this line, as required by Regulatory Guide 4.2, is contained in the following subsections.

3.9.1 GENERAL DESCRIPTION

The Harris-Harnett 500 kV Line has three 1590 MCM ACSR conductors per phase which yields a normal and emergency load capacity of 4025 MVA. The typical span length is 1,200 feet with a minimum ground clearance of 36 ft. The typical structure is a rusted brown steel tower (Cor-ten or equivalent) as illustrated in Figure 3.9.1-1.

3.9.2 TRANSMISSION RIGHTS-OF-WAY

3.9.2.1 General Description

The Harris-Harnett 500 kV Line extends from the SHNPP 500 kV switchyard to the Harnett 500 kV Substation, a distance of 27.8 mi. (Figure 3.9.2-1). The line is constructed on a 180-ft. wide corridor and requires 607 ac. of right-of-way.

3.9.2.2 Land Adjacent to Right-of-Way

The terrain through which the Harris-Harnett Line passes is gently sloping to flat. The present land use is primarily agricultural with some timber production and surface mining interspersed between small rural communities. The land use is expected to change very little in the foreseeable future. However, some population growth is expected around the towns of Lillington, Fuquay-Varina, and Buies Creek.

The major vegetation along the proposed route is a mosaic of agricultural fields, cutover forests, pine plantations, and various pine-hardwood and hardwood forests, all typical of the upper Coastal Plain and lower Piedmont physiographic provinces. The northern one-quarter of the route (Piedmont) is dominated by second and third growth pine and pine-hardwood forests. The southern three-quarters of the route (Coastal Plain) is dominated by agricultural fields interspersed between small bands of bottomland forests associated with streams of the Cape Fear River drainage system. Only 150 ft. of the 180-ft. right-of-way was totally cleared. This accounts for the clearing of 103 ac. in the Piedmont and 213 ac. in the Coastal Plain Physiographic Region. Therefore, there was approximately 316 ac. of total clearing.

The Harris-Harnett Line crosses 5 primary and 23 secondary roads. The primary roads crossed are U.S. 401, N.C. 42, N.C. 55, N.C. 27, and N.C. 210. Where natural vegetation exists, a vista screen will be maintained on these primary roads.

The Harris-Harnett Line also crosses three railroads. Prior to construction, crossing permits were obtained, and line clearance meets or exceeds National Electrical Safety Code requirements.

The Harris-Harnett Line crosses six minor streams and eight farm ponds. A buffer zone of natural vegetation will be retained, where feasible, that will prevent erosion of the stream or pond bank. There are no navigable stream or river crossings.

The Harris-Harnett Line crosses no known archeological, historical, or recreational sites.

The Harris-Harnett Line presents no hazard to aerial navigation. All structures were designed well within the 200-foot vertical regulation of the Federal Aviation Administration guidelines. Also, the proposed line is not located near any approach zones to the area's airports.

3.9.3 ELECTRICAL EFFECTS

The electrical effects of high voltage transmission lines can be divided into two categories: (1) those resulting from corona, and (2) those resulting from the electric field.

Corona on high voltage transmission lines can cause television and radio interference, production of ozone (O_3), and acoustical noise. These effects can be minimized or eliminated by controlling corona on the line. The 500 kV lines associated with the SHNPP are designed to be generally corona free. Since the lines are essentially corona free, no significant television or radio interference, ozone production, or acoustical noise is expected.

Strong electric fields from high voltage transmission lines can induce measurable voltages in metal objects located near the transmission line. The electric field cannot be eliminated, but its effects can be minimized by physically separating the high voltage conductors from large metal objects. The line design and right-of-way width associated with the Harris-Harnett Line generally prevent induction into adjacent metal objects. Should any unanticipated problems occur, CP&L is committed to cooperating with property owners and the general public to resolve such situations.

3.9.4 ALTERNATIVE RIGHTS-OF-WAY

Alternative routes considered for the Harris-Harnett Line are discussed in Section 10.9.

4.0 ENVIRONMENTAL EFFECTS OF SITE PREPARATION, STATION CONSTRUCTION, AND TRANSMISSION FACILITIES CONSTRUCTION

4.1 SITE PREPARATION AND STATION CONSTRUCTION

The intent of this section is to discuss potential areas of impact associated with site construction activities at the Shearon Harris Nuclear Power Plant. Section 4.5 identifies mitigative measures and assesses the type and extent of the resulting impact. Land area requirements (Table 4.1-1) and estimated construction work force (Table 4.1-2) are also tabulated in this section.

Construction activities commenced on January 14, 1974, following issuance of the Limited Work Authorization and on January 27, 1978, following issuance of the Construction Permit. Construction activities will be continuous until commercial operation of the fourth unit is achieved.

4.1.1 LAND RESOURCES

Land resources affected by construction activities were the 5,338 acres of the approximately 10,800 acre site area. The following serves as a general checklist to facilitate identification of potential areas of construction impact. These areas are discussed in detail in Section 4.5.

a) Runoff and erosion

b) Vehicle washdown

c) Solid and liquid waste disposition

d) Dust

e) Noise

f) Fuel and oil storage

g) Landscape restoration

h) Explosives

i) Smoke

j) Excavation

k) Agricultural productivity

l) Transportation

4.1.2 CULTURAL RESOURCES

There were no areas of historical, archaeological, or natural significance that were affected by construction (see Section 2.6). However, two benchmarks used by the U. S. Geodetic Survey were located within the area affected by project construction. The North Carolina Geodetic Survey requested that CP&L destroy each of these markers, and the U. S. Geodetic Survey was informed of their destruction.

4.1.3 TERRESTRIAL COMMUNITIES

The most significant unavoidable impact on the terrestrial ecosystem resulting from site preparation and construction of SHNPP was the conversion of the previously existing terrestrial wildlife habitat of the Main and Auxiliary Reservoir areas to aquatic ecosystems. Other terrestrial habitat losses or modifications have resulted from construction of various facilities such as the transmission corridors, makeup water pipeline, access roads, and pump station at the Cape Fear River. (Table 4.1-1).

1 As discussed in Section 2.2.1.1, the native flora of the site had been previously disturbed by agricultural and timber production activities and was typical of the vegetation found throughout the Piedmont of North Carolina. Thus, the development of the SHNPP site involved only a small part of a large area of similar habitat. The area cleared for the reservoirs and plant facilities was composed primarily of second growth pine and pine-hardwood communities common to this area of the Piedmont. These pine communities and several other plant communities once located in the area cleared for the
1 reservoirs (Section 2.2.1.1) will be partially replaced by aquatic communities as the reservoirs are filled and natural succession occurs. Aquatic vegetation will develop mainly in the shallow areas of the reservoirs.

Present vegetation along the margin of the reservoirs may gradually shift in composition to species characteristic of wetter habitats. Natural vegetation in the areas used for plant site facilities will be replaced by ornamental plants, lawns, and various other cover species.

Where the cleared areas are inundated, the overall long-term effect is the loss of that land's terrestrial productivity for as long as the reservoir exists. In other areas where cleared land is revegetated naturally or by means of artificial seeding or planting, the habitat alteration resulting from construction will cause only temporary changes in the species diversity and population levels. As such areas progress through the stages of secondary succession, wildlife will repopulate the available habitat.

The most obvious and important unavoidable effect of construction on wildlife was the displacement or loss of the individual animals occupying the areas which were cleared. The larger, more mobile animals were able to avoid immediate destruction by moving into adjacent areas. However, intraspecific and interspecific competition for food and space probably increased, especially where existing wildlife populations were at or near the habitat's carrying capacity. Ultimately, it can be expected that the animal populations in these areas will reach an equilibrium with each other and the available habitat, reflecting an overall loss approximately equal to the number of animals originally displaced from the areas cleared. Many of the smaller, less mobile animals were not capable of escaping the clearing process and probably were eliminated immediately.

Movement of workers and equipment during peak periods of site preparation and construction will temporarily disrupt normal behavior patterns of some local fauna. Movement patterns, antipredatory behavior, reproductive behavior, and general intraspecific auditory communication between some species may be affected by noise, traffic, and dust resulting from construction activities. Such effects will be short-term and will not have serious long-term consequences. In areas where animals are driven out or disturbed during construction, the return or recovery of those animal populations is expected to be quite rapid.

Once construction activities are completed, some areas of land previously committed to construction activities or other land use will be reforested or revegetated. As these areas progress through natural successioral stages, both food and cover will be provided for many wildlife species.

The reservoirs constructed for the operation of the SHNPP will significantly increase the value of the site as waterfowl and furbearer habitat. The aquatic environment will enhance local populations of certain species of waterfowl by providing food, resting places, and in some cases, nesting sites. Furbearing species which characteristically inhabit aquatic communities will benefit by the increase in shoreline habitat. Many woodland, marsh, and wading species of birds will utilize the shoreline habitat around the reservoirs. The reservoirs and the margins of the reservoirs also provide suitable habitat for many amphibian and aquatic reptile species.

Of the threatened and endangered terrestrial vertebrate and plant species identified on or near the SHNPP site, none are expected to be adversely affcted by site preparation or construction activities. A discussion of these species and their status at the SHNPP site is in Section 2.2.2.3.

4.1.4 AQUATIC COMMUNITIES

The local flora and fauna inhabiting the various creeks comprising the Whiteoak-Buckhorn drainage basin are discussed in Section 2.2.0. These local | 1
communities will exhibit alterations of species composition and relative abundance as the present system of free flowing streams is impounded for the Main and Auxiliary Reservoirs. Alterations in species composition and relative abundance will occur as organisms well adapted for stream (lotic) habitat are replaced by plants and animals which are better adapted for lake (lentic) habitats.

Although erosion control measures designed to minimize siltation and sedimentation effects were initiated after approval by appropriate regulatory agencies, construction activities for reservoir basin clearing and site preparation, as expected, have resulted in some impacts to the periphytic, benthic and fish communities. Changes in these communities that occurred during the initial stage of construction activity included decreased abundance and diversity of aquatic communities, reduction of silt intolerant organisms, limitation of food and habitats, interference with | 1
filter feeding activities, and scouring. Because all these effects are associated with siltation and sedimentation resulting from land clearing and

other initial construction activities, it is expected that the stream communities will temporarily recover prior to filling of the reservoirs. However, with the completion of the Main and Auxiliary Reservoir Dams and the filling of the reservoirs, the following changes in algal, benthic macroinvertebrate, and fish communities will occur:

a) Algal Community - The periphytic algae present in the SHNPP stream system are predominantly rheophilic (those found mainly in flowing waters); however, some are also common in the littoral zones of lakes. The benthic algal forms present in the streams will be replaced by planktonic forms as the reservoirs are filled. Consequently, the plankton assemblage will be more important to productivity than periphytic species.

A species shift is expected from the dominant stream benthic diatom population to small green algae with true planktonic diatoms predominating in the reservoirs. Some blue-green algae will also exist in the reservoirs. Achnanthes, Cocconeis, Gomphonema, Navicula, and Nitzschia are some of the common benthic genera presently found in the streams which will not be as abundant in the reservoirs. Asterionella, Cyclotella, Melosira, and Synedra, common planktonic diatoms, are present in the SHNPP streams and can be expected to be found in abundance when the reservoirs are filled.

1 There is a possibility, depending on the flushing rate, of eutrophication occurring in some of the shallow arms of the reservoir due to high nutrient loadings from the creeks feeding the arms. With a slow flushing rate, a potential for excessive blue-green algae populations and eutrophication could occur in the shallow areas.

Zooplankton expected to be found in the reservoirs should be similar to genera found in lakes of the Piedmont of North Carolina. Genera that may be present include the rotifers (Keratella, Polyarthra, and Synchaeta); the cladocerans (Bosmina, Ceriodaphnia, and Daphnia); the copepods (Diaptomus,
1 Mesocyclops, and Cyclops); and the larvae of the dipteran, Chaoborus. A stable zooplankton population will not be achieved until 2 to 4 years after the reservoirs are filled, and so considerable fluctuation in densities and species may be expected during this period.

b) Benthic Macroinvertebrate Community - As the reservoirs begin filling, a succession of benthic macroinvertebrate communities will occur. This
1 succession may follow a pattern similar to that reported by Weiss et al. for Belews Lake, North Carolina (Reference 4.1.4-1). According to Weiss et al., the succession of the benthic community began as water filled Belews Lake. The Belews Lake data indicated a decline in the number of taxa collected due to a loss of rheophilic organisms inhabiting lotic environments. The initial stage of lake colonization was marked by high local densities of many different kinds of organisms distributed in highly mosaic patterns. This initial stage was overlapped by a second stage of colonization when benthic species favored by water level fluctuations and high debris levels became dominant. A third stage of colonization, characterized by organisms adapted to lower water level fluctuations and lower debris concentrations, was observed when Belews Lake reached normal pool.

TABLE 4.1-1

LAND AREA REQUIREMENTS AFFECTED BY STATION AND STATION RELATED FACILITIES

The total site is approximately 10,800 acres (See Figure 2.1.1-1); the following acreage was required for actual construction work:

Facilities	Acres
Main Reservoir	4,121
Main Dam	40
Main Dam Access Road	4
Main Reservoir Makeup System	57
Auxiliary Reservoir	335
Auxiliary Dam Spillway	7
Auxiliary Dam	138
Auxiliary Separating Dike	12
Auxiliary Reservoir Channel	7
Borrow Areas for Main and Auxiliary Reservoir Dams	76
Main Plant	437
Aggregate Rescreen	1
Main Access Road	17
Cooling Tower Blowdown Line	13
Construction Access Road	6
Emergency Service Water Channels	6
Southwest Spoil Area for Main Plant	23
Plant Access Railroad Spur	8
Spoil Areas for Railroad Relocations	30
Total	5,338

TABLE 4.1-1 (Continued)

LAND AREA REQUIREMENTS AFFECTED BY STATION AND STATION RELATED FACILITIES

Facilities	Acres
Onsite and Offsite Transmission Line Corridors (pre-existing rights-of-way not included; onsite rights-of-way acreage not additive to the 5,338 acres required for onsite construction)	2,560

TABLE 4.1-2

ANNUAL SCHEDULE OF ESTIMATED WORK FORCE

Year	Average Yearly Manpower
1982	3,864
1983	3,914
1984	4,026
1985	3,176
1986	2,814
1987	3,384
1988	3,480
1989	3,639
1990	2,916
1991	2,095
1992	1,197
1993	618
1994	247

1

Note: The above totals include constructor, contractors, site nuclear plant construction, and site quality assurance personnel for Units 1, 2, 3 and 4 based on an in-service date of March, 1988 for Unit No. 2.

4.2 TRANSMISSION FACILITIES CONSTRUCTION

The purpose of this section is to describe the effects of transmission facilities construction on plant, wildlife, and human populations. Information presented in Sections 3.11.5 and 3.11.9 of the SHNPP Construction Permit Environmental Report requires no updating except as discussed below for the Harris-Harnett 500 kV Transmission Line. Section 3.9 of this report provides a general description of the Harris-Harnett 500 kV Transmission Line.

4.2.1 EFFECTS OF RIGHT-OF-WAY CLEARING ON PLANT AND ANIMAL LIFE

Clearing the right-of-way displaces some existing plant and animal communities for the life of the transmission lines. However, this displacement introduces new and more varied communities which, in many cases, benefits existing ecosystems. Environmentally sensitive areas, such as Raven Rock State Park and the Cape Fear River, were avoided during the location process. However, the presence of a limited impact along the corridor must be acknowledged.

4.2.1.1 Clearing Techniques

In the right-of-way portion totally cleared, all woody vegetation was cut within four in. of the ground. All cut debris was windrowed on each side and completely within the right-of-way boundaries, leaving an unobstructed construction strip. A vista screen was left and maintained at major road crossings, where existing vegetation permitted. At major stream crossings, a buffer zone not less than 10 ft. each side of the stream was maintained. Typical clearing was performed with a bulldozer utilizing a K/G blade, and manual clearing was done on all steep slopes to prevent soil erosion. Outside the right-of-way, all trees that would fall within 10 ft. of the nearest conductor were considered "danger trees" and were cut to fall parallel with the corridor. The right-of-way will be maintained in accordance with the above specifications that accomodate a danger tree cutting and mowing cycle approximately every three-to-five years.

4.2.1.2 Effects on Flora

As a result of clearing the corridors, plant communities adapted to the open field environment replace shade-tolerant species. During the transmission line's life, this open field environment will be maintained by mowing the corridor every three-to-five years. Carolina Power & Light currently uses no herbicides to clear or maintain the right-of-way. Should the transmission lines no longer be needed, the climax plant communities would become reestablished through secondary succession.

The major vegetation types of mixed hardwoods and pines found along the corridor is identified in Table 2.14 of the SHNPP Construction Permit Environmental Report. After the corridors were cleared, secondary succession permitted various grasses, sedges, and asters, and some pine saplings to become established.

Clearing the corridor is not expected to promote changes to the existing aquatic communities. Other than the selective danger tree cutting, a natural vegetation buffer zone was maintained at major stream crossings.

Minimal erosion occurred along the corridors as a result of topographic relief. Where steep slopes occurred, the area was seeded based on USDA Soil Conservation Service recommendations. Once the surface revegatated, the open field communities became established and further stabilized the steep slopes.

4.2.1.3 Effects on Fauna

Clearing the corridors in wooded areas created an "edge effect" or ecotone. This transition zone is favorable to some wildlife species while unfavorable to others but minimal effects were expected to adjacent undisturbed communities. As a result of clearing through a typical woodland, the following three ecological effects occurred: 1) exclusion of pre-existing species, 2) enhancement for pre-existing species, and 3) encouragement for previously absent species.

Species excluded from the corridors were those which were restricted to the adjacent woodland environments. Such bird species probably include but are not restricted to the wood warblers (Parulidae), woodpeckers (Picidae), Carolina chickadee (Parus carolinensis), tufted titmouse (Parus bicolor), flycatchers (Emphidonax), nuthatches (Sittidae), thrushes (Turdidae), and the vireos (Vireonidae). Examples of mammals that were probably excluded were the white-footed mouse (Peromyscus leucopus) and the golden mouse (Peromyscus nuttalli).

Species which were present but have derived benefit from the corridor include the bobwhite (Colinus virginianus), vultures (Cathartidae), falcons (Falconidae), hawks (Accipitridae) foxes (Carnidae) and possibly other predators. These species were attracted to corridors where an abundant food supply existed.

Species previously absent but attracted to the corridors were typically associated with open spaces or brushy habitats. Such bird species probably include but are not restricted to various sparrows (Spizallidae and Melospizidae) eastern meadowlark (Sturnella magna), red-winged blackbird (Agelaius phoeniceus), blue grosbeak (Guiraca caerulea), prairie warbler (Dendroica discolor), common yellowthroat (Geothlypis trichas), yellow-breasted chat (Icteria virens) and indigo bunting (Passerina cyanea) among others. Invading mammals probably included the rice rat (Oryzomys palustris), hispid cotton rat (Sigmodon hispidus), meadow vole (Microtus pennsylvanicus), and eastern harvest mouse (Reithrodontomys humulis). In addition to these species, there were numerous other species attracted to the edge areas along streams and adjacent to the corridor (Reference 4.2.1-1).

4.2.2 ENVIRONMENTAL EFFECTS OF ERECTING STRUCTURES AND STRINGING CONDUCTORS

4.2.2.1 Construction Techniques

Structure foundations were dug by either a truck or track-mounted auger. Some blasting was required when rock was encountered while digging the foundations.

Areas where a high water table existed were pumped to keep the hole dry. After the foundation holes were dug, the concrete was poured. In some cases, the structure site required minor grading.

Lattice steel was hauled to each structure site where the tower was partially assembled. Once the structure was erected and completely assembled, rubber-tired and track equipment was used to string the conductor. Carolina Power & Light Company specified conductor sag clearances which met or exceeded National Electrical Safety Code requirements.

