ENCLOSURE 1

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE

SEQUOYAH NUCLEAR PLANT (SQN) UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

(TVA-SQN-TS-96-04)

LIST OF AFFECTED PAGES

UNIT 1	UNIT 2
License page 6	License page 6
page V	page V
page IX	page IX
page XIV	page XIV
3/4 3-58	3/4 3-59
3/4 3-59	3/4 3-60
3/4 3-60	3/4 3-61
3/4 3-61	3/4 3-62
3/4 3-62	3/4 3-63
3/4 3-63	3/4 3-64
3/4 3-64	3/4 3-65
3/4 3-65	3/4 3-66
3/4 3-66	3/4 3-67
3/4 3-67	3/4 3-67a
3/4 3-68	3/4 7-43
3/4 3-69	3/4 7-44
3/4 7-31	3/4 7-45
3/4 7-32	3/4 7-46
3/4 7-33	3/4 7-47
3/4 7-34	3/4 7-48
3/4 7-35	3/4 7-49
3/4 7-36	3/4 7-50
3/4 7-37	3/4 7-51
3/4 7-38	3/4 7-52
3/4 7-39	B 3/4 3-4
3/4 7-40	B 3/4 7-7
3/4 7-41	B 3/4 7-8
B 3/4 3-4	6-2
B 3/4 7-7	
B 3/4 7-8	
6-2	

(c) By no later than June 30, 1982, all safety-related electrical equipment in the facility shall be qualified in accordance with the provisions of: Division of Operating Reactors "Guidelines for Evaluating Environmental Qualification of Class IE Electrical Equipment in Operating Reactors" (DOR Guidelines); or, NUREG-0588, "Interim Staff Position on
R4 Environmental Qualification of Safety-Related Electrical Equipment," December 1979. Copies of these documents are attached to the Order for Modification of License DPR-77 dated November 6, 1980.

(13) Loss of Non-Class IE Instrumentation and Control Room System Bus During Operation (Section 7.10)

Prior to exceeding five percent power, TVA must complete revisions to plant emergency procedures to the satisfaction of the NRC.

(14) Engineering Safety Feature (ESF) Reset Controls (Section 7.11)

In conformance with IE Bulletin 80-06, TVA shall test the system to identify any further areas of concern, and TVA shall review the control schemes to determine that they are the best in terms of equipment control and plant safety. The results of these test and review efforts shall be provided to the NRC in accordance with the bulletin.

(15) Diesel Generator Reliability (Section 8.3.1)

Prior to operation following the first refueling, TVA shall implement the following design and procedure modifications as outlined in Section 8.3.1 of SER Supplement No. 2. These include: (a) Moisture in Air Starting System; (b) Turbocharger Gear