4.2.2.2 Environmental Effects

Erecting structures and stringing conductors had a minimal impact. The most notable effect was construction noise created during the construction phase. However, the construction noise was generally confined to the right-of-way and caused only a temporary impact. Such an impact was not considered significant to wildlife or human populations.

4.2.3 CONSTRUCTION OF ACCESS ROADS

Carolina Power & Light Company does not build access roads to the proposed corridors. Existing public and private roads provide the necessary access. Concrete trucks used the corridor as access to structure locations.

4.2.4 EROSION DIRECTLY TRACEABLE TO CONSTRUCTION ACTIVITIES

Prior to construction, an Erosion Control Plan was filed with the State of North Carolina according to the rules and regulations of the Sedimentation Pollution Control Act of 1973. This plan specifies protective measures where the potential for significant soil erosion exists. Special emphasis is placed on steep slopes, severely erosive soils, and the crossings of all streams, rivers, ponds, and lakes.

The Universal Soil Loss Equation (Reference 4.2.4-1) shows that 3008 tons/year of soil would be lost along the corridor if the soil were left unreclaimed. The following discussion explains the Universal Soil Loss Equation and the assumptions and rationale behind its utilization:

$$A = KRLSCP$$

Where:
- A = the average annual predicted soil loss in tons per acre
- K = the soil erodibility factor
- R = the rainfall factor
- L = slope length
- S = percent slope
- C = the cropping-management factor [equals one (1) based on no cropping-management] and
- P = the erosion control practice factor [equals one (1) based on no farming erosion control practices being undertaken]

Assumptions and rationale:

1) That the soil surface is bare and there are no erosion control practices. Rationale for this assumption is that no erosion control practices should be calculated to maintain a degree of relativity in showing the worst case.

2) That only slopes of 10 percent grade or more will be calculated. The rationale for this assumption is that only the potentially significant amounts of soil loss will be measured since comprehensive data would be too voluminous for this statement.

3) That the dominant soils in the association are the only taxonomic units which occur along any portion of the proposed right-of-way as identified by the Soil Conservation Services general soil maps. Rationale for this assumption is that since site specific information is not available, the chosen taxonomic unit represents all the soils in the association and its inclusions.

4.2.5 EFFECTS OF CONSTRUCTION ON AGRICULTURAL PRODUCTIVITY

The construction of transmission lines had a minimal impact on agriculture productivity. Some cropland was temporarily disturbed during structure erection and conductor installation. However, once the line was constructed, only the area where the structures were located was lost to crop production. The landowner can use all remaining land on the corridor at his discretion, providing he does not endanger the line's integrity.

The Harris-Harnett Line crosses approximately 10.4 miles of agricultural lands. This amounts to 37 percent of the total line length and equals 227 acres of right-of-way. The estimated loss of agriculture productivity where the towers are located is approximately 2.3 acres.

4.2.6 EFFECTS OF CONSTRUCTION ON ENDANGERED SPECIES

The Harris-Harnett Line had no identifiable impact on any known endangered species.

4.4 RADIOACTIVITY

Since the SHNPP is a four-unit generating plant and the units will be brought on-line over a period of several years, there will be a considerable number of construction workers on site completing the remaining units while the completed units are operating. The estimated annual doses at various locations for these personnel are included in the SHNPP Final Safety Analysis Report Section 12.4.

5.2.1 EXPOSURE PATHWAYS

5.2.1.1 Organisms Other Than Man

Aquatic biota may be exposed to external radiation from radiation from radionuclides in the water and sediment and to internal radiation from the assimilation of these radionuclides. In addition to uptake via the ingestion of food organisms, fish and invertebrates can acquire radionuclides through direct absorption from the water and can at least partially assimilate radioactivity from ingested sediment. Figure 5.2.1-1 is a flow chart representing the transfer of radionuclides through the aquatic ecosystem. The flow chart is equally applicable to the Cape Fear River and the Main Reservoir.

The organisms which constitute the lower trophic levels of the aquatic food web (plankton and benthic invertebrates) in the Cape Fear River and the Buckhorn Creek system are described in Section 2.2.2. Dominant phytoplankton are the green algae (Chlorophyta), blue-green algae (Cyanophyta) and diatoms (Bacillariophyceae). Zooplankton expected to inhabit the reservoirs should be similar to genera found in other lakes of the Piedmont of North Carolina. Genera that will predominate include the rotifers (Keratella, Polyarthra, and Synchaeta); the cladocerans (Bosmina, Ceriodaphnia, and Daphnia); the copepods (Diaptomus, Mesocyclops, and Cyclops); and the larvae of the dipteran, Chaoborus. Rotifers probably will be the dominant taxa in the reservoirs while the cladocerans and copepods will be secondarily dominant. A stable zooplankton population will not be achieved until 2 to 4 years after the reservoirs are filled, and so considerable fluctuation in densities and species may be expected during this period. Benthic macroinvertebrates typically play an important role in the aquatic food web, serving as a link between the detrital level and the higher trophic levels. Mayfly larvae, dipteran larvae, and molluscs are examples of the benthic macroinvertebrates that are found in the Cape Fear River and associated streams and creeks in the vicinity of SHNPP. Fish feeding upon the plankton, benthic macroinvertebrates, and other fish, constitute a higher trophic level of the aquatic food web. Fish found in the SHNPP site vicinity are listed in Table 2.2.2-2.

The terrestrial ecology of the SHNPP area is described in Section 2.2.1. Terrestrial biota may be exposed to external radiation from immersion in the plant's gaseous effluents, from swimming in water containing the plant's liquid effluents, and from direct shine from radionuclides that have deposited on the ground and shoreline. Internal exposure of terrestrial organisms may result from the inhalation of radioactive materials from the plant's gaseous effluents and from the ingestion of foods that have assimilated radioactive materials from both gaseous and liquid plant effluents. Figure 5.2.1-2 presents the pathways by which terrestrial biota other than man are exposed to radioactive material released from the SHNPP.

The routes of internal exposure to terrestrial biota other than man are highly varied due to the diversified feeding habits of the animals living in the vicinity of the site. The vegetation in the region will receive radionuclides from deposition onto the plant foliage and from the uptake of radioactivity initially deposited on the ground. Deer, rabbits, squirrels and other herbivorous animals could then be internally exposed from the ingestion of this vegetation. In turn, foxes, bobcats, and other predatory animals living in the vicinity may be internally exposed to radiation from feeding on those animals that have concentrated radionuclides in their flesh.

5.2.1.2 Man

As a result of the operation of the SHNPP there are several potential radiation exposure pathways to man. Figure 5.2.1-3 presents the various potential pathways. These potential pathways may be divided into two categories: those pathways resulting in a radiation dose via internal exposure, and those pathways resulting in a dose via external exposure. External exposure to an individual may result from contact with radioactivity deposited on the ground, immersion of an individual in a cloud containing radioactive gaseous effluents, or direct contact with water containing radioactive liquid effluents while an individual is swimming or engaged in a similar activity. Internal exposures may result from the ingestion of various foods, and inhalation.

5.2.1.2.1 Internal Exposure

Liquid effluents from SHNPP are combined with the cooling tower blowdown and discharged into the Main Reservoir via a submerged discharge line. The annual average flow from the reservoir into the Cape Fear River is 35 cfs. It is anticipated that makeup water will be pumped from the Cape Fear River into the Main Reservoir periodically during the SHNPP operating lifetime. This indicates that the internal exposure pathway via domestic potable water intake from the Cape Fear River (nearest approximately 12 miles downstream from the plant site, Section 2.4.4) and via commercial fish and shellfish consumption (only negligible fish and shellfish catch within 50 miles of the reservoir, Section 2.1.3) will be minimal. However, recreational use of the Main Reservoir can result in internal exposures through the aquatic food chain.

The aquatic food chains, including well water, will be monitored during preoperational and operational stages in order to accurately assess the radiological impact of the liquid effluents and to verify the accuracy of preoperational estimates.

Although the majority of the land within a five mile radius of the plant site is wooded, several dairy farms and residential vegetable gardens exist within this area; therefore there exist four additional potential routes of internal radiation exposure to man. These routes result from the deposition of radioactive wastes discharged into the atmosphere. The first route is air-grass-milk-man; the second, the air-vegetable-man route; the third, the air-grass-meat-man route; and the fourth, inhalation. The locations of the nearest milk cow, meat animal, residence garden and site boundary for SHNPP is presented in Table 2.1.3-1. Expanded development of this area is not anticipated due to the poor septic characteristics of the soils and lack of adequate sewage and water systems.

The majority of the land within a 50-mile radius of the plant is devoted to agricultural activity which includes the following crops: grain, cotton, tobacco, soybeans, hay, vegetables and peanuts; livestock includes hogs,

5.2.2 RADIOACTIVITY IN THE ENVIRONMENT

In Section 3.5, the radionuclides discharged in the liquid and gaseous effluents are provided. This section considers how these effluents are distributed in the environment surrounding the SHNPP site. Specifically, estimates have been made for the radionuclide concentration: a) in the water and sediment in the Main Reservoir; b) in the atmosphere around the site; and c) on land areas and vegetation surrounding the plant.

The models and assumptions used to determine annual average air concentration (χ/Q), depleted concentration, and deposition (D/Q) are described in Section 6.1.3. The meteorological data used in these models is described in detail in Section 2.3.3. The concentrations were calculated at points within a radial grid of sixteen 22.5 degree sectors centered at true north and extending to a distance of 50 miles from the station. The data points are located in each sector at 0.5, 1.5, 2.5, 3.5, 4.5, 7.5, 15, 25, 35, and 45 miles. In addition, calculations were also made at the critical receptors in each sector within five miles of the site. These distances and directions are presented in Table 5.2.2-1 along with the χ/Q, depleted χ/Q and D/Q.

The highest ground level airborne concentrations in the vicinity of the site due to gaseous releases have been calculated using these meteorological data and the source terms presented in Section 3.5. The concentrations are presented in Table 5.2.2-2. The concentrations of radionuclides on the ground and in vegetation are controlled by the deposition of gaseous effluents since irrigation of cropland with reservoir water is not anticipated. These concentrations are also presented in Table 5.2.2-2 at the same location as the maximum airborne concentration.

5.2.2.1 Surface Water Models

A simplified approach has been used to predict the transport of liquid radioactive effluents. This approach is conservative in that it overestimates the radiological impact of the normal operation of SHNPP. Discussions of the basic hydrologic and water use data of the area are provided in Section 2.1.3 and 2.4.

5.2.2.1.1 Transport Models

Liquid radioactive wastes are diluted by the cooling tower blowdown flow prior to being released to the Main Reservoir. Assuming 35 cfs flow out of the Main Reservoir, mixing in 80 percent of the Main Reservoir volume, and the release quantities from Section 3.5, the expected concentrations of radionuclides in the cooling tower blowdown and the Main Reservoir are presented in Table 5.2.2-3. The concentrations in the reservoir were calculated using the completely mixed, closed loop dispersion model presented in NRC Regulatory Guide 1.113.

To calculate the maximum radiological impact, it was assumed that the critical biota, including man, are exposed to these reservoir concentrations.

5.2.2.1.2 Sediment Uptake Models

To calculate the exposure from shoreline activities, an estimate of the concentrations of radionuclides in the reservoir sediment was made using the "effective" surface model presented in the Nuclear Regulatory Commission Regulatory Guide 1.109.

Although radionuclide concentrations in the reservoir sediment have been calculated, no credit has been claimed for concentration reductions of radionuclides in the surface water resulting from sediment uptake.

5.2.2.1.3 Water Use Models

To calculate the radiological impact of liquid effluents from the normal operation of SHNPP, it has been assumed that the maximum exposed individual catches and consumes all of his fish from the reservoir. It has also been assumed that the quantity of water released from the reservoir is small. The calculated annual average release rate from the reservoir is 35 cfs.

5.2.2.2 Groundwater Models

All plant liquid effluents are released to the Main Reservoir. In addition, because of the low hydraulic gradient and permeability of the region described in Section 2.4, groundwater transport to surrounding private wells is extremely slow and hence, the radiological impact from the groundwater pathway is negligible. See Section 2.4.3 for additional information of groundwater.

TABLE 5.2.2-2

SITE BOUNDARY* CONCENTRATIONS OF GASEOUS EFFLUENTS

	Airborne (uCi/cc)	Air C/MPC	On Ground (pCi/m^2)	In Vegetation (pCi/kg)
Kr 83M	1.71E-13	5.70E-08	0	0
Kr 85M	2.91E-12	2.91E-05	0	0
Kr 85	3.76E-11	1.25E-04	0	0
Kr 87	5.13E-13	2.57E-05	0	0
Kr 88	4.10E-12	2.05E-04	0	0
Xe131M	2.22E-12	5.56E-06	0	0
Xe133M	7.87E-12	2.62E-05	0	0
Xe133	4.62E-10	1.54E-03	0	0
Xe135	1.20E-11	1.20E-04	0	0
Xe138	1.71E-13	5.70E-08	0	0
I131	7.87E-15	7.87E-05	1.30E+01	1.99E+00
I133	1.03E-14	2.57E-05	1.85E+00	4.19E-01
Mn 54	8.38E-16	8.38E-07	5.22E+01	2.18E-01
Fe 59	2.74E-16	1.37E-07	2.53E+00	5.68E-02
Co 60	2.74E-15	9.12E-06	9.30E+02	7.51E-01
Co 60	1.30E-15	4.33E-06	4.42E-02	3.57E-01
Sr 89	6.16E-17	2.05E-07	6.58E-01	1.32E-02
Sr 90	1.11E-17	3.71E-07	7.26E+00	3.42E-03
Cs134	8.38E-16	2.09E-06	1.28E+02	2.22E-01
Cs137	1.40E-15	2.80E-06	9.26E+02	4.06E-01
H 3	9.92E-11	4.96E-04		
TOTAL C/MPC		2.70E-03	9.18E+07	4.70E+03

* Calculated at 2.14 kilometers in the NNE direction.

TABLE 5.2.3-1

DOSES TO BIOTA OTHER THAN MAN FROM LIQUID EFFLUENTS

	DOSE (mred/yr./unit)		
	INTERNAL	EXTERNAL	TOTAL
Fish	2.41	2.35	4.75
Invertebrate	1.01	4.69	5.71
Algae	1.18	neg.	1.19
Muskrat	12.6	1.57	14.1
Raccoon	0.68	1.17	1.86
Heron	72.6	1.56	74.2
Duck	11.1	2.35	13.4

TABLE 5.2.5-1

ANNUAL POPULATION - INTEGRATED DOSES

	Total Body	Thyroid
Immersion	0.74	-
Direct from ground	0.21	-
Inhalation	1.54	2.51
Ingestion - Milk	0.52	2.70
Meat	0.09	0.12
Total	3.10	5.33

TABLE 5.6.2-1

MAJOR NOISE SOURCES AT SHNPP

Four cooling tower rims
Four condensers
Eight steam generator feed pump motors
Four turbine generator assemblies
Four cooling tower stacks
Twelve 336 MVA transformers
Eight deaerator vents
Eight steam generator feed pumps

TABLE 5.8.2-1

TOTAL ESTIMATED COSTS FOR POSSIBLE DECOMMISSIONING CHOICES

Decommissioning Mode	Decommissioning Costs ($ millions)[a] [b] Number of Years After Reactor Shutdown Dismantlement is Deferred				
	0	10	30	50	100
Immediate Dismantlement	42.1	--	--	--	--
Preparations for Safe Storage	--	12.6	12.6	12.6	12.6
Continuing Care	--	0.6	2.2	3.7	7.8
Deferred Dismantlement	--	37.0	37.0	30.5[c]	30.4[c]
Total Decommissioning Cost	42.1	50.2	51.8	46.8	50.8

[a] Values include a 25% contingency.
[b] Values are in constant 1978 dollars.
[c] These reduced values result from lesser amounts of contaminated materials for burial in a licensed disposal site.

TABLE 5.8.3-1

SUMMARY OF SAFETY ANALYSIS FOR DECOMMISSIONING THE REFERENCE PWR

Type of Safety Concern	Source of Safety Concern	Units	Immediate Dismantlement	Safe Storage with Deferred Dismantlement After 10 Years	30 Years	50 Years	100 Years
Public Safety[a]							
Radiation Exposure	Decommissioning Operations	man-rem	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Transportation	man-rem	22	(c)	(c)	(c)	(c)
	Safe Storage	man-rem	---	neg.[b]	neg.[b]	neg.[b]	neg.[b]
Occupational Safety							
Serious Lost-time Injuries	Decommissioning Operations	total no.	4.0	4.9	4.9	4.9	4.9
	Transportation	total no.	1.1	1.2	1.2	1.2	1.2
	Safe Storage	total no.	--	0.96	1.2	1.4	1.9
Fatalities	Decommissioning Operations	total no.	0.029	0.029	0.029	0.029	0.029
	Transportation	total no.	0.068	0.075	0.075	0.075	0.075
	Safe Storage	total no.	--	0.00087	0.0026	0.0045	0.0087

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n = Total number of hours having wind flow in the direction of interest

S = Total number of sectors (16).

For the realistic accident assessment χ/Q determination as described in Section 2.3.4 of Regulatory Guide 1.70, P should be selected as 50 percent.

Note that P_e can exceed 100 percent if n is sufficiently small. In those directions, the selection of a χ/Q value may be ignored unless the χ/Q values for that sector are very high when compared with χ/Q values of P_e in other direction sectors. For each assessment, the χ/Q values that are selected, for the 16 directions are compared and the highest value is utilized.

Using the described procedure and the available onsite joint frequency data, χ/Q values were calculated using the Exclusion Area for the appropriate time periods. Results obtained from these calculations are presented in the SHNPP FSAR in Section 2.3.4.

6.1.3.2.2 Long-Term (Routine Operation) Diffusion Model Estimates

Onsite annual joint frequencies of wind direction, wind speed, and stability class for the lower level of wind sensors were determined from hourly averages of temperature differences between the two wind sensing levels. These parameters were used as input to a computerized Gaussian model which calculates annual average χ/Q values for distances to 50 miles from the SHNPP. The basic equation used in the diffusion model is:

$$(5)\quad \frac{\bar{\chi}(x,k)}{Q} = \frac{2.032}{x} RF_k(x) \sum_{ij} DEPL_{ijk}(x) \cdot DEC_i(x) \cdot f_{ijk}[\bar{u}_i (\sigma_{zj}^2(x) + \frac{D_z^2}{\pi})^{1/2}]^{-1}$$

$$(6)\quad \frac{\bar{\chi}(x,k)}{Q} = \frac{2.032}{x} RF_k(x) \sum_{ij} DEPL_{ijk}(x) \cdot DEC_i(x) \cdot f_{ijk} (\sqrt{3}\ \bar{u}_i \sigma_{zj}(x))^{-1}$$

where:

$\frac{\bar{\chi}(x,k)}{Q}$ = average effluent concentration normalized by source strength at distance x and direction k;

$\bar{u}_i$ = mid-point values of the ith wind speed class;

$\sigma_{zj}(x)$ = vertical (x) spread of effluent at distance x for jth stability class;

f_{ijk} = joint probability of the ith wind speed class, jth stability class, and kth wind direction;

x = downwind distance from release point or building;

$DEC_i(x)$ = reduction factor due to radioactive decay at distance x for the i^{th} wind speed class;

$DEPL_{ijk}(x)$ = reduction factor due to plume depletion at distance x for the i^{th} wind speed class, j^{th} stability class, and k^{th} wind direction;

$RF_k(x)$ = correction factor for air recirculation and stagnation at distance x and k^{th} wind direction; and

D_z = the building height from which effluent is released which is used to describe the dilution due to the building wake, effect.

Equation 5 represents the maximum building wake dilution allowed; the computer code uses the higher value of (χ/Q) calculated from Equation 5.

The computer code used to generate the annual long-term values is the NRC program "XOQDOQ" described in NUREG-0324. The recirculation factors for an inland location are specified as input along with the exclusion boundary distances and the special points of interest.

The results obtained from these calculations are presented in the SHNPP FSAR in Section 2.3.5.

6.1.3.3 Operational Meteorological Monitoring Program

The operational phase of the onsite meteorological monitoring program will be basically a continuation of the preoperational program with certain modifications. The instrument modifications were made in 1979 and described in Section 6.1.3.1. Additionally, the meteorological information will be collected by the SHNPP Radiation Monitoring System (RMS) for display and utilization in the plant control room.

The RMS will be linked in parallel to the existing meteorological collection system and continuously transmit information on site weather conditions display and emergency response. The RMS system will store the onsite data for future reference, however it will not be used in report preparation, since the data will be unedited.

Meteorological data transmitted to CP&L's General Office in Raleigh will be periodically reviewed by the meteorological staff and posted to reflect deviations in instrumentation calibrations or other known anomalies. The edited meteorological data set will be transmitted to the RMS computer system onsite and used as the primary source of information in the generation of reports and analysis requiring onsite meteorological information.

The program will be continued during operation of the plant for the following reasons:

6.1.4 LAND

6.1.4.1 Geology and Soils

Information on geology and soils was obtained from exploration programs which were designed primarily to provide data for site feasibility studies and for site safety analysis. Detailed discussions of these exploration programs are included in Sections 2.5.1 and 2.5.6 of the Final Safety Analysis Report for SHNPP. The following is a brief summary of the relevant programs:

6.1.4.1.1 Preliminary Field Investigations

General - Preliminary field investigations were performed to evaluate the engineering geologic and seismologic characteristics of the site. The field exploration program consisted of:

a) an engineering geologic survey of the site and surrounding areas;

b) a test boring program;

c) a trench excavation program; and

d) a seismic refraction survey.

Engineering Geologic Survey - A comprehensive survey was conducted to identify the engineering geologic characteristics of the site and surrounding area. This investigation included detailed inspections of: 1) rock cores from test borings; 2) surface features; 3) exposed road cuts, 4) excavated trenches, and 5) bedrock outcrops, and a Brunton Compass survey.

Geologic maps, literature, gravity survey data, aerial photographs, and topographic maps were examined. Representatives of local and state agencies, universities, and private organizations were interviewed to obtain engineering geologic data.

Geologic Borings - Numerous geologic borings were drilled to investigate the bedrock composition, orientation, and quality across the site. The locations of the borings included the proposed plant area and the axis of the Auxiliary Reservoir Dam and spillway. The location of these borings is shown on Figure 6.1.4-1.

Trench Excavation Program - Twelve thousand one hundred and twenty feet of trenching was performed at the site to supplement the information obtained from the bedrock. The locations of these trenches are shown on Figure 6.1.4-1. Portions of Trenches 1 and 2 are adjacent to the plant site. Trenches 3 and 4 are located on the reservoir dam alignment.

Seismic Refraction Surveys - The seismic refraction surveys were performed along six seismic lines for a total length of approximately 5,000 linear feet. The purpose of these surveys was to determine the depth and configuration of the bedrock surface in the plant and Auxiliary Reservoir Dam areas. The locations of the seismic lines are shown on Figures 6.1.4-2, 6.1.4-3, and 6.1.4-4.

6.1.4.1.2 Design Subsurface Investigations

An extensive program of design subsurface investigations was conducted in order to evaluate foundation conditions for the plant and other structures such as dams, dikes, channels, roads, and railways, and to explore and sample potential borrow areas.

Foundation Borings and Excavations - Several hundred borings were drilled to evaluate foundation conditions for the power plant, the Main Reservoir Dam, the Auxiliary Reservoir Dam, the Auxiliary Reservoir Separating Dike, the Auxiliary Reservoir, the Emergency Service Water Intake and Discharge Channels, the Cooling Tower Make-up Water Intake Channel, other reservoir-related structures, and relocated highways and railroads. The locations of borings in the power plant vicinity are shown in Figures 6.1.4-1, 6.1.4-5, and 6.1.4-6. Locations of borings in the Main Reservoir Dam area are shown in Figures 6.1.4-7 and 6.1.4-8, and borehole locations in the Auxiliary Reservoir Dam area are shown in Figures 6.1.4-3 and 6.1.4-4.

Two test trenches were excavated in the foundation for the Auxiliary Reservoir Dam with a Case 580B backhoe for the purpose of obtaining undisturbed representative block samples of the dam's foundation soils. The location of the trenches, identified as TPA 1 and TPA2, are shown in Figure 6.1.4-3.

Borrow Area Borings and Test Pits - Uncased auger borings were drilled in three potential borrow areas in order to obtain 25 lb. bag samples of soil for laboratory investigations. Test pits were also excavated in each borrow area to obtain 300 lb. representative soil samples containing the proper proportion of the different types of soil observed in the pit. The locations of boreholes and test pits in Borrow Area Y are shown in Figure 6.1.4-2; those in Borrow Area Z are shown in Figure 6.1.4-3; and those in Borrow Area M in Figure 6.1.4-7.

Seismic Refraction Survey - A seismic refraction survey consisting of six survey lines was conducted along the Main Dam centerline and in the spillway area in order to determine depth to bedrock and general excavation conditions. The locations of these survey lines are shown in Figures 6.1.4-7 and 6.1.4-8.

6.1.4.2 Land Use and Demographic Surveys

The majority of the land use characteristics for the area immediately surrounding the plant (0 mi. to 5 mi.) were collected by actual on-site observations. Specific on-site surveys were documented as indicated by respective references throughout Section 2.1. Surveys were conducted as near to the tendering date of this report as was reasonably possible.

Where required, source literature and materials were used, as indicated by text references. An attempt was made to use the most current literature available. On occasion, personal communications were necessary to document data.

TABLE 6.1.5-2

NATURAL BACKGROUND AND MANMADE EXPOSURES

Natural Background	Dose (mrem/yr)
Internal Exposures	
K-40	19
H-3	0.001
C-14	0.7
Rb-87	0.3
Total Average Internal Exposure	20.0
External Exposures	
Cosmic Radiation	
Average	30
Variability	28-50
Terrestrial Radiation	
Average	44
Variability	20-100
Total Average Exposure	74
Manmade Exposures	
Medical (gonad exposure)	300 mrem/x-ray
Average	0-3000 mrem/x-ray
Variability	4 mrem/yr
Fallout (1969)	

Sources:

1. National Council on Radiation Protection and Measurements, Natural Background Radiation in the United States, NCRP Report No. 45, Washington, D. C. 1975.

2. United Nations Scientific Committee on the Effects of Atomic Radiation, Ionizing Radiation: Levels and Effects. 1972.

3. Advisory Committee on the Biological Effects of Ionizing Radiations, The Effects on Populations of Exposure to Low Levels of Ionizing Radiation, U. S. National Academy of Sciences, National Research Council, Washington, D. C. 1972.

TABLE 6.1.5-5

July, 1978 thru June, 1979
Pasteurized Milk - Charlotte, N. C.

Radionuclide Concentration	^{137}Cs pCi/l ±e	^{148}Ba pCi/l ±e	^{131}I pCi/l ±e
Date			
July 78	18 ± 15	-7 ± 19	2 ± 13
August 78	11 ± 15	-5 ± 19	-5 ± 13
September 78	11 ± 15	-4 ± 19	-9 ± 13
October 78	7 ± 7	2 ± 8	5 ± 7
November 78	8 ± 15	9 ± 20	-1 ± 13
December 78	6 ± 15	9 ± 20	6 ± 13
1/2/79	3 ± 15	-11 ± 19	-10 ± 13
1/8/79	6 ± 7	-4 ± 8	4 ± 7
2/5/79	8 ± 15	-2 ± 20	4 ± 13
3/5/79	8 ± 15	1 ± 20	-6 ± 13
4/2/79	-2 ± 15	-3 ± 20	1 ± 13
5/7/79	16 ± 15	2 ± 20	1 ± 13
6/4/79	5 ± 15	-7 ± 19	2 ± 13

e = 2 Sigma Counting Error

Source: U. S. Environmental Protection Agency, Environmental Radiation Data, Reports: 15, 16, 17 & 18, Technical Services Branch, Eastern Environmental Radiation Facility, Montgomery, Alabama

REFERENCES: SECTION 6.1 (Continued)

6.1.4-2 Electric Power Research Institute prepared by Sigma Research, Inc. Guidelines for Estimating Present and Forecasting Future Population Distributions Surrounding Power Reactor Sites, Special Report EPRI EA-427-SR Palo Alto, Ca., 1976.

6.1.4-3 State of North Carolina, Office of State Budget and Management. Update North Carolina Population Projections. Raleigh, North Carolina. July 1981. 1

6.1.4-4 U. S. Department of Commerce, Bureau of the Census, Projections of the Population of the United States: 1977 to 2050, Series P-25, No. 704, U. S. Government Printing Office, Washington D. C., 1977.

6.1.4-5 United States Atomic Energy Commission, Revised Final Environmental Statement Related to Construction of Shearon Harris Nuclear Power Plant, Units 1, 2, 3 and 4 Carolina Power & Light Company, 1974.

6.1.4-6 Carolina Power & Light Company prepared by Aquatic Control, Inc., Baseline Biota of the Shearon Harris Nuclear Power Plant Area, North Carolina. Raleigh, N.C., [1974].

6.1.4-7 ____________________, prepared by Aquatic Control, Inc., Baseline Biota of the Shearon Harris Nuclear Power Plant Study Area, June 1973 - May 1974, Raleigh, N.C., 1975.

6.1.4-8 ____________________. Shearon Harris Nuclear Power Plant Pre-Construction Monitoring Report, Terrestrial Biology (June 1974 - January 1978), Water Chemistry (1972 - 1977), Raleigh, N.C., 1978.

6.1.4-9 ____________________. Shearon Harris Nuclear Power Plant, Annual Environmental Monitoring Report, Water Chemistry, Aquatic Biology, Terrestrial Biology, 1978 Raleigh, N.C., 1979.

6.1.4-10 ____________________. Shearon Harris Nuclear Power Plant, Annual Environmental Monitoring Report for 1979, Raleigh, N. C. 1981 1

6.1.5-1 (Draft) Radiological Effluent Technical Specifications for PWR's NUREG-0472 Revision 3, March, 1979.

6.1.5-2 U. S. Nuclear Regulatory Commission, Regulatory Guide 4.8 Environmental Technical Specifications for Nuclear Power Plants, December, 1975.

6.1.5-3 National Council on Radiation Protection and Measurements, Natural Background Radiation in the United States, NCRP Report No. 45, Washington, D. C., 1975.

6.1.5-4 United Nations Scientific Committee on the Effects of Atomic Radiation. Ionizing Radiation: Levels and Effects, 1972.

6.2 OPERATIONAL MONITORING PROGRAM

6.2.1 NON-RADIOLOGICAL (BIOLOGICAL) MONITORING PROGRAM

The preoperational non-radiological (biological) monitoring program required in the Revised Final Environmental Statement (Reference 6.2.1-1) will be conducted until one year after all units are in commercial operation. This monitoring program will span the period of both operation and construction phases of the four units. Future monitoring programs beyond that described above will be governed by the NPDES permit and/or the Operating License requirements.

6.2.2 RADIOLOGICAL MONITORING PROGRAM

The operational radiological monitoring program will be a continuation of the preoperational radiological monitoring program described in Section 6.1.5. In general, it is anticipated that this program will continue for the operating life of the station. Modifications may be proposed at any time with appropriate justification.

6.2.3 METEOROLOGICAL MONITORING PROGRAM

The operational meteorological monitoring program will be a continuation of the preoperational monitoring program described in Section 6.1.3. The only anticipated change will be the inclusion of the Radiological Monitoring System computer (RMS-21) which will interrogate the meteorological station on a regular interval for the purpose of displaying the collected data in the reactor control room for emergency response purposes. No meteorological parameters currently being monitored (as per Section 6.1.3) are expected to be discontinued; however, additional parameters may be monitored with appropriate justification.

8.0 BENEFITS AND COSTS

8.1 BENEFITS

This section describes the social and economic benefits associated with the construction and operation of SHNPP. The social and economic effects of plant construction, as well as the relative benefits and costs of alternative sites and plants are discussed in detail in the SHNPP Construction Permit Environmental Report.

As defined in NRC Regulatory Guide 4.2, Revision 2, the primary benefits are those inherent in the value of the generated electricity delivered to customers. These benefits include the value of the average annual kilowatt-hours of electrical energy generated, the importance of providing an adequate reserve margin for the CP&L system, and an avoidance in the increase in the possibility of power shortages with associated social and economic effects. Secondary benefits of the operation of SHNPP will include tax revenues generated, increased employment opportunities, increased regional product, and increased knowledge as a result of environmental studies.

8.1.1 PRIMARY BENEFITS

Each SHNPP Unit has a net generating capacity of 900 megawatts. The expected average annual generation per unit is 5.52 billion kilowatt-hours of electrical energy. Table 8.1.1-1 shows the projected proportional distribution of this energy by user class.

The need for the power to be generated by SHNPP has been discussed in detail in Chapter 1. Briefly summarized, this power is needed to maintain the reliability of CP&L's system and to provide an adequate supply of electrical energy to meet the needs of its customers.

Without the addition of the SHNPP Units, the reliability of the VACAR Subregion would be impaired. Sporadic interruptions or shortages in the availability of electricity to customers could occur. The social and economic consequences of interruptions and shortages would be likely to include impairment of commercial and industrial operations. Social costs to the citizens in the region would result from the decrease in employment opportunities as a consequence of reduced industrial productivity and potential for future growth.

8.1.2 SECONDARY BENEFITS

The construction of SHNPP will have a beneficial effect on the regional economy. In order to quantitatively assess the effect on the regional economy, income and employment multipliers can be used. The income multipliers are 1.5 for income and 0.7 for employment. The income multiplier is applied against 75 percent of the direct salaries assuming that 20 percent for taxes and 5 percent for personal savings is not available to the regional economy (Reference 8.1.2-1).

8.1.2.1 Direct and Induced Income and Employment Effects

Payroll and employment data derived from CP&L records show that approximately $859 million (in 1984 dollars) will be expended by CP&L for construction worker's salaries. Applying the regional income multipliers and adjustments for taxes and savings, this expenditure by CP&L can be anticipated to induce additional expenditures of about $966 million in the regional economy. Carolina Power & Light Company also created approximately 3700 job opportunities for construction workers during the year of peak construction activity. Using the regional employment multiplier, this can be anticipated to stimulate approximately 2590 additional job opportunities in the regional economy during construction.

During the operation of SHNPP, CP&L expects to spend $20.4 million (1984 dollars) annually as payroll for the operations staff. Assuming an increase in salary costs of 8 percent per year, this payroll would accumulate to approximately $653 million (1984 dollars) over the estimated 32 year life of the plant. This accumulated payroll can be expected to induce additional expenditures of about $735 million (1984 dollars) in the regional economy. In addition, the operations staff employed by CP&L is expected to be approximately 900 employees for all four units, which using the regional multiplier, can be anticipated to stimulate approximately 630 additional job opportunities in the regional economy.

In addition to the direct operations and construction force payroll, the expenditures made by CP&L for the goods and services required for the construction, operation, and maintenance of SHNPP will stimulate an incremental increase in production in the area(s) where they are purchased.

8.1.2.2 Taxes and Tax Effects

Estimated ad valorem taxes to be paid to government agencies are as shown in Table 8.1.2-1. The estimated tax was computed based on the 1979 Capital Budget projection, the 1978 ratio of assessed value to undepreciated original cost, and the 1979 Wake County tax rate of $0.83 per $100 valuation. The State of North Carolina's ratio of assessed value to undepreciated original cost has varied historically from one to three percent per year. The County tax rate is dependent on many factors including County services and tax base, but should decrease as expenditures on the SHNPP units increase the taxable base.

8.1.2.3 Environmental Research and Enhancement

Environmental monitoring programs have been conducted by CP&L since 1972 and have been used to identify and evaluate the consequences of site development on the SHNPP area flora and fauna. Studies have included baseline, preconstruction, and construction monitoring as required by the NRC (Section 2.2). Environmental monitoring programs will continue at least until one year after the last of the SHNPP units begins commercial operation (Section 6.2).

All environmental programs have been and will be conducted by qualified professional scientists. Reports resulting from the monitoring programs are periodically prepared by CP&L and, upon submittal to regulatory agencies, would become a matter of public record.

The land and reservoirs associated with the SHNPP will provide valuable habitat for many wildlife species. The land policy stated in Section 2.1.3 effectively will protect the flood control area around the reservoirs and approximately 4,000 acres of surface water from private development. Much of this land and water will remain available as fish and wildlife habitat throughout the operational life of the SHNPP station. Carolina Power & Light Company will permit the appropriate state agencies to establish wildlife refuge areas and a wildlife management program to benefit the native wildlife.

Important game species including whitetail deer, wild turkey, mourning dove, bobwhite, cottontail, and gray squirrel will continue to inhabit the woodlands and abandoned fields surrounding the reservoirs and plant site. In satisfying the conditions of the Erosion and Sedimentation Control Plan (Section 4.5), revegetation of the immediate plant site, dam banks, borrow areas, and road cuts and fills have enhanced the availability of food and cover to many wildlife species.

The SHNPP Main Reservoir is expected to provide waterfowl with approximately 4,000 acres of open water and many miles of shoreline. Puddle ducks and diving ducks are expected to utilize the shallow coves, open water, and shoreline for resting and feeding during winter months and during spring and fall migration. Several species of furbearing animals also will benefit from the miles of undeveloped shoreline habitat.

The development of a favorable sport fishery in the Main Reservoir is expected to result from the existing Whiteoak Creek and Buckhorn Creek populations with seeding from Cape Fear River makeup water. Operational monitoring programs (Section 6.2) will be conducted.

8.1.2.4 Enhancement of Recreational Values

Prior to the construction of the SHNPP and associated Main Reservoir, the available public recreational opportunity in the Buckhorn Creek watershed was limited to a relatively insignificant level of small game hunting and stream fishing. With the development of the watershed for the SHNPP, the recreational use of the area will be significantly enhanced. The CP&L land policy stated in Section 2.1.3 will ensure a much greater and more varied recreational opportunity to a greater number of people.

8.1.2.5 Enhancement of Esthetic Values

Development of the SHNPP site has converted a typical Piedmont stream system and its surrounding terrestrial areas into a water supply reservoir. The aesthetic value of the site area was not unique to the region as evidenced by the fact that none of the streams in the Buckhorn Creek basin were candidates to the State's proposed natural and scenic river system. The Main Reservoir has an aesthetic appeal of its own and provides a recreational value which would not exist without the project. Because the SHNPP land policy

(Section 2.1.3) prohibits private development of the shoreline of the reservoir, the natural aesthetic appeal will be preserved.

8.1.2.6 Public Educational Facilities

The Visitor's Center at the Energy and Environmental Center, located a short distance from SHNPP, will assist in educating the general population in the availability of energy and the technology associated with the generation of electricity from various energy sources. The Visitor's Center also provides the general public with general information specific to SHNPP.

8.1.2.7 Annual Savings in Imported Crude Oil

The average annual savings in consumption of imported crude oil through the production of electrical energy at SHNPP from nuclear fuel versus an oil burning plant is approximately 35.3 million barrels.

TABLE 8.1.1-1

ESTIMATED BENEFITS OF SHNPP

DIRECT BENEFITS	
Number of Units	4
Expected Average Annual Generation Per Unit	5.52×10^9 Kw-Hr
Capacity Per Unit	900,000 kW
Proportional Distribution of Electrical Energy Per Unit	
Industrial	2.09×10^9 Kw-Hr
Residential	1.22×10^9 Kw-Hr
Commercial	0.86×10^9 Kw-Hr
Public Street and Highway Lighting	0.01×10^9 Kw-Hr
Other Sales to Public Authority	0.13×10^9 Kw-Hr
Sales for Resale	1.21×10^9 Kw-Hr
*Annual Revenues from Delivered Benefits Per Unit	
Industrial	$ 93,632,000
Residential	80,154,000
Commercial	51,772,000
Public Street and Highway Lighting	1,002,000
Other Sales to Public Authority	6,032,000
Sales for Resale	47,795,000
Total	$280,387,000
INDIRECT BENEFITS	
Taxes	See Table 8.1.2-1
*Regional Product	
Construction Payroll	$859 Million
Operations Payroll	$653 Million
Employment at SHNPP	
Construction	3700 personnel at peak
Operation	900 personnel

*1984 Dollars

REFERENCES: SECTION 8.1

8.1.2-1 Personal Communication, Mr. J. V. Cartwright, U. S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Analysis Division, Washington D.C. January, 1980.

8.2 Cost

8.2.1 Internal Cost

The 1984 present worth cost of land and generating facilities for the SHNPP is currently estimated to be \$3.321 billion, a breakdown of which is shown on Table 8.2.1-1. The comparable cost of incremental transmission facilities is estimated to be about \$70 million for switchyard facilities and \$14 million for associated lines. Thus, the total estimated 1984 present worth capital investment is about \$3.405 billion.

Capital cost estimates are based on a recent North Carolina law allowing inclusion by a utility in its retail rate base of expenditures incurred after July 1979 for construction work in progress (CWIP). The net effect of this provision is a reduction in the accrued allowance for funds used during construction (AFC) because AFC accrual is discontinued on CWIP included in the rate base. The cost estimates provided above have been adjusted to include the effect of this legislation.

Fuel costs over the life of the project are estimated to be \$3.967 billion; other operating and maintenance costs, \$1.360 billion (both in 1984 dollars). Decommissioning costs are discussed in Section 5.8.

Levelized revenue requirements are shown in Table 8.2.1-2. Each Unit has a depreciable lifetime of 25 years. Since the first Unit starts commercial operation in 1984 and the last in 1991, the project lifetime is 32 years. All levelized revenue requirements are computed over this period.

TABLE 8.2.1-1 (continued)

Cost Information for SHNPP

Indirect Costs	Unit 1	Unit 2	Unit 3	Unit 4
a. Construction facility equipment and services	59,692	14,333	14,154	14,587
b. Engineering and Construction Management services	214,395	74,479	72,696	60,734
c. Other Costs	94,288	60,576	50,099	59,475
d. Interest during construction (@ 8%/year)	347,279	164,949	118,506	140,559
Escalation Escalation during Construction @ 8%/year	incl. above	incl. above	incl. above	incl. above
Total Cost Total Station Cost, @ Start of Commercial Operation	1,435,523	634,502	589,724	660,847

Note: The total nominal dollars expended as of the in-service date were present worthed to 1984.

TABLE 8.2.1-2

Estimated Costs of Electrical Energy Generation

Fixed Charges[2]	Mills/Killowatthour[1]
Return on Investment (Cost of Money)	12.8
Depreciation	7.8
Income Taxes	7.8
Property Insurance & Tax, A&G	4.5
Subtotal	32.9
Fuel Cycle Costs[3]	
Uranium/Conversion/Enrichment	10.9
Fabrication	1.5
Spent Fuel Storage/Disposal	1.2
Carrying Charges	3.9
Subtotal	17.5
Operation & Maintenance Costs[4]	
Fixed Component	6.8
Variable Component	0.9
Subtotal	7.7
Nuclear Liability Insurance	.1

[1] Levelized 1984-2015; Escalation varies, approximately 9%

[2] Using 70 percent capacity factor

[3] Using 10,930 Btu/Kwh

[4] Escalation at 10 percent

8.2.2 EXTERNAL COSTS

Beyond the primary internal costs of the SHNPP and its operation, there is a potential for many external economic and social costs. The following discussion of external costs of the SHNPP is subdivided into temporary costs and long-term costs. As much as possible, the probable number and location of any population group affected, the estimated economic and social impact, and special measures taken to alleviate the impact are described for each cost.

8.2.2.1 Temporary External Costs

Possible temporary external costs include: shortages of housing; inflationary rentals and prices; congestion of local streets and highways; noise and temporary esthetic disturbances; overloading of water supply and sewage treatment facilities; crowding of local schools, hospitals, or other public facilities; overtaxing of community services; and the disruption of people's lives or the local community caused by acquisition of land for the site.

a) Shortages of Housing

Because limited construction work was begun in 1974, and full scale construction was not begun until 1978, there was a period of four full years of advanced notification of plant construction to the local area. This notification lead time coupled with the dispersion of construction worker residences over a nearly 100 mile radius accounted for the minimal housing impact on the local area. As of March, 1979, records indicate that 31 percent of the force live within 25 miles of the project, 55 percent live within 50 miles, 77 percent live within 75 miles and 83 percent live within 100 miles. The remaining 17 percent of the work force live more than 100 miles from the project site. Given the large number of mobile home parks, apartment complexes, duplexes and single family housing units within a 100 mile radius of the project site, the net effect of the project work force on local housing was not significant.

b) Inflationary Rentals and Prices

The advance notice of the construction of the SHNPP and the dispersion of the work force minimized the potential of inflated rentals and prices. Inflated costs probably were no greater in the SHNPP area than elsewhere in the greater Raleigh area. |1

c) Congestion of Local Streets and Highways

The only major highway in the vicinity of the site is U.S. 1. This highway, which passes approximately 7,000 ft. northwest of the SHNPP, had a daily vehicle use of approximately 3,000 prior to construction. Although vehicular traffic increased due to construction activity, the highway itself was essentially unaffected by the site development. The only exception was the installation of longer culverts and building the embankment for future third and fourth lanes where the highway crosses the upper fingers of the Auxiliary Reservoir. Minor traffic delays resulted during installation of these culverts and embankments.

State Road 1127, which was a paved road near the northeast end of the reservoir, was partially relocated and raised to cross one arm of the Main Reservoir. Service was maintained during the relocation. Approximately 16 miles of unpaved State roads located in Wake and Chatham counties were abandoned by the North Carolina State Department of Transportation. Those which served as construction roads were closed when they were no longer needed. Since these dirt roads only served the few families who were relocated from the site, their closing represented insignificant impact on the surrounding community. As roads were closed, they were plowed and planted in pine seedlings. No private property owners were denied access to their property by the closing of roads.

d) Noise and Temporary Esthetic Disturbances

The construction activities created some noise, but because of the remote location of the site and sparse population, the impact on human environment was minimal. Since the nearest resident to the center line of the four reactors is 1.5 miles, normal construction noise was not audible. Occasional blasting could be heard by some area residents. The greatest noise impact on residents in the area was from construction trucks. Other construction equipment at the site was provided with standard mufflers to reduce noise from operation.

Smoke from burning debris during the site and reservoir clearing produced a minor temporary esthetic disturbance to nearby residents. The only open burning permitted by State regulation was for land clearing. Approximately 5,800 acres were cleared and vegetation piled and burned. Merchantable timber and pulpwood left by the original land owners was harvested by CP&L's clearing contractor prior to machine clearing to eliminate its waste and to reduce the volume to be burned.

Dust created by construction activities was another temporary esthetic disturbance in the immediate vicinity of the plant. Only several local residences along unpaved access roads to the site were temporarily affected by this problem. Dust caused by the movement of construction vehicles was controlled by periodically spraying unpaved areas with water obtained from runoff basins, excavation dewatering discharge, and washdown wastewater. The frequencies of spraying and the quantity of water sprayed were determined by visual inspections and existing weather conditions. Equipment which emits large quantities of dust such as the concrete batch plant cement storage silos, were equipped with filter bag systems as required by applicable air quality permits.

Temporary visual disturbances caused by construction of the SHNPP are restricted to the project site and will be alleviated after construction is completed by landscape restoration. As construction activities are completed, facilities such as temporary parking lots, roads, and the land occupied by shops, offices, and the concrete batch plant, which were not incorporated into the finished plant, are being relandscaped to conform to the surroundings.

Building material used during the construction of the power block and related facilities, together with permanent plant equipment, required enclosed storage and a large open storage area. Upon completion of construction these areas will be cleaned up and relandscaped to conform to the surroundings. Cleanup and restoration of areas affected by construction activities are conducted as outlined in Soil Erosion and Sedimentation Control Plans approved by the North Carolina Department of Natural Resources and Community Development. The disturbed areas are being graded to the natural contour of the land or as shown on construction drawings. The entire area to be seeded is being cultivated to a depth of two to four inches parallel to the line of embankment or ditches to minimize erosion. Fertilizer is applied prior to preparation of the seedbed at rates and types recommended by the seeding specification. Grass seed is distributed uniformly over moistened seedbeds and rolled or hydroseeded. Areas not showing sufficient growth to prevent erosion are being reseeded. Additional inspections, reseeding, and fertilizing are being performed until good growth is attained. Pine seedlings are planted in abandoned roads, fields, and other cleared areas not necessary for construction support.

e) Overloading of Water Supply and Sewage Treatment Facilities

Water supply and sewage treatment facilities were provided at the SHNPP site. Therefore, there were no effects on public systems. The advance notice of the construction of the SHNPP and the dispersed locations of the work force residences prevented the overloading of any nearby municipal water supply or sewage treatment facilities.

f) Crowding of Local Schools, Hospitals, or Other Public Facilities

The availability of public education facilities for families of construction workers did not pose a problem because of the project's long lead time notification to public education planners. Also, the dispersion of construction worker residences over a 100 mile plus radius reduced the effect on any one local area school system. In addition to elementary and high school facilities, there were numerous technical schools, community colleges, and four-year colleges within the area where construction work force members resided.

A fire protection system is established on site with a fire brigade designated on each shift. When necessary, volunteer fire departments from Apex, Holly Springs, and Fuquay-Varina are available to augment site resources. Adequate police protection is provided in the local area by the Wake County Sheriff's Department and the North Carolina Highway Patrol. On-site security is provided by contractual arrangement.

A medical facility is operated on site to serve construction workers. This facility examines workers who become ill or are involved in accidents on the site. Individuals are treated and, if necessary, referred to community medical facilities in Apex or Raleigh. North Carolina Memorial Hospital in Chapel Hill is the primary medical facility for the SHNPP during operation.

g) Disruption of People's Lives or Local Communities

The disruption of people's lives or local communities caused by acquisition of land for the site was minimized by the location of the plant in a rural environment. Population was concentrated in a relatively few dispersed areas and large concentration of industrial activity did not exist. About 25 families were relocated as a result of the SHNPP construction.

8.2.2.2 Long-Term External Costs

Possible long-term external costs include impairment of recreational values, deterioration of esthetic and scenic values; restrictions on access to areas of scenic, historic, or cultural interest; degradation of areas having historic, cultural, natural, or archaeological value; removal of land from present or contemplated alternative uses; creation of locally adverse meteorological conditions; creation of noise, reduction of regional products, lost income from recreation or tourism; lost income of commercial fishermen; decrease in real estate values; and increased costs to local governments.

a) Impairment of Recreational Values

Although there was an alteration and/or loss of wildlife habitats and some direct and indirect loss of flora and fauna associated with the construction of the SHNPP, these were considered relatively small commitments of wildlife resources when compared to the availability of like or similar habitats and wildlife throughout the region.

Although some previous small game hunting and stream fishing was precluded, the overall recreational usage of the project area for boating, fishing, hunting, and other outdoor activities is much greater than prior to construction of the SHNPP. The Main Reservoir and adjacent lands will provide a significant recreational resource available for public use. CP&L's land and reservoir use policy is presented in Section 2.1.3.

b) Deterioration of Esthetic and Scenic Values

Because the site was not previously considered aesthetically unique (Section 2.6) the Main Reservoir coupled with its accessiblity to the public for recreational use has enhanced the aesthetic value of the area. However, the SHNPP has some visual impact on the area. One major negative visual impact results from the presence of the 520 ft. natural draft cooling towers which are visible over long distances.

c) Restriction of Access and Degradation to Areas of Scenic, Historic or Cultural Interest

The regional historic, archaeological, architectural, scenic, cultural, and natural features are discussed in Section 2.6. Recognized and maintained areas of scenic, historic, or cultural significance are not located in or near the project area. Therefore, operation of the plant will not restrict access or degrade any such area.

d) Removal of Land from Present or Contemplated Alternative Uses

The site related removal of land from its preconstruction uses is discussed in Section 4.5.1.4 of this report and Section 5.1.1 of the Revised Final Environmental Statement. About two percent of the approximately 10,800 acres of land included in the plant site were devoted to crop production. Most of the fields in the project were abandoned or outlying from small dairy operations. Any loss in regional farm production was not considered significant. Timber and paper companies owned the majority of the land which was in pine tree production, mostly on formerly cropped and abandoned fields. Because of extensive wooded areas nearby, the removal of land from timber production at the SHNPP did not cause an important impact on the local forest industry. No contemplated alternative uses of the SHNPP site were known.

e) Creation of Locally Adverse Meteorological Conditions

The possibility of the creation of adverse meteorological conditions due to plant operation is outlined in Sections 5.1.2.1, 5.1.2.2 and 5.1.2.3 of the Revised Final Environmental Statement. Discussions of plume, fogging, icing, and drift are included. None of these factors are expected to have a significant impact on the local meteorological conditions.

f) Creation of Noise

The SHNPP produces noise during normal operation. However, the plant's predicted environmental noise emission will have little impact on the residents living at or near the plant boundary. (Section 5.6) 1

g) Reduction of Regional Products

There was no significant reduction of regional products due to displacement of persons from the land developed for the SHNPP site.

h) Lost Income from Recreation or Tourism

There are no nearby recreational or tourist sites or facilities that are expected to be impaired by environmental disturbances caused by the SHNPP. Therefore, no loss of income to such developments is anticipated.

i) Lost Income of Commercial Fishermen

As discussed in Section 2.1.3, commercial fish and shellfish catch is negligible within 50 miles of the SHNPP and was non-existent at the site. Therefore, no loss of income to commercial fishermen results from the SHNPP.

j) Decrease in Real Estate Values

Decreases of real estate values in areas adjacent to the facility are not expected to occur. Present trends in real estate indicate an appreciation in property values in areas near the plant site. If present trends continue, the establishment of the plant site will not adversely affect local real estate values.

k) Increased Cost to Local Governments

Increased costs to local governments for service required by the permanently employed workers and their families are expected to be minimal. A stable work force of about 900 is expected during operation of the SHNPP. This force will reside in various nearby communities and will exert no adverse impacts on public facilities.

9.0 ALTERNATIVE ENERGY SOURCES AND SITES

This section is written in accordance with the discussion in the Introduction (Part 6.b) to the Nuclear Regulatory Commission, Regulatory Guide 4.2, pertaining to the "Applicants Environmental Report - Operating License Stage." This report is an updating of the previously completed "Applicants Environmental Report, Construction Permit Stage for Shearon Harris Nuclear Power Plant Unit Nos. 1, 2, 3, and 4" submitted by Carolina Power & Light Company on June 8, 1971. The Construction Permit Stage Environmental Report and the "Revised Final Environmental Statement Related to the Construction of Shearon Harris Nuclear Power Plant Units 1, 2, 3, and 4" issued by the United States Atomic Energy Commission, Directorate of Licensing, in March 1974, as supplemented contain a complete description of the process utilized to select the energy source and site now represented by the Shearon Harris Nuclear Power Plant.

11.0 SUMMARY COST BENEFIT ANALYSIS

11.1 BENEFITS

The principal benefit of SHNPP is the distributed generation of approximately 22.08 billion Kwh of electrical energy annually. The SHNPP capacity will contribute to meeting the anticipated demand within the CP&L service area and ensure that there is sufficient reserve capacity to allow necessary maintenance to be performed on other generating units.

As described in Section 8.1.2.1, the payroll expended during the construction of SHNPP is anticipated to induce estimated expenditures of approximately $966 million (in 1984 dollars) in the regional economy. The employment opportunities provided during peak construction are anticipated to stimulate the creation of approximately 2590 opportunities in the regional economy in addition to the direct peak construction force employment level of 3700 personnel. The expenditures by CP&L for payroll during the operation of SHNPP, accumulated over the 32-year life of the plant, will induce a total of approximately $735 million (discounted to 1984) in the regional economy. The jobs provided by CP&L's operations staff can also be expected to induce creation of about 630 employment opportunities in the regional economy in addition to the direct operational staff of approximately 900 personnel. Therefore, the total combined construction and operations payroll and employment opportunities provided by CP&L are expected to stimulate both the creation of about 3220 job opportunities (in addition to the direct construction and operating staff) and the expenditure of approximately $1.7 billion in the regional economy over the life of the plant.

As explained by Table 8.1.2-1, local governments and citizens will receive an estimated $97.5 million in tax benefits from the construction of SHNPP during the period 1980 through 1990. Plant operation is anticipated to generate about $31 million in taxes annually when all four units are operational. These taxes will be used to finance a variety of programs providing services to the community.

Carolina Power & Light Company will conduct an environmental program monitoring meteorological conditions, water quality, and aquatic and terrestrial biology. These programs will increase the knowledge and understanding of nuclear generating stations and their effects on the environment by providing information from which future advances in design and technology can evolve.

11.2 COST

In accordance with Regulatory Guide 4.2, CP&L has calculated a 1984 (date of commercial operation of Unit 1) present worth cost of the four SHNPP units and the associated transmission and switchyard facilities of $3.405 billion. The cost for fuel, operations, and maintenance of SHNPP over the life of the project is expected to be approximately $5.327 billion (in 1984 dollars). In addition, there are other external costs (Section 8.2.2) due to the environmental impacts discussed in Chapters 4 and 5. These costs, while difficult to quantify, have been investigated, and are believed not to be significant when compared to the benefits derived from the project.

Decommissioning costs for each unit in 1978 dollars will probably fall within the range of \$42.1 million for immediate dismantlement to \$51.8 million for safe storage with deferred dismantlement, depending on the method selected. See Section 5.8 for further details.

11.3 CONCLUSIONS

It is the judgment of CP&L that, giving due consideration to the anticipated demand for electricity within the CP&L service area, as well as the likely resultant environmental effects, SHNPP represents the optimum economic and environmental alternative available for producing the needed electricity.

Environmental Management (DEM) was created to perform administrative and technical duties for the EMC.

The construction of a well requires a permit from DEM as outlined in Title 15, Subchapter 2C of the North Carolina Administrative Code (NCAC). In a well construction permit application, DEM considers public health and possible groundwater contamination, impact to groundwater use, proximity to other wells, well yield, and impact to existing groundwater table.

The construction and operation of a wastewater treatment facility which does not discharge to the waters of the State require permits from DEM (see 15NCAC 2H .0200). In issuing these permits, DEM is responsible for determining the ability of the treatment system to prevent discharges to surface waters and adverse impact to groundwater resources.

Permits are also required from DEM for emission of pollutants to the atmosphere as outlined in 15 NCAC 2H .0600. Factors considered in this regulatory review include public health, plant and animal life, impact to ambient air quality, available technology, and cost of proposed project.

As outlined in Section 401 of the Clean Water Act, any applicant for a federal license or permit to conduct any activity which may result in any discharge to navigable waters shall be required to obtain State certification that such discharge would comply with the water quality standards as provided in Sections 301, 302, 303, 306, and 307 of the Act. DEM is responsible for this certification in North Carolina.

A National Pollutant Discharge Elimination System (NPDES) permit is required for the discharge of pollutants into navigable waters as outlined in Section 402 of the Clean Water Act. This permitting authority has been delegated by EPA to DEM.

DEM has the authority to control the consumptive use of water in the State by the use of Special Orders and will do so when they deem it appropriate for the wise and fair use of the water resource.

12.2.2.3 North Carolina Division of Health Services

The Division of Health Services requires a permit be obtained before constructing an impoundment (see 10 NCAC 10C .0400) so that the Division may ensure protection of public health and prevention of insect-borne diseases. Particular attention is given to reservoir clearing specifications and mosquito control measures.

12.2.2.4 North Carolina Division of Earth Resources

The N. C. Division of Earth Resources requires significant earth disturbing activities have approved erosion control plans pursuant to the Sedimentation Pollution Control Act of 1973. The Division conducts periodic inspections to determine the adequacy of installed control measures and the need for additional ones.

12.2.2.5 North Carolina Department of Transportation

Permission to relocate or close existing bridges and roads to construct electric generating plants and supporting facilities must be obtained from the North Carolina Department of Transportation (DOT). The Department of Transportation as the regulatory agency considers factors such as current standards on road construction, volume and type of road use involved, public inconvenience created by the proposed relocation and public benefits of the proposed relocation outlined in the applicant's plans.

12.2.3 COUNTY AGENCIES

The following county agencies require issuance of permits and/or approvals.

12.2.3.1 Wake and Chatham County Commissioners

County Commissioners must approve the abandonment of roads in their respective counties. Once the Commissioners approve, they must petition the North Carolina Board of Transportation for State approval.

12.2.3.2 Wake County Planning Board

Through County zoning regulations, the Wake County Planning Board regulates the size of buildings and other structures, percentage of a lot that may be occupied, the size of open spaces and yards, density of population, and the location and use of buildings and land. Compliance with these regulations requires a Land Use Permit.

APPENDIX A LIST OF TABLES (Cont'd)

The RAB Normal Exhaust System serves as containment pre-entry purge and normal containment purge during normal plant operation. Also, the Pre-Entry Purge System serves as a standby unit for the RAB Normal Exhaust System for both Units 1 and 2. A similar arrangement exists for Units 3 and 4.

In the event of an accident or loss of offsite power, the RABNVS will shutdown. Air will be exhausted by an independent Emergency Exhaust System.

Air sampling systems in the normal exhaust ducts will detect the radioactivity level as described in FSAR Sections 11.5 and 12.3.4.

2) RAB NNS Ventilation System

Design data for principal system components are presented in Table A.6.1-7. The RAB NNS Ventilation System consists of an outside air intake plenum, medium efficiency filter, electric heating coil, chilled water cooling coil and centrifugal supply and return fans. The system is capable of functioning as a once through or as a mixed (recirculation with makeup) system. The conditioned air is supplied to the H&V equipment rooms through a sheet metal ductwork distribution system.

3) RAB Emergency Exhaust System

The RAB Emergency Exhaust System consists of redundant 100 percent capacity fan and filter subsystems. Design data for principal system components are presented in Table A.6.1-7.

Each of the two subsystem filter trains includes a motor operated butterfly valve, decay heat cooling air connection, demister, electric heating coil, medium efficiency filter, HEPA pre-filter, charcoal adsorber and HEPA after-filter. Connected to each filter train outlet is a centrifugal fan with a motor operated-butterfly valve on its inlet and a backdraft damper on its outlet to prevent reverse airflow through the inactive fan.

Upon receipt of a SIAS, air operated valves on the normal ventilation penetrations into the areas containing equipment essential for safe shutdown close and both RAB Emergency Exhaust Systems are automatically energized. Either unit may then be manually deenergized from the Control Room, and placed on standby.

Access into the areas exhausted by the RAB Emergency Exhaust System from other parts of the RAB is through leaktight doors under administrative controls.

All penetrations into the enclosed area are provided with proper seals which limit the amount of inleakage. The seals permit differential movement between the penetration and the wall due to thermally or seismically induced motion.

Negative pressure is established at 1/8 in. wg. by continuously exhausting air. Pressure is then controlled by the Airflow Control System which adjusts the variable inlet vane of the exhaust system. Decay heat cooling air is provided by a duct connection admitting cool air into the idle unit through a check valve and a two position motorized butterfly valve in series. These duct connections are located between each train's inlet valve and the demister section.

Interconnecting ducts between the two air cleaning units are provided to allow one air cleaning unit to draw a small quantity of air flow through the second inactive filtration train for decay heat cooling. A manual locked open butterfly valve is provided in this cross connection.

Cooling for all areas exhausted by RAB Emergency Exhaust System is provided by the RAB ESF Equipment Cooling System.

4) Control Room Emergency Filtration System

The Control Room Emergency Filtration System consists of two 100 percent capacity filtration systems. Each filtration system contains in the direction of airflow, the following components:

a) Two motorized valves arranged in parallel

b) Two centrifugal fans arranged in parallel

c) Two motorized valves arranged in parallel

d) Two flow elements arranged in parallel

e) Interconnecting ducts between stand-by fans and other filtration trains

f) A Demister

g) Two electric heating coils arranged in series (one operating and one stand-by)

h) HEPA pre-filter bank

i) Charcoal adsorber bank

j) HEPA after-filter bank

k) One motorized isolation valve

l) Connecting duct with isolation valve to other unit discharge

m) Two interconnecting ducts between unit discharge with isolation valves

TABLE A.6.1-7

B. EMERGENCY EXHAUST SYSTEM

1. Exhaust Fans

Quantity, Per System	1, 100% each, centrifugal with variable inlet vanes, single width, single inlet, belt driven
Capacity, Per Fan acfm	6800
Static Pressure, in. wg.	20 1/2
Code	Air Moving and Conditioning Association (AMCA), Anti-Friction Bearing Manufacturer Association (AFBMA)

2. Motors

Quantity, Per Fan	1
Type	40 HP, 460 V, 60 Hz 3 phase, horizontal induction type
Insulation	Class B Powerhouse
Enclosure and Ventilation	Drip-proof
Code	NEMA Class B, IEEE Class 1E

3. Electric Heating Coils

Quantity, Per System	1
Type	Electric
Capacity (kW) Per Coil	50 (Sufficiently sized to reduce the relative humidity of the inlet air from 100% to 70%)
Code	Underwriter Laboratories (UL), National Electrical Manufacturers Association (NEMA), National Electric Code (NEC) IEEE Class 1E
Material	Galvanized steel

SHNPP ER

TABLE A.6.4-1 (Continued)

PLANT AIRBORNE EFFLUENT RELEASE POINTS[1]

RELEASE POINT NO.	RELEASE POINT ELEV. (FT.MSL)	RELEASE POINT EL. ABOVE GRADE[3] (FT.)	DISTANCE TO NEAREST RESTRICTED AREA BOUNDARY (FT.)	BUILDING	UNIT NO.	SYSTEM	PER SYSTEM	CFM[2] TOTAL CFM PER POINT	SIZE & SHAPE OF ORIFICE	APPROX. VELOCITY (FPM)
3A	296	36	435	Turbine Bldg.	1	Combined Effluent from Condensate Polishers Cubicles and Mech. Vac. Pumps Effluent Treat. Sys.	22,650	22,650	Dia. = 44 in. Circular	2145
3B					2	Combined Effluent from Condensate Polishers Cubicles and Mech. Vac. Pumps Effluent Treat. System	22,650	22,650	Dia. = 44 in. Circular	2145
4A	296	36	435	Turbine Bldg.	3	Combined Effluent from Condensate Polishers Cubicles and Mech. Vac. Pumps	22,650	22,650	Dia. = 44 in. Circular	2145
4B					4	Combined Effluent from Condensate Polishers Cubicles and Mech. Vac. Pumps Effluent Treat. Sys.	22,650	22,650	Dia. = 44 in. Circular	2145
5	321	61	335	Waste Processing Bldg.	1-4	Office Area Exhaustion Gen. Area Exh. Fan Filter Exh. System Office Area Economizer Fan	2,700 5,500 130,800 16,000			

APR008

50-400

SHEARON HARRIS

CAROLINA POWER & LIGHT COMPANY

Superseded Per Rev 1 To Inservice

SHEARON HARRIS NUCLEAR POWER PLANT

Inspection Inservice Procedure ISI-201, ASME Preservice Insp Plan Dtd 3/5/85

PLANT OPERATING MANUAL

VOLUME 6

PART 7

PROCEDURE TYPE: INSERVICE INSPECTION PROGRAM (ISI)

NUMBER: ISI-201

PROCEDURE TITLE: ASME PRESERVICE INSPECTION PROGRAM PLAN (EXCEPT REACTOR VESSEL)

REVISION 0

APPROVED: EM Stewart (Signature) 2-3-84 (Date)

TITLE: MGR- TECH SUPPORT

CONTROLLED COPY

Table of Contents

1.0 INTRODUCTION

This Program Plan has been prepared to fulfill the remaining Preservice Inspection (PSI) requirements for Shearon Harris Nuclear Power Plant. The reactor pressure vessel preservice program plan was previously submitted on March 14, 1983. This Program Plan has been written to meet the requirements specified by the Code of Federal Regulations 10 CFR 50.55a. The Program Plan has been expanded to include augmented inservice inspection requirements which comply with the following:

A. U.S. Nuclear Regulatory Commission Standards Review Plan, Section 3.6.1 "Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside Containment" (NUREG 75/087 Updated to NUREG-0800, 1981).

B. U.S. Nuclear Regulatory Commission Standard Review Plan, Section 6.6 "Inservice Inspection of Class 2 & 3 Components" (NUREG-0800, 1981).

C. U.S. Nuclear Regulatory Commission Regulatory Guide 1.14 "Reactor Coolant Pump Flywheel Integrity."

D. Request for additional information from NRC to CP&L by letter dated October 11, 1983.

In addition to the above, the Program Plan also incorporates the SHNPP FSAR commitments on Preservice/Inservice Inspection.

The scope of examinations, procedures and acceptance criteria meet the requirements outlined in Section XI of the ASME Boiler and Pressure Vessel Code, "Rules for Inservice Inspection of Nuclear Power Plant Components," 1980 Edition, with addenda through Winter 1981. Accordingly, all class 1, 2, and 3 pressure retaining components and their supports as defined by 10 CFR 50 and NRC Regulatory Guide 1.26, will be examined to comply with ASME Code Section XI requirements to the extent practicable within the limitations of the component, or system portion, design and geometry.

All water, steam, air and other fluid systems within the scope of ASME Section XI are shown in SHNPP Procedure 1-ISI-200. All references in Appendices A-D to flow diagrams and proper Quality Group refer to procedure 1-ISI-200.

Several piping systems will receive augmented inspections for protection against postulated piping failures as outlined in Section 3.6.1 and 6.6 of the Standard Review Plan. The extent of examinations to those piping systems is defined by Shearon Harris Nuclear Power Plant FSAR Section 6.6.8. Augmented examinations will also be performed on the flywheel of the Reactor Coolant pumps in accordance with Regulatory Guide 1.14. Augmented components and examinations are listed in Appendix D.

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2.0 REQUIREMENT FOR PRESERVICE INSPECTION

2.1 NRC Regulations

The Preservice Inspection requirements stipulated by 10 CFR 50.55a(g)(3) establish the applicable Edition of Section XI of the ASME Code for the components of a facility whose construction permit was issued after July 1, 1974.

The quality group classification system for radioactive water/steam-containing components important to the safety of water-cooled nuclear power plants is established by NRC Regulatory Guide 1.26, in conjunction with Section 50.55a of 10 CFR 50. Regulatory Guide 1.26 defines the Quality Group Classification System consisting of four Quality Groups, A through D. The definition of Quality Group A is provided by 10 CFR 50.2(v) under "Reactor Coolant Pressure Boundary." The definitions of Groups B, C and D are provided by Regulatory Guide 1.26.

2.2 Definition of Owner Intent

In accordance with the requirements set forth by 10 CFR 50.55a, the Shearon Harris Plant must comply with the requirements of the 1974 Edition of Section XI, with addenda through Summer 1975 as modified by Appendix III of Winter 1975 Addenda. However, in order to comply with a more recent code and addenda, Carolina Power & Light has elected to comply with the 1980 Edition of Section XI, with addenda through Winter 1981 and Code Case N-335.

The extent of examination selection of Class 1 and Class 2 piping has been determined by the requirements of the 1974 Edition of Section XI with Addenda through Summer 1975 as allowed by 10 CFR 50.55a (b)(2).

In addition, this Program Plan includes Augmented Inspections from NUREG 75/087, "Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside Containment" and Regulatory Guide 1.14, "Reactor Coolant Pump Flywheel Integrity." Additional inspections will be performed on certain systems required to satisfy NRC questions submitted during the FSAR review.

3.0 EXEMPTIONS

The following exemptions from examination requirements are applicable to Quality Group A, B, and C piping, components and their supports.

3.1 Quality Group A

Components except piping will be exempted in accordance with IWB-1220 (1980 Edition thru and including Winter 1981 Addenda) from the volumetric and surface examination requirements of

3.0 EXEMPTIONS

3.1 Quality Group A (cont.)

IWB-2500. Category B-J components will be exempted in accordance with IWB-1220 (1974 Edition thru and including Summer 1975 Addenda) from the volumetric and surface examination requirements of IWB-2500.

In Quality Group A Code Categories B-L-2 and B-M-2 a VT-3 examination is required. It is CP&L's position that this is an Inservice requirement and does not apply to Preservice.

Quality Group A nonexempt components and examination requirements are listed in Appendix A.

3.2 Quality Group B

Components except piping will be exempted in accordance with IWC-1220 (1980 Edition thru and including Winter 1981 Addenda) from the volumetric and surface examination requirements of IWC-2500. Category C-F components will be exempted in accordance with IWC-1220 (1974 Edition thru and including Summer 1975 Addenda) from the volumetric and surface examination requirements of IWC-2500.

Within the scope of the PSI Program Plan there are no Code Category C-D or C-G components subject to inspection requirements of Table IWC-2500-1.

Quality Group B nonexempt components and examination requirements are listed in Appendix B.

3.3 Quality Group C

Integral attachments of supports and restraints to components will be exempted in accordance with IWD-1220 (1980 Edition thru and including Winter 1981 Addenda) from the visual examination VT-3, except that all Auxiliary Feedwater integral attachments on piping greater than 1" nominal pipe size will receive a VT-3 visual examination.

Quality Group C nonexempt components and examination requirements are listed in Appendix C.

3.4 Component Supports

Component supports selected for examination will be the supports of those components greater than one inch in diameter that are required to be examined under IWB, IWC, and IWD. In addition, the examination requirements shall apply to the component support types identified in IWF-1210.

3.0 EXEMPTIONS

3.4 Component Supports (cont.)

Preservice inspection shall be performed by the required examinations listed in Table IWF-2500-1. All required VT-3 examinations will commence upon completion of Final System Turnover on a system as described in the Harris Plant Start-up Manual.

All snubbers will receive a preservice inspection and functional test prior to the commencement of hot functional testing of completed systems. Manufacturers test data may be used to satisfy the Preservice testing requirements.

3.5 Exempt Components

All Quality Group A, B and C components exempted from Preservice examination requirements will have undergone the system hydrostatic test when the system has been completed as required by ASME Section III. Preservice hydrostatic testing is not required by Section XI, IWA-5215.

4.0 EXCEPTIONS

Exceptions to Code required examinations may be authorized by the regulatory authority, as allowed by 10 CFR 50.55 a(a)(2), provided that design fabrication, installation, testing and inspection performed in compliance with Codes and Section XI requirements would result in hardship without a compensating increase in the level of quality and safety, or provided that the proposed alternative examination will provide an acceptable level of quality and safety.

Detailed descriptions and justifications for exceptions taken will be submitted when needed by a Request for Relief.

5.0 QUALITY ASSURANCE

The PSI Program Plan will be performed in accordance with the requirements of the CP&L Quality Assurance Manual which is in compliance with Appendix B of 10 CFR 50.

6.0 EXAMINATION PROCEDURES

Subarticle IWA-1400 of Section XI requires the development and preparation of written examination procedures necessary for the conduct of the nondestructive examinations associated with PSI operations. The written procedures for the performance of visual, surface, and volumetric examinations are provided by the NDE Contractor and will be reviewed and approved by CP&L prior to use.

6.0 EXAMINATION PROCEDURES

Methods, techniques, and procedures for the preservice inspections are titled visual, surface, and volumetric. Each term describes a general method permitting a selection of different techniques and procedures restricted to that method to accommodate varying degrees of accessibility and radiation levels.

A visual examination is employed to provide a report of the general condition of the part, component, or surface to be examined, including such conditions as scratches, wear, cracks, corrosion or erosion on the surfaces; misalignment or movement of the part of component; or evidence of leaking. Visual examinations are applicable to welds, support members, valves, pumps, fasteners, cladding, etc. Visual examination procedure is based on the requirements of IWA-2210 of Section XI of the ASME Code.

A liquid penetrant examination is specified as the surface examination method to delineate or verify the presence of cracks or discontinuities open to the examination surface. Liquid penetrant examination procedure is in compliance with the requirements of Article 6 of Section V of the ASME Code, as required by Section XI IWA-2222. As a substitute to liquid penetrant, SHNPP can utilize a magnetic particle examination to satisfy surface examination requirements.

The ultrasonic pulse echo examination is selected as the volumetric examination method to indicate the presence of subsurface discontinuities by examining the entire volume of metal contained beneath the surface to be examined. Ultrasonic examination is in compliance with Appendix III of Section XI (or Articles 4 and 5 of Section V, as applicable) of the ASME Code, as required by Section XI IWA-2232 and including Code Case N-335 as amended in Section 7.0. Radiography may be used as a substitute for ultrasonic examination when access to welds is restricted.

7.0 ULTRASONIC TESTING

The calibration standard design drawing is part of the PSI Program Plan and shown in Figure 1. Table 1 lists all UT Calibration Standards required to perform the UT examinations. All calibration standards are retained on site.

The UT examination calibration standard design and material selection are in accordance with Subarticle III-3400 of Appendix III to Section XI 1980 Edition including Winter 81 addenda. In addition to the required notches, drilled holes have been installed as additional reflectors in accordance with the provisions of Article 5 of Section V of the Code. These additional reflectors are allowed by Subarticle III-3400 of Appendix III of Section XI.

7.0 ULTRASONIC TESTING

A. In addition to this requirement it is CP&L's intent to perform ultrasonic examinations on austenitic stainless steel piping utilizing ASME Boiler and Pressure Vessel Code Case N-335 with the following input:

1. Personnel and procedures used to perform the examinations shall be qualified in accordance with a program described in Appendix E. The J. A. Jones EPRI NDE Center IGSCC Training/Qualification Program may be used in lieu of or integral to this program.

2. Level I examiners will not be used to monitor the ultrasonic instrument during examinations.

3. The typical calibration block design to be utilized is shown in Figure 1. CP&L reserves the right to change segments of piping used dependent upon pipe size, (e.g., small diameter piping ≤ 4 in may be 360 degree sections). Calibration reflectors shall be installed as follows:

   a. For calibration blocks with pipe wall nominal thicknesses of one (1) inch and greater Paragraph A.4 below applies.

   b. For calibration blocks with pipe wall nominal thickness less than one (1) inch to and including 0.5 inch a single side drilled hole (SDH) will be installed at 1/2t. Notches will be staggered at the I.D. and O.D. locations.

   c. For calibration blocks with pipe wall nominal thickness less than 0.5 inch no SDH will be installed. I.D. and O.D. notches will be staggered to prevent interference during calibration.

4. For angle beam calibration Subparagraph 3.2.2(d), of Code Case N-335 is revised to read as follows:

   a. "Where the calibration is limited to the half V path due to material attenuation or examination technique selection, side drilled holes shall be used to obtain the slope and shape of the DAC curve. A minimum of two holes, each of the same diameter and located at 1/4t and 3/4t, shall be placed in the calibration block. The diameter of the holes shall be in accordance with Fig. T-546.1 of Article 5 of Section V. The holes shall be perpendicular to the examination beam direction. The minimum hole length shall be 1½ inches. Calibration shall be accomplished by constructing a DAC curve from the side drilled holes so that the maximum amplitude point is at 80% FSH. Once

7.0 ULTRASONIC TESTING

the shape and slope are determined and marked on the screen, the curve shall be extrapolated 1/4t to cover the full examination thickness. Next, establish the sensitivity from the inside diameter (I.D.) surface notches by setting the indication amplitude at the level of the DAC curve."

5. Recording requirements of Subparagraph 4.5.1, Code Case N-335 will be amended to read:

   a. The following indications shall be recorded and investigated by a Level II or Level III examiner to the extent necessary to determine the shape, type, and location of the reflector.

      1) An indication of a suspected flaw originating in the HAZ or adjacent base metal regardless of amplitude.

      2) Any indication 20% of DAC or greater than those from geometric or metallurgical origin.

   b. Indications 50% of DAC or greater from geometric or metallurgical origin shall be recorded.

   Criteria to record geometric and metallurgical ultrasonic indications is described as amended above. These indications will not be reported, they will be recorded for the record and for future correlation to similar indications during Inservice Inspection. Ambiguous responses from geometry will be evaluated and characterized on a case basis using multiple ultrasonic techniques and correlation to radiographic results.

6. Since Supplement 7 of Code Case N-335 will be applied to SHNPP austenitic piping welds, concerns regarding Supplement 7 in Appendix III of Section XI do not apply. This position is taken as a result of the major improvements preferred in N-335.

B. The investigation, evaluation, or corrective measures taken as a result of indications recorded during piping ultrasonic examinations shall be based up A.5. above. It is CP&L's belief that in amending N-335, Paragraph 4.5.1 with more stringent requirement in A.5 above will ensure adequate evaluation and, if necessary, corrective action for disposition of any indication investigated and found to be other than geometric or metallurgical in nature.

7.0 ULTRASONIC TESTING

C. Cast austenitic stainless steel fittings, nozzles, and other piping components will be ultrasonically examined using state-of-the-art techniques, eg. dual search units, etc. Technique limitations due to material attenuation, noise, and access will be documented in the record. Capabilities to examine cast austenitic stainless steel ultrasonically is a function of the thickness involved. Cast main loop piping, cast-to-cast fitting welds or assemblies are recognized uninspectable. Thinner wall cast piping, fittings or assemblies as in the pressurizer surge line are inspectable in most cases using conventional UT techniques. Cast to wrought stainless steel welds will be examined from the wrought side, the cast side will be examined if it is determined that the results are meaningful. The examination record will reflect all scanning limitations.

8.0 EVALUATION CRITERIA

Evaluation of any indications detected during PSI shall be made in accordance with IWA-3000 of Section XI. Indications detected may be evaluated by other nondestructive methods, where practical, to assist in the determination of size, shape, location, and orientation before final disposition is made.

9.0 RECORDS AND REPORTS

A system of records of the Preservice Inspection, plans, schedules, and calibration standards; the examination results and reports, the corrective action required and taken, will be developed and maintained at the site in accordance with IWA-6000 of Section XI.

10.0 PERSONNEL QUALIFICATION

Personnel performing nondestructive examination operations shall be qualified with procedures prepared in accordance with SNT-TC-1A, 1980 Edition, for the applicable examination technique and methods as required by IWA-2300 of Section XI. All examinations shall be performed and the results evaluated by qualified nondestructive examination personnel.

For those nondestructive examination methods not covered by SNT-TC-1A documents, qualification will be based on the particular method involved. Such qualification provides for uniform programs of training, evaluation, and certification of personnel. For personnel performing ultrasonic inspections the additional requirements of Section 7.0 will be required.

11.0 PRE-EXAMINATION REQUIREMENTS

General provisions for accessibility have been defined by IWA-1500 of Section XI of the ASME Code.

11.0 PRE-EXAMINATION REQUIREMENTS

1. All systems and components that require inspection in accordance with the requirements of ASME Section XI will be designed with adequate physical access to allow the required inspection.

2. It is intended that piping systems requiring ultrasonic inspection will be designed so that all welds requiring inspection are physically accessible for inspection with ultrasonic equipment.

   A. Access will be provided by leaving adequate space around pipes at these welds and by means of removable insulation and shielding as required.

   B. Pipes welded to fittings will be designed to permit meaningful examination by avoidance of irregular surface geometries.

   C. The surface of welds will be smoothed and contoured to permit effective use of ultrasonic transducers or surface examination indicators.

   D. Piping systems requiring surface or visual examination will be designed to allow access and visibility adequate for performance of such examination.

12.0 PROGRAM PLAN NOTES

NOTE 1. Augmented Program FSAR Section 6.6.8.b

NOTE 2. Augmented Program FSAR Section 6.6.8.c

NOTE 3. Augmented Program FSAR Section 6.6.8.d

NOTE 4. Augmented Program FSAR Section 6.6.8.e

NOTE 5. Augmented Program - Review of the FSAR and request for additional information regarding Preservice (PSI)/Inservice (ISI) Program Section 250.1 paragraph 2

NOTE 6. ISI Requirement Only (Not Required for PSI)

NOTE 7. No circumferential weld on this line.

TABLE 1

CALIBRATION BLOCKS

Piping Calibration Blocks	Material	Piping Cal. Block Number	Systems
2½" sch 80 (XS)	A106 GR.B	UT-10	AF
3" sch 40S (STD)	A312-304	UT-11	RH
3" sch 80 (XS)	A106 GR.B	UT-12	MS
3" sch 160	A106 GR.B	UT-13	FW
3" sch 160	A376-304	UT-14	CS,SI
4" sch 40 (STD)	A106 GR.B	UT-15	BD
4" sch 80 (XS)	A106 GR.B	UT-16	AF
4" sch 160	A376-304	UT-17	CS,RC,SI
6" sch 80 (XS)	A106 GR.B	UT-18	AF,MS
6" sch 120	A106 GR.B	UT-19	FW
6" sch 160	A376-304	UT-20	RC,SI
8" sch 40S (STD)	A312-304	UT-21	CT
8" sch 80 (XS)	A106 GR.B	UT-22	MS
10" sch 140 (XXS)	A376-316	UT-23	SI
12" sch 40S (STD)	A312-304	UT-24	RH
12" sch 60	A106 GR.B	UT-25	MS
12" sch 140	A376-304	UT-26	CS,RC,RH,SI
14" sch 40	A358-304	UT-27	RH
14" sch 160	A376-316	UT-28	RC
16" .668" MW	A106 GR.B	UT-29	FW
16" 1.006" MW	A106 GR.B	UT-30	FW
32" 1.051" MW	A106 GR.C.	UT-31	MS
34" 2.0" MW	A106 GR.C.	UT-32	MS
44" 1.447" MW	A106 GR.C.	UT-33	MS
50" 3.279 MW	A155 KC 70	UT-34	MS
9.226 1.5" MW	A106 GR.C	UT-35	MS

Vessel Calibration Blocks		
Pressurizer Shell	SA533 GRA, CL2	UT-50
S/G Channel Head (PRI)	SA533 GRB, CL1	UT-51
S/G Secondary Shell	SA533 GRA, CL2	UT-52
Regenerative HT EX	SA351 - CF8	UT-53
RHR HT EX	SA515 - 70	UT-54
BIT Shell	SA351 CF8A	UT-55
BIT Head	SA240 Type 304	UT-56

Figure 1

CASES OF ASME BOILER AND PRESSURE VESSEL CODE

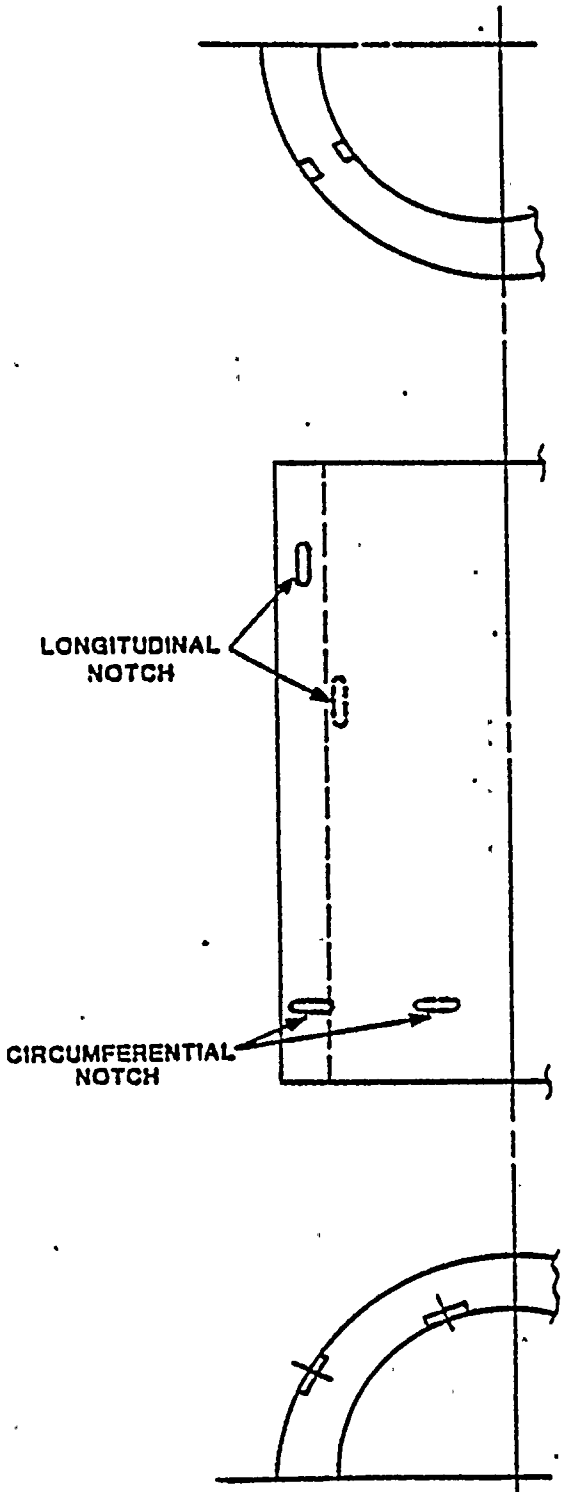

FIG. 3.4.3-2 RECOMMENDED DESIGN FOR BASIC CALIBRATION BLOCK

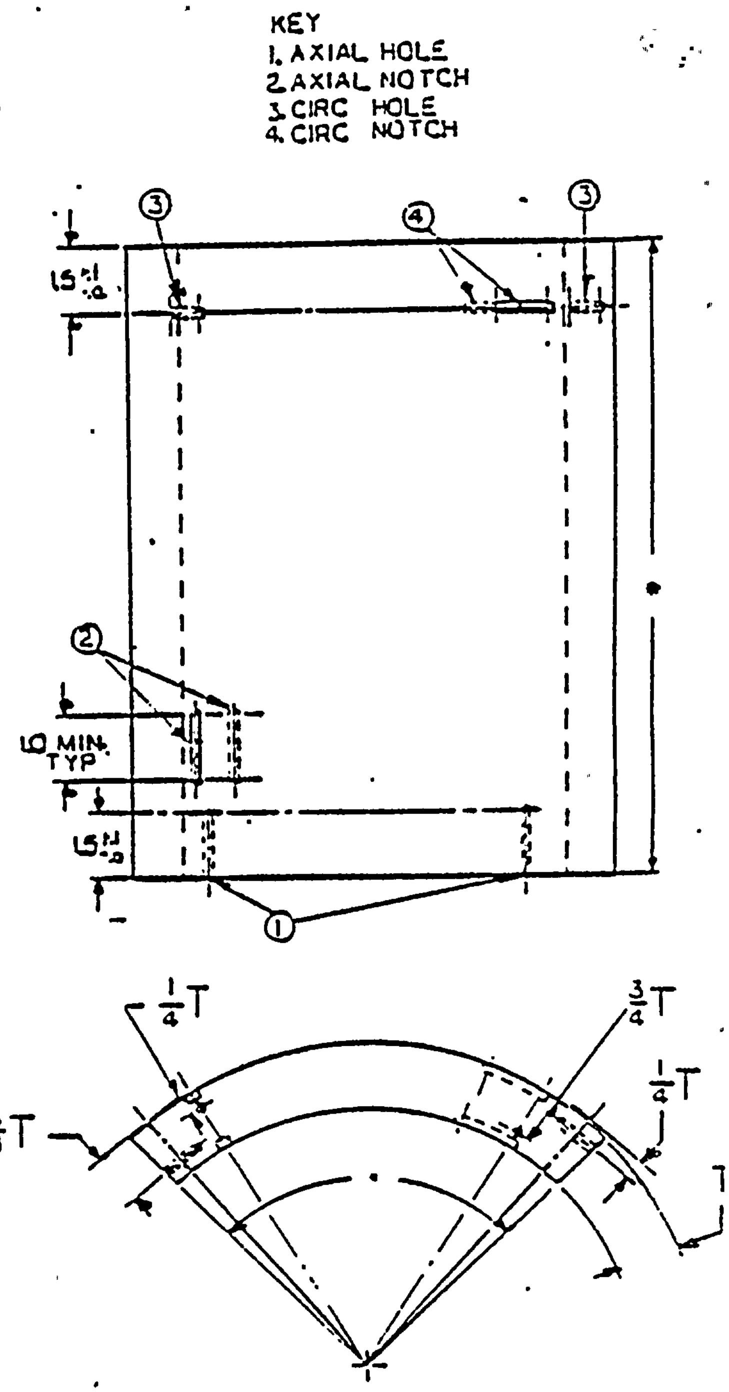

FIG. III-3430-2 RECOMMENDED DESIGN FOR BASIC PIPING CALIBRATION BLOCK *

* LENGTH/ARC SHALL BE ADEQUATE TO PROVIDE REQUIRED ANGLE BEAM CALIBRATION. FOR PIPE SCHEDULES LESS THAN ONE (1) INCH NOMINAL WALL THICKNESS:

1. STAGGER NOTCH ID/OD LOCATIONS
2. A 1/2t SIDE DRILLED HOLE MAY BE USED IN LIEU OF 1/4t AND 3/4t SDH.

APPENDIX A

QUALITY GROUP A

INSPECTION PLAN SUMMARY

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-B, Pressure Retaining Welds in Vessels other than Reactor Vessels
ITEM: B2.11, Circumferential Welds

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
PZR	801	J-6		Vol		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-B, Pressure Retaining Welds in Vessels other than Reactor Vessels
ITEM: B2.12, Longitudinal Welds

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
PZR	801	J-6		Vol		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-B, Pressure Retaining Welds in Vessels other than Reactor Vessel
ITEM: B2.40, Tubesheet-to-Head Weld (Primary Side)

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
S/G	800	E-4	1A	Vol		
S/G	800	H-4	1B	Vol		
S/G	800	E-17	1C	Vol		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-D, Full Penetration Welds of Nozzles in Vessels - Inspection Program B
ITEM: B3.110, Nozzle to Vessel Welds

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
PZR	801	J-6		Vol		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-D, Full Penetration Welds of Nozzles in Vessels - Inspection Program B
ITEM: B3.120, Nozzle Inside Radius Section

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
PZR	801	J-6		Vol		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-D, Full Penetration Welds of Nozzles in Vessels - Inspection Program B
ITEM: B3.130, Nozzle-to-Nozzle Welds

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
S/G	800	E-4	1A	Vol		
S/G	800	H-4	1B	Vol		
S/G	800	E-17	1C	Vol		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-D, Full Penetration Welds of Nozzles in Vessels - Inspection Program B
ITEM: B3.140, Nozzle Inside Radius Section

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
S/G	800	E-4	1A	Vol		
S/G	800	H-4	1B	Vol		
S/G	800	E-17	1C	Vol		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-E, Pressure Retaining Partial Penetration Welds in Vessels
ITEM: B4.20, Heater Penetration Welds

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
PZR	801	J-6		VT-2		6

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-F, Pressure Retaining Dissimilar Metal Welds
ITEM: B5.40, Nozzle-to-Safe End Butt Welds, nps ≥ 4", Pressurizer

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
RC	801	L-6	RC14-35	Vol & Sur		
RC	801	I-6	RC6-124	Vol & Sur		
RC	801	I-6	RC6-126	Vol & Sur		
RC	801	I-6	RC6-128	Vol & Sur		
RC	801	I-6	RC6-135	Vol & Sur		
RC	801	I-6	RC6-231	Vol & Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-F, Pressure Retaining Dissimilar Welds
ITEM: B5.70, Nozzle-to-Safe End Butt Welds, nps ≥ 4", Steam Generator

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
RC	800	F-3	RC31-2	Vol & Sur		
RC	800	I-3	RC31-5	Vol & Sur		
RC	800	F-17	RC31-8	Vol & Sur		
RC	800	F-4	RC29-1	Vol & Sur		
RC	800	I-4	RC29-4	Vol & Sur		
RC	800	F-17	RC29-7	Vol & Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-G-1, Pressure Retaining Bolting, Greater than 2" in Diameter
ITEM: B6.180, Bolts and Studs

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
RCP	800	C-3	1A	Vol		
RCP	800	L-3	1B	Vol		
RCP	800	C-17	1C	Vol		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-G-1, Pressure Retaining Bolting, Greater than 2" in Diameter
ITEM: B6.190, Flange Surface

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
RCP	800	C-3	1A	VT-1		
RCP	800	L-3	1B	VT-1		
RCP	800	C-17	1C	VT-1		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-G-1, Pressure Retaining Bolting, Greater than 2" in Diameter
ITEM: B6.200, Nuts, Bushings and Washers

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
RCP	800	C-3	1A	VT-1		
RCP	800	L-3	1B	VT-1		
RCP	800	C-17	1C	VT-1		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-G-2, Pressure Retaining Bolting, 2" and less in Diameter
ITEM: B7.20, Bolts, Studs and Nuts

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
PZR	801	J-6	--	VT-1		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-G-2, Pressure Retaining Bolting, 2" and less in Diameter
ITEM: B7.30, Bolts, Studs and Nuts (Vessels)

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
Stm Gen	800	C-3	1A	VT-1		
Stm Gen	800	L-3	1B	VT-1		
Stm Gen	800	C-17	1C	VT-1		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-G-2, Pressure Retaining Bolting, 2" and less in Diameter
ITEM: B7.50, Bolts, Studs and Nuts (Piping)

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
CS	803	I-6	CS1½-16	VT-1		
CS	803	I-6	CS1½-17	VT-1		
CS	803	I-6	CS1½-18	VT-1		
RC	802	D-6	RC3-21	VT-1		
RC	802	D-6	RC3-40	VT-1		
RC	802	D-6	RC3-61	VT-1		
RC	802	E-6	RC2-24	VT-1		
RC	802	E-6	RC2-43	VT-1		
RC	802	E-6	RC2-64	VT-1		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-G-2, Pressure Retaining Bolting, 2" and less in Diameter
ITEM: B7.70, Bolts, Studs and Nuts (Valves)

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	VALVE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
RC	800	B-3	V500	VT-1		
RC	800	C-2	V501	VT-1		
RC	800	M-2	V502	VT-1		
RC	800	C-18	V503	VT-1		
RC	801	E-2	V526	VT-1		
RC	801	E-1	V527	VT-1		
RC	801	H-2	V528	VT-1		
RC	801	I-10	P525	VT-1		
RC	801	K-10	P526	VT-1		
RC	801	E-1	P527	VT-1		
RC	801	F-1	P528	VT-1		
RC	801	H-1	P529	VT-1		
RC	801	F-8	R528	VT-1		
RC	801	F-6	R529	VT-1		
RC	801	F-4	R530	VT-1		
RC	802	E-6	V540	VT-1		
RC	802	E-6	V541	VT-1		
RC	802	E-6	V542	VT-1		
CS	803	A-3	L500	VT-1		
CS	803	A-4	L501	VT-1		
CS	803	C-3	V504	VT-1		
CS	803	C-3	V505	VT-1		
CS	803	B-3	V506	VT-1		
CS	803	B-3	V507	VT-1		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-G-2, Pressure Retaining Bolting, 2" and less in Diameter
ITEM: B7.70, Bolts, Studs and Nuts (Valves)

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	VALVE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
SI	808	B-3	V507	VT-1		
SI	808	C-3	V508	VT-1		
SI	808	D-3	V509	VT-1		
SI	808	B-11	V510	VT-1		
SI	808	C-11	V511	VT-1		
SI	808	B-17	V512	VT-1		
SI	808	C-17	V513	VT-1		
SI	808	D-17	V514	VT-1		
SI	809	D-6	V544	VT-1		
SI	809	H-6	V545	VT-1		
SI	809	K-6	V546	VT-1		
SI	809	D-3	V547	VT-1		
SI	809	H-3	V548	VT-1		
SI	809	K-3	V549	VT-1		
SI	810	C-2	V584	VT-1		
SI	810	E-2	V585	VT-1		
SI	810	E-2	V586	VT-1		
RH	824	L-4	V503	VT-1		
RH	824	L-3	V502	VT-1		
RH	824	I-4	V501	VT-1		
RH	824	I-3	V500	VT-1		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-H, Integral Attachments for Vessels
ITEM: B8.20, Integrally Welded Attachments

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
PZR	801	J-6	--	Vol or Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 74S75

CATEGORY: B-J, Pressure Retaining Welds in Piping
ITEM: B9.11, Circumferential Welds, nps ≥ 4"

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
RC	800	E-1	RC31-2	Vol & Sur		
RC	800	K-1	RC31-5	Vol & Sur		
RC	800	E-19	RC31-8	Vol & Sur		
RC	800	G-7	RC29-1	Vol & Sur		
RC	800	J-7	RC29-4	Vol & Sur		
RC	800	G-14	RC29-7	Vol & Sur		
RC	800	D-6	RC27½-3	Vol & Sur		
RC	800	L-7	RC27½-6	Vol & Sur		
RC	800	C-14	RC27½-9	Vol & Sur		
RC	800.	J-4	RC14-35	Vol & Sur		
RC	800	G-6	RC12-12	Vol & Sur		
RC	800	D-8	RC12-26	Vol & Sur		
RC	800	L-6	RC12-46	Vol & Sur		
RC	800	F-11	RC12-51	Vol & Sur		
RC	800	C-11	RC12-65	Vol & Sur		
RC	800	G-8	RC6-10	Vol & Sur		
RC	800	D-8	RC6-27	Vol & Sur		
RC	800	I-9	RC6-29	Vol & Sur		
RC	800	L-9	RC6-47	Vol & Sur		
RC	800	G-10	RC6-49	Vol & Sur		
RC	800	E-10	RC6-66	Vol & Sur		
RC	800	D-6	RC6-25	Vol & Sur		
RC	800	M-5	RC4-44	Vol & Sur		
RC	801	M-6	RC14-35	Vol & Sur		
RC	801	I-9	RC6-122	Vol & Sur		
RC	801	H-8	RC6-124	Vol & Sur		
RC	801	H-6	RC6-126	Vol & Sur		
RC	801	H-5	RC6-128	Vol & Sur		
RC	801	H-3	RC6-135	Vol & Sur		
RC	801	J-11	RC4-25	Vol & Sur		
RC	801	K-11	RC4-44	Vol & Sur		
RC	801	I-7	RC4-231	Vol & Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 74S75

CATEGORY: B-J, Pressure Retaining Welds in Piping
ITEM: B9.11, Circumferential Welds, nps ≥ 4

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
SI	808	B-5	SI6-272	Vol & Sur		
SI	808	C-5	SI6-271	Vol & Sur		
SI	808	D-4	SI6-270	Vol & Sur		
SI	808	B-14	SI6-81	Vol & Sur		
SI	808	C-14	SI6-80	Vol & Sur		
SI	808	D-17	SI6-314	Vol & Sur		
SI	809	D-4	SI12-161	Vol & Sur		
SI	809	G-4	SI12-162	Vol & Sur		
SI	809	J-4	SI12-163	Vol & Sur		
RH	824	I-4	RH12-39	Vol & Sur		
RH	824	L-4	RH12-38	Vol & Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 74S75

CATEGORY: B-J, Pressure Retaining Welds in Piping
ITEM: B9.21, Circumferential Welds, nps G.T. 1" and L.T. 4"

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
RC	800	D-2	RC3-21	Sur		
RC	800	D-3	RC3-23	Sur		
RC	800	E-8	RC3-28	Sur		
RC	800	M-7	RC3-45	Sur		
RC	800	M-2	RC3-40	Sur		
RC	800	C-18	RC3-61	Sur		
RC	801	H-2	RC3-139	Sur		
RC	801	F-2	RC3-140	Sur		
RC	801	E-2	RC3-141	Sur		
RC	802	E-6	RC3-21	Sur		
RC	802	E-6	RC3-40	Sur		
RC	802	E-6	RC3-61	Sur		
CS	803	A-3	CS3-116	Sur		
CS	803	B-3	CS3-117	Sur		
CS	803	C-3	CS3-118	Sur		
CS	803	I-4	CS1½-16	Sur		
CS	803	I-4	CS1½-17	Sur		
CS	803	I-4	CS1½-18	Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 74S75

CATEGORY: B-J, Pressure Retaining Welds in Piping
ITEM: B9.31, Branch Pipe Connection Welds, nps ≥ 4"

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
RC	800	G-7	RC29-1	Vol & Sur		
RC	800	J-7	RC29-4	Vol & Sur		
RC	800	G-14	RC29-7	Vol & Sur		
RC	800	D-6	RC27½-3	Vol & Sur		
RC	800	L-7	RC27½-6	Vol & Sur		
RC	800	C-14	RC27½-9	Vol & Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 74S75

CATEGORY: B-J, Pressure Retaining Welds in Piping
ITEM: B9.32, Branch Pipe Connection Welds, nps G.T. 1" and L.T. 4"

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
RC	800	E-1	RC31-2	Sur		
RC	800	K-1	RC31-5	Sur		
RC	800	E-19	RC31-8	Sur		
RC	800	G-7	RC29-1	Sur		
RC	800	J-7	RC29-4	Sur		
RC	800	G-14	RC29-7	Sur		
RC	800	D-6	RC27½-3	Sur		
RC	800	L-7	RC27½-6	Sur		
RC	800	C-4	RC27½-9	Sur		
SI	808	C-5	SI6-272	Sur		
SI	808	C-5	SI6-271	Sur		
SI	808	D-4	SI6-270	Sur		
SI	808	B-14	SI6-81	Sur		
SI	808	C-14	SI6-80	Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 74S75

CATEGORY: B-J, Pressure Retaining Welds in Piping
ITEM: B9.40, Socket Welds, nps G.T. 1"

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
RC	800	G-6	RC2-16	Sur		
RC	800	D-5	RC2-24	Sur		
RC	800	D-3	RC2-71	Sur		
RC	800	C-3	RC2-22	Sur		
RC	800	J-6	RC2-34	Sur		
RC	800	L-4	RC2-43	Sur		
RC	800	M-3	RC2-41	Sur		
RC	800	F-14	RC2-55	Sur		
RC	800	D-18	RC2-63	Sur		
RC	800	D-17	RC2-64	Sur		
RC	801	H-10	RC2-123	Sur		
RC	801	K-11	RC1½-284	Sur		
RC	801	J-11	RC1½-285	Sur		
RC	802	E-11	RC2-16	Sur		
RC	802	E-2	RC2-24	Sur		
RC	802	E-11	RC2-34	Sur		
RC	802	E-2	RC2-43	Sur		
RC	802	E-11	RC2-55	Sur		
RC	802	E-2	RC2-64	Sur		
CS	803	D-3	CS2-658	Sur		
SI	808	C-3	SI2-18	Sur		
SI	808	C-6	SI2-63	Sur		
SI	808	D-4	SI2-22	Sur		
SI	808	D-7	SI2-59	Sur		
SI	808	D-5	SI2-26	Sur		
SI	808	D-8	SI2-55	Sur		
SI	808	C-12	SI2-36	Sur		
SI	808	C-14	SI2-69	Sur		
SI	808	C-13	SI2-40	Sur		
SI	808	C-16	SI2-73	Sur		
SI	808	D-16	SI2-78	Sur		
SI	808	D-16	SI2-77	Sur		
SI	808	D-14	SI2-43	Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 74S75

CATEGORY: B-K-1, Integral Attachments for Piping, Pumps, and Valves
ITEM: B10.10, Integrally Welded Attachments

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
RC	800	L-5	RC4-44	Sur		
RC	801	H-6	RC6-126	Sur		
RC	801	F-2	RC3-140	Sur		
RC	801	H-2	RC3-139	Sur		
RC	801	E-2	RC3-141	Sur		
SI	808	D-4	SI6-270	Sur		
SI	808	C-5	SI6-271	Sur		
SI	808	B-5	SI6-272	Sur		
SI	808	C-14	SI6-80	Sur		
SI	808	B-14	SI6-81	Sur		
RH	824	L-4	RH12-38	Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 74S75

CATEGORY: B-L-1, Pressure Retaining Welds in Pump Casing
ITEM: B12.10, Pump Casing Welds

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
RCP	800	C-3	1A	Vol		
RCP	800	L-3	1B	Vol		
RCP	800	C-17	1C	Vol		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 74S75

CATEGORY: B-L-2, Pump Casing and Valve Bodies
ITEM: B12.20, Pump Casing

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
RCP	800	C-3	1A	VT-3		
RCP	800	L-3	1B	VT-3		
RCP	800	C-17	1C	VT-3		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-M-2, Pump Casing and Valve Bodies
ITEM: B12.50, Valve Body G.T. 4" nps

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	VALVE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
RC	801	F-8	R528	VT-3		
RC	801	F-6	R529	VT-3		
RC	801	F-4	R530	VT-3		
SI	808	B-3	V507	VT-3		
SI	808	C-3	V508	VT-3		
SI	808	D-3	V509	VT-3		
SI	808	B-11	V510	VT-3		
SI	808	C-11	V511	VT-3		
SI	808	B-17	V512	VT-3		
SI	808	C-17	V513	VT-3		
SI	808	D-17	V514	VT-3		
SI	809	D-6	V544	VT-3		
SI	809	H-6	V545	VT-3		
SI	809	K-6	V546	VT-3		
SI	809	D-3	V547	VT-3		
SI	809	H-3	V548	VT-3		
SI	809	K-3	V549	VT-3		
SI	810	C-2	V584	VT-3		
SI	810	F-2	V585	VT-3		
SI	810	E-2	V586	VT-3		
RH	824	I-3	V500	VT-3		
RH	824	I-4	V501	VT-3		
RH	824	L-3	V502	VT-3		
RH	824	L-4	V503	VT-3		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: B-Q, Steam Generator Tubing
ITEM: B16.20, U-Tube Steam Generator Tubing

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
S/G	800	E-3	1A	Vol		
S/G	800	H-3	1B	Vol		
S/G	800	E-17	1C	Vol		

APPENDIX B

QUALITY GROUP B
INSPECTION PLAN SUMMARY

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: C-A, Pressure Retaining Welds in Pressure Vessels
ITEM: C1.10, Shell Circumferential Welds

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
S/G	042	E-1	1A	Vol		
S/G	042	I-1	1B	Vol		
S/G	042	L-1	1C	Vol		
Rgn Ht Xchg	803	C-8		Vol		
X.L. Ht Xchg	803	D-11		Vol		
RHR Ht Xchg	824	C-14	1A	Vol		
RHR Ht Xchg	824	E-14	1B	Vol		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: C-A, Pressure Retaining Welds in Pressure Vessels
ITEM: C1.20, Head Circumferential Welds

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
S/G	042	E-1	1A	Vol		
S/G	042	I-1	1B	Vol		
S/G	042	L-1	1C	Vol		
Rgn Ht Xchg	803	C-8		Vol		
X.L Ht Xchg	803	D-11		Vol		
B.I.T.	808	J-3		Vol		
RHR Ht Xchg	824	C-14	1A	Vol		
RHR Ht Xchg	824	E-14	1B	Vol		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: C-A, Pressure Retaining Welds in Pressure Vessels
ITEM: C1.30, Tubesheet-To-Shell Welds

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
S/G	042	E-1	1A	Vol		
S/G	042	I-1	1B	Vol		
S/G	042	L-1	1C	Vol		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: C-B, Pressure Retaining Nozzle Welds in Vessels
ITEM: C2.21, Nozzle to Shell (or Head) Weld, Nozzles without Reinforcing Plate in Vessels G.T. ½" nom. Thickness

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
B.I.T.	808	J-3	--	Vol & Sur		
S/G	42	E-1	1A	Vol & Sur		
S/G	42	I-1	1B	Vol & Sur		
S/G	42	L-1	1C	Vol & Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: C-B, Pressure Retaining Nozzle Welds in Vessels
ITEM: C2.31, Reinforcing Plate Welds to Nozzle and Vessels in Vessels G.T. ½" nom. Thickness

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
RHR Ht Xchg	824	C-14	1A	Sur		
RHR Ht Xchg	824	E-14	1B	Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: C-B, Pressure Retaining Nozzle Welds in Vessels
ITEM: C2.32, Nozzle to Shell in Vessels G.T. ½" nom. Thickness, Inside of Vessel Inaccessible

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
RHR Ht Xchg	824	C-14	1A	VT-2		6
RHR Ht Xchg	824	E-14	1B	VT-2		6

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: C-C, Integral Attachments for Vessels, Piping Pumps, and Valves
ITEM: C3.10, Integrally Welded Attachments for Pressure Vessels

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
Regenerative Ht Xchg	803	C-8		Sur		
Excess Letdown Ht Xchg	803	D-11		Sur		
B.I.T.	808	J-3		Sur		
Accuml	809	C-11	1A	Sur		
Accuml	809	F-11	1B	Sur		
Accuml	809	I-11	1C	Sur		
RHR Ht Xchg	824	C-14	1A	Sur		
RHR Ht Xchg	824	E-14	1B	Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: C-C, Integral Attachments for Vessels, Piping Pumps, and Valves
ITEM: C3.20, Integrally Welded Attachments for Piping

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
MS	042	H-1	MS32-2	Sur		
MS	042	K-1	MS32-3	Sur		
MS	042	D-2	MS32-1	Sur		
FW	044	L-2	FW16-69	Sur		
FW	044	D-2	FW16-67	Sur		
AF	044	C-6	AF6-59	Sur		
AF	044	C-6	AF6-60	Sur		
CT	050	K-13	CT12-3	Sur		
CT	050	M-10	CT12-7	Sur		
CT	050	F-16	CT12-4	Sur		
CT	050	J-16	CT12-6	Sur		
CT	050	F-8	CT8-10	Sur		
CT	050	K-8	CT8-15	Sur		
CT	050	F-2	CT6-60	Sur		
CT	050	K-2	CT6-62	Sur		
CS	803	D-9	CS12-721	Sur		
CS	805	J-12	CS8-282	Sur		
CS	805	J-11	CS8-284	Sur		
CS	805	I-12	CS8-281	Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: C-C, Integral Attachments for Vessels, Piping Pumps, and Valves
ITEM: C3.20, Integrally Welded Attachments for Piping

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
SI	809	D-8	SI12-223	Sur		
SI	809	K-8	SI12-225	Sur		
SI	810	M-7	SI14-254	Sur		
SI	810	C-5	SI10-309	Sur		
SI	810	E-4	SI10-258	Sur		
SI	810	E-6	SI10-257	Sur		
SI	810	B-4	SI6-264	Sur		
SI	810	C-2	SI6-269	Sur		
SI	810	E-3	SI6-283	Sur		
RH	824	I-5	RH12-6	Sur		
RH	824	L-5	RH12-1	Sur		
RH	824	I-12	RH10-8	Sur		
RH	824	E-9	RH10-9	Sur		
RH	824	C-8	RH10-4	Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: C-C, Integral Attachments for Vessels, Piping, Pumps, and Valves
ITEM: C3.30, Integrally Welded Attachments for Pumps

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
CSIP	805	H-9	1A	Sur		
CSIP	805	K-9	1B	Sur		
CSIP	805	J-9	1C	Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 74S75

CATEGORY: C-F, Pressure Retaining Welds in Piping
ITEM: C-5.11, Circumferential Welds, Th ≤ ½" Nom.

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
CS	805	K-12	CS8-320	Sur		
CS	805	K-11	CS8-302	Sur		
CS	805	K-13	CS8-327	Sur		
CS	805	J-12	CS8-282	Sur		
CS	805	J-12	CS8-321	Sur		
CS	805	I-12	CS8-281	Sur		
CS	805	J-11	CS8-284	Sur		
CS	805	H-10	CS6-285	Sur		
CS	805	J-10	CS6-288	Sur		
CS	805	K-10	CS6-290	Sur		
SI	809	D-8	SI12-158	Sur		
SI	809	H-10	ST12-159	Sur		
SI	809	K-10	ST12-160	Sur		
SI	810	M-4	SI14-251	Sur		
SI	810	M-7	SI14-254	Sur		
SI	810	M-11	SI14-256	Sur		
SI	810	N-4	SI14-252	Sur		
SI	810	N-8	SI14-253	Sur		
SI	810	N-11	SI14-255	Sur		
SI	810	E-6	SI10-257	Sur		
SI	810	B-4	SI10-264	Sur		
SI	810	C-5	SI10-309	Sur		
SI	810	E-4	SI10-258	Sur		
SI	810	B-5	SI8-265	Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 74S75

CATEGORY: C-F, Pressure Retaining Welds in Piping
ITEM: C-5.11, Circumferential Welds, Th ≤ ½" Nom.

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
RH	824	L-9	RH14-2	Sur		
RH	824	I-8	RH14-7	Sur		
RH	824	L-5	RH12-1	Sur		
RH	824	I-5	RH12-6	Sur		
RH	824	L-12	RH10-3	Sur		
RH	824	C-8	RH10-4	Sur		
RH	824	I-12	RH10-8	Sur		
RH	824	E-9	RH10-9	Sur		
RH	824	C-13	RH8-20	Sur		
RH	824	E-14	RH8-5	Sur		
RH	824	E-12	RH8-33	Sur		
RH	824	G-11	RH8-10	Sur		
MS	042	C-8	MS8-107	Sur		
MS	042	J-7	MS8-109	Sur		
MS	042	G-8	MS8-108	Sur		
MS	042	K-7	MS6-57	Sur		
MS	042	H-7	MS6-56	Sur		
AF	044	C-6	AF6-59	Sur		
AF	044	I-5	AF6-7	Sur		
AF	044	M-5	AF6-60	Sur		
AF	044	C-2	AF6-93	Sur		
AF	044	C-2	AF6-92	Sur		
AF	044	C-2	AF6-91	Sur		
CT	050	F-16	CT12-4	Sur		
CT	050	J-16	CT12-6	Sur		
CT	050	K-13	CT12-3	Sur		
CT	050	M-10	CT12-7	Sur		
CT	050	F-8	CT8-10	Sur		
CT	050	K-8	CT8-15	Sur		
CT	050	F-5	CT6-14	Sur		
CT	050	F-3	CT6-163	Sur		
CT	050	F-2	CT6-60	Sur		
CT	050	K-2	CT6-62	Sur		
CT	050	L-4	CT6-19	Sur		
CT	050	L-3	CT6-162	Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 74S75

CATEGORY: C-F, Pressure Retaining Welds in Piping
ITEM: C-5.12, Longitudinal Welds, Th ≤ ½" Nom.

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
SI	810	N-8	SI14-253	Sur		
SI	810	M-7	SI14-254	Sur		
RH	824	L-9	RH14-2	Sur		
RH	824	I-8	RH14-7	Sur		
RH	824	L-5	RH12-6	Sur		
RH	824	I-5	RH12-1	Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 74S75

CATEGORY: C-F, Pressure Retaining Welds in Piping
ITEM: C5.21, Circumferential Welds, Th > ½" Nom.

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
CS	803	D-9	CS12-721	Vol & Sur		
SI	808	C-11	SI10-304	Vol & Sur		
SI	808	C-11	SI6-27	Vol & Sur		
SI	808	C-11	SI6-28	Vol & Sur		
SI	809	D-8	SI12-223	Vol & Sur		
SI	809	H-8	SI12-224	Vol & Sur		
SI	809	K-8	SI12-225	Vol & Sur		
SI	810	B-2	SI10-304	Vol & Sur		
SI	810	C-3	SI10-308	Vol & Sur		
SI	810	E-3	SI10-303	Vol & Sur		
SI	810	C-2	SI6-269	Vol & Sur		
SI	810	E-2	SI6-267	Vol & Sur		
SI	810	E-3	SI6-283	Vol & Sur		
SI	810	E-2	SI6-268	Vol & Sur		
MS	042	D-2	MS34-235	Vol & Sur		
MS	042	G-5	MS34-236	Vol & Sur		
MS	042	K-5	MS34-237	Vol & Sur		
MS	042	D-1	MS32-1	Vol & Sur		
MS	042	H-1	MS32-2	Vol & Sur		
MS	042	K-1	MS32-3	Vol & Sur		
MS	042	D-8	MS12-122	Vol & Sur		
MS	042	H-8	MS12-123	Vol & Sur		
MS	042	K-8	MS12-124	Vol & Sur		
FW	044	B-6	FW16-13	Vol & Sur		
FW	044	G-6	FW16-15	Vol & Sur		
FW	044	L-6	FW16-17	Vol & Sur		
FW	044	D-3	FW16-67	Vol & Sur		
FW	044	D-3	FW16-68	Vol & Sur		
FW	044	D-3	FW16-69	Vol & Sur		

APPENDIX C

QUALITY GROUP C
INSPECTION PLAN SUMMARY

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: D-A, Systems in Support of Reactor Shutdown Function
ITEM: D1.20, D1.30, D1.40, D1.50, and D1.60; Integral Attachments

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
MS	042	N-3	MS16-185	VT-3		
MS	042	M-3	MS16-238	VT-3		
MS	042	L-2	MS8-230	VT-3		
MS	042	N-3	MS8-239	VT-3		
MS	042	L-2	MS6-223	VT-3		
MS	042	H-3	MS6-59	VT-3		
MS	042	L-5	MS6-60	VT-3		
MS	042	M-2	MS6-130	VT-3		
MS	042	N-1	MS6-166	VT-3		
AF	044	M-11	AF6-8	VT-3		
AF	044	M-9	AF6-16	VT-3		
AF	044	N-5	AF4-76	VT-3		
AF	044	N-4	AF4-6	VT-3		
AF	044	N-9	AF4-10	VT-3		
AF	044	M-8	AF4-11	VT-3		
AF	044	N-9	AF4-9	VT-3		
AF	044	J-7	AF4-78	VT-3		
AF	044	J-5	AF4-5	VT-3		
AF	044	E-6	AF4-94	VT-3		
AF	044	I-7	AF4-55	VT-3		
AF	044	I-11	AF4-3	VT-3		
AF	044	N-11	AF4-74	VT-3		
AF	044	D-6	AF4-2	VT-3		
AF	044	D-11	AF4-1	VT-3		
AF	044	H-7	AF4-4	VT-3		
AF	044	N-7	AF4-77	VT-3		
AF	044	H-13	AF3-15	VT-3		
AF	044	D-12	AF2-12	VT-3		
AF	044	I-12	AF2-13	VT-3		
AF	044	L-13	AF2-14	VT-3		
AF	045	B-6	AF3-120	VT-3		
AF	045	B-6	AF2-119	VT-3		
CE	045	D-7	CE8-38	VT-3		
CE	045	H-9	CE8-41	VT-3		
CE	045	H-7	CE6-39	VT-3		
CE	045	H-8	CE6-40	VT-3		
CE	045	J-9	CE6-196	VT-3		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: D-B, Systems in Support of ECCS, Containment Heat Removal, Atmosphere Cleanup, and RHR
ITEM: D2.20, D2.30, D2.40, D2.50 and D2.60, Integral Attachments

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
SW	047	D-5	SW30-2	VT-3		
SW	047	G-1	SW30-3	VT-3		
SW	047	C-5	SW30-5	VT-3		
SW	047	G-2	SW30-6	VT-3		
SW	047	I-1	SW30-10	VT-3		
SW	047	I-2	SW30-11	VT-3		
SW	047	M-9	SW30-25	VT-3		
SW	047	L-15	SW30-99	VT-3		
SW	047	L-13	SW30-146	VT-3		
SW	047	L-6	SW24-67	VT-3		
SW	047	H-5	SW24-66	VT-3		
SW	047	H-13	SW24-72	VT-3		
SW	047	K-13	SW24-73	VT-3		
SW	047	H-4	SW20-8	VT-3		
SW	047	M-12	SW18-22	VT-3		
SW	047	H-13	SW16-7	VT-3		
SW	047	H-6	SW14-26	VT-3		
SW	047	F-5	SW14-27	VT-3		
SW	047	E-6	SW14-28	VT-3		
SW	047	G-7	SW14-39	VT-3		
SW	047	H-14	SW14-45	VT-3		
SW	047	F-14	SW14-46	VT-3		
SW	047	F-14	SW14-47	VT-3		
SW	047	F-13	SW14-53	VT-3		
SW	047	H-7	SW14-343	VT-3		
SW	047	G-13	SW14-345	VT-3		
SW	047	G-5	SW12-410	VT-3		
SW	047	G-14	SW12-411	VT-3		
SW	047	I-4	SW12-83	VT-3		
SW	047	M-7	SW12-84	VT-3		
SW	047	I-11	SW12-85	VT-3		
SW	047	K-11	SW12-86	VT-3		
SW	047	D-6	SW10-31	VT-3		
SW	047	D-7	SW10-33	VT-3		
SW	047	G-13	SW10-34	VT-3		
SW	047	E-8	SW10-36	VT-3		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: D-B, Systems in Support of ECCS, Containment Heat Removal, Atmosphere Cleanup, and RHR
ITEM: D2.20, D2.30, D2.40, D2.50 and D2.60, Integral Attachments

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
SW	047	E-10	SW10-38	VT-3		
SW	047	E-11	SW10-52	VT-3		
SW	047	D-13	SW10-54	VT-3		
SW	047	D-13	SW10-57	VT-3		
SW	047	I-7	SW10-68	VT-3		
SW	047	D-14	SW10-297	VT-3		
SW	047	I-10	SW10-74	VT-3		
SW	047	B-1	SW10-752	VT-3		
SW	047	J-9	SW8-81	VT-3		
SW	047	H-10	SW8-87	VT-3		
SW	047	L-14	SW8-88	VT-3		
SW	047	K-14	SW8-122	VT-3		
SW	047	I-8	SW8-128	VT-3		
SW	047	I-14	SW8-165	VT-3		
SW	047	H-9	SW8-338	VT-3		
SW	047	J-10	SW6-80	VT-3		
SW	047	J-8	SW6-82	VT-3		
EA	133	G-3	EA24-1	VT-3		
EA	133	G-3	EA24-2	VT-3		
EA	133	G-5	EA24-3	VT-3		
EA	133	G-5	EA24-4	VT-3		
CH	498	B-2	CH10-91	VT-3		
CH	498	B-5	CH8-208	VT-3		
CH	498	B-11	CH-205	VT-3		
CX	498	M-5	CX10-118	VT-3		
CX	498	M-7	CX8-201	VT-3		
CX	498	J-3	CX6-187	VT-3		
CX	498	K-10	CX6-200	VT-3		
CH	498S02	G-14	CH10-91	VT-3		
CX	498S02	H-6	CX10-168	VT-3		
CX	498S02	K-9	CX10-118	VT-3		
SW	498S02	F-6	SW10-938	VT-3		
SW	498S02	E-7	SW8-800	VT-3		
SW	498S02	E-11	SW8-801	VT-3		
SW	498S02	D-8	SW6-875	VT-3		
CH	499	B-14	CH10-50	VT-3		
CH	499	B-11	CH8-51	VT-3		
CH	499	B-10	CH6-72	VT-3		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: D-B, Systems in Support of ECCS, Containment Heat Removal, Atmosphere Cleanup, and RHR
ITEM: D2.20, D2.30, D2.40, D2.50 and D2.60, Integral Attachments

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
CX	499	K-16	CX10-68	VT-3		
CX	499	L-12	CX8-69	VT-3		
CX	499	K-10	CX6-116	VT-3		
CH	499S02	G-14	CH10-50	VT-3		
CX	499S02	L-12	CX10-68	VT-3		
CX	499S02	H-6	CX10-172	VT-3		
SW	499S02	E-7	SW8-804	VT-3		
SW	499S02	E-11	SW8-805	VT-3		
SW	499S02	D-8	SW8-876	VT-3		
CC	819	G-3	CC18-2	VT-3		
CC	819	E-8	CC18-3	VT-3		
CC	819	E-15	CC18-4	VT-3		
CC	819	K-4	CC18-5	VT-3		
CC	819	L-11	CC18-6	VT-3		
CC	819	H-8	CC18-18	VT-3		
CC	819	H-9	CC18-19	VT-3		
CC	819	J-16	CC18-7	VT-3		
CC	819	G-5	CC18-16	VT-3		
CC	820	B-12	CC12-12	VT-3		
CC	820	A-3	CC12-13	VT-3		
CC	820	M-12	CC12-14	VT-3		
CC	820	L-3	CC12-15	VT-3		
CC	821	D-1	CC8-10	VT-3		
CC	821	B-16	CC8-146	VT-3		
CC	821	B-11	CC6-145	VT-3		
CC	821	E-1	CC6-147	VT-3		
CC	821	E-1	CC6-148	VT-3		
CC	821	G-1	CC6-149	VT-3		
CC	821	G-12	CC6-195	VT-3		
CC	821	D-12	CC6-201	VT-3		
CC	821	D-2	CC6-130	VT-3		
CC	822	M-8	CC20-254	VT-3		
CC	822	F-5	CC20-11	VT-3		
CC	822	F-13	CC18-251	VT-3		
CC	822	L-14	CC18-252	VT-3		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: D-B, Systems in Support of ECCS, Containment Heat Removal, Atmosphere Cleanup, and RHR
ITEM: D2.20, D2.30, D2.40, D2.50 and D2.60, Integral Attachments

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
CC	822	F-14	CC14-281	VT-3		
CC	822	J-15	CC14-282	VT-3		
CC	822	F-13	CC14-411	VT-3		
CC	822	G-14	CC14-412	VT-3		
CC	822	H-14	CC14-413	VT-3		
CC	822	K-15	CC14-414	VT-3		
CC	822	L-4	CC6-275	VT-3		
CC	822	M-12	CC8-544	VT-3		
CC	822	G-4	CC6-274	VT-3		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY
ASME SECTION XI EDITION 80W81

CATEGORY: D-C, Systems in Support of Residual Heat Removal from Spent Fuel Storage Pool
ITEM: D3.20, D3.30, D3.40, D3.50 and D3.60, Integral Attachments

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
SF	305	E-16	SF16-1	VT-3		
SF	305	E-16	SF16-2	VT-3		
SF	305	H-11	SF16-7	VT-3		
SF	305	J-11	SF16-8	VT-3		
SF	305	H-10	SF14-283	VT-3		
SF	305	J-10	SF14-284	VT-3		
SF	305	H-5	SF12-3	VT-3		
SF	305	K-5	SF12-4	VT-3		
SF	305	B-3	SF12-5	VT-3		
SF	305	A-3	SF12-6	VT-3		
SF	305	G-8	SF12-9	VT-3		
SF	305	J-8	SF12-10	VT-3		
SF	305	J-6	SF12-11	VT-3		
SF	305	H-11	SF12-12	VT-3		
SF	305	J-11	SF12-14	VT-3		
SF	305	F-14	SF12-171.	VT-3		
SF	305	F-13	SF12-174	VT-3		
SF	305	B-6	SF12-176	VT-3		
SF	305	C-6	SF12-179	VT-3		
SF	305	F-14	SF12-82	VT-3		

APPENDIX D

AUGMENTED INSPECTION PLAN SUMMARY

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY

CATEGORY: Reg. Guide 1.14
ITEM: RCP Flywheel Keyway and Bore Areas

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
Flywheel	800	C-3	1A	Vol		
Flywheel	800	L-3	1B	Vol		
Flywheel	800	C-17	1C	Vol		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY

CATEGORY: Reg. Guide 1.14
ITEM: Flywheel Exposed Surface

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
Flywheel	800	C-3	1A	Vol & Sur		
Flywheel	800	L-3	1B	Vol & Sur		
Flywheel	800	C-17	1C	Vol & Sur		

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY

CATEGORY: Augmented Piping Welds

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
MS	042	D-8	MS12-122	Vol		2,4
MS	042	K-8	MS12-123	Vol		2,4
MS	042	H-8	MS12-124	Vol		2,4
MS	042	D-2	MS34-235	Vol		1,2,4
MS	042	G-5	MS34-236	Vol		1,2,4
MS	042	K-5	MS34-237	Vol		1,2,4
MS	042	F-10	MS50-7	Vol		2,4
MS	042	F-11	MS44-8	Vol		2,4
MS	042	G-11	MS44-9	Vol		2,4
MS	042	D-9	MS32-4	Vol		2,4
MS	042	G-9	MS32-5	Vol		2,4
MS	042	K-9	MS32-6	Vol		2,4
MS	042	C-8	MS8-107	Vol		2,4
MS	042	G-8	MS8-108	Vol		2,4
MS	042	J-7	MS8-109	Vol		2,4
MS	042	C-3	MS8-62	Vol		2,4,7
MS	042	C-4	MS8-63	Vol		2,4,7
MS	042	C-5	MS8-64	Vol		2,4,7
MS	042	C-6	MS8-65	Vol		2,4,7
MS	042	C-6	MS8-66	Vol		2,4,7
MS	042	G-3	MS8-67	Vol		2,4,7
MS	042	G-4	MS8-68	Vol		2,4,7
MS	042	G-5	MS8-69	Vol		2,4,7
MS	042	G-6	MS8-70	Vol		2,4,7
MS	042	G-6	MS8-71	Vol		2,4,7
MS	042	J-3	MS8-72	Vol		2,4,7
MS	042	J-4	MS8-73	Vol		2,4,7
MS	042	J-5	MS8-74	Vol		2,4,7
MS	042	J-6	MS8-75	Vol		2,4,7
MS	042	J-6	MS8-76	Vol		2,4,7
MS	042	H-7	MS6-56	Vol		2,4
MS	042	K-7	MS6-57	Vol		2,4
MS	042	D-8	MS3-116	Vol		2,4
MS	042	H-8	MS3-117	Vol		2,4
MS	042	K-8	MS3-118	Vol		2,4
FW	044	C-3	FW16-13	Vol		1,2,4
FW	044	F-3	FW16-15	Vol		1,2,4
FW	044	F-3	FW16-17	Vol		1,2,4
AF	044	C-5	AF6-59	Vol		1,4
AF	044	G-3	AF6-7	Vol		1,4
AF	044	K-3	AF6-60	Vol		1,4
AF	044	H-8	AF4-98	Vol		1,4
AF	044	C-6	AF4-95	Vol		1,4
AF	044	E-6	AF4-75	Vol		1,4

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY

CATEGORY: Augmented Piping Welds

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
AF	044	G-4	AF4-96	Vol		1,4
AF	044	F-5	AF4-97	Vol		1,4
AF	044	G-7	AF4-85	Vol		1,4
FW	044	G-19	FW3-83	Vol		2,4
FW	044	G-19	FW3-82	Vol		2,4
FW	044	G-19	FW3-84	Vol		2,4
FW	044	G-19	FW3-85	Vol		2,4
FW	044	G-19	FW3-86	Vol		2,4
FW	044	G-19	FW3-87	Vol		2,4
FW	044	B-8	FW16-12	Vol		2,4
FW	044	G-8	FW16-14	Vol		2,4
FW	044	K-8	FW16-16	Vol		2,4
FW	044	E-19	FW6-78	Vol		2,4
FW	044	E-19	FW6-76	Vol		2,4
FW	044	E-19	FW6-80	Vol		2,4
FW	044	E-19	FW2-129	Sur		2,4
FW	044	E-19	FW2-130	Sur		2,4
FW	044	E-19	FW2-131	Sur		2,4
CT	050	F-16	CT24-1	Sur		5
CT	050	H-16	CT16-8	Sur		5
CT	050	G-16	CT14-79	Sur		5
CT	050	H-16	CT14-9	Sur		5
CT	050	G-16	CT8-65	Sur		5
CT	050	G-16	CT8-77	Sur		5
CT	050	F-8	CT8-10	Sur		5
CT	050	K-8	CT8-15	Sur		5
BD	051	D-5	BD4-3	Sur		3,4
BD	051	I-4	BD4-7	Sur		3,4
BD	051	N-5	BD4-11	Sur		3,4
CS	803	A-14	CS3-96	Sur		3,4
CS	803	B-17	CS3-95	Vol		1,4
CS	803	B-10	CS2-138	Sur		3,4
CS	803	B-11	CS2-91	Sur		3,4
CS	803	B-12	CS2-92	Sur		3,4
CS	803	J-3	CS1½-19	Sur		3,4
CS	803	J-3	CS1½-20	Sur		3,4
CS	803	J-3	CS1½-21	Sur		3,4
CS	805	H-6	CS4-300	Vol		5
CS	805	H-8	CS3-294	Vol		5

SHEARON HARRIS UNIT NO. 1
PRESERVICE INSPECTION PROGRAM PLAN SUMMARY

CATEGORY: Augmented Piping Welds

SYSTEM/ Component	FLOW DIAGRAM (2165-G)	FLOW DIAG COORD	LINE NUMBER	EXAM METHOD	RELIEF REQUEST	PROGRAM Notes
CS	805	K-8	CS3-337	Vol		5
CS	805	J-7	CS3-292	Vol		5
SI	808	K-13	SI4-32	Vol		5
SI	808	M-13	SI4-1	Vol		5
SI	808	J-13	SI4-47	Vol		5
SI	808	M-14	SI4-84	Vol		5
SI	808	F-11	SI3-2	Vol		5
SI	808	N-6	SI3-4	Vol		5
SI	808	M-5	SI3-45	Vol		5
SI	808	L-3	SI3-44	Vol		5
SI	808	K-3	SI3-410	Vol		5
SI	808	H-3	SI3-11	Vol		5
SI	808	F-2	SI3-12	Vol		5
SI	808	K-12	SI3-3	Vol		5
SI	808	H-13	SI3-49	Vol		5
SI	808	F-11	SI3-50	Vol		5
SI	808	F 14	SI3-51	Vol		5
SI	808	E-3	SI2-17	Sur		5
SI	808	E-4	SI2-21	Sur		5
SI	808	E-5	SI2-23	Sur		5
SI	808	E-14	SI2-68	Sur		5
SI	808	E-15	SI2-72	Sur		5
SI	808	E-8	SI2-52	Sur		5
SI	808	E-7	SI2-58	Sur		5
SI	808	E-6	SI2-60	Sur		5
SI	808	E-16	SI2-76	Sur		5
SI	808	E-13	SI2-39	Sur		5
SI	808	E-14	SI2-29	Sur		5
SI	808	E-12	S12-33	Sur		5

APPENDIX E

PERSONNEL QUALIFICATION PROGRAM FOR AUSTENETIC WELD INSPECTION

QUALIFICATION PROGRAM

(1) CP&L or their agent will prepare a Qualification Program Plan to assure the following:

(a) The techniques applied are effective for the detection, characterization, sizing, and evaluation of service induced defects.

(b) Personnel performing the examinations, including detection, characterization, and sizing are capable of carrying out these procedures.

(c) That performance of examinations in the plant reflect the capabilities demonstrated in the qualification program (1) (a) and (b) above.

(2) The Qualification Program Plan shall address the following:

(a) Procedure and equipment requirements.

(b) The description of the test parts including number of cracks, geometrical reflectors, and samples containing no defects. The suitability of these samples to demonstrate the objectives of the Qualification Program Plan.

(c) Criteria for acceptance of the demonstration for both procedures and personnel.

(d) Period for which qualification is valid as well as conditions which require requalification.

(e) The components to which the qualification applies.

(f) Documentation of the qualification results.

(3) The Qualification Test Program shall be reviewed by the Authorized Nuclear Inservice Inspector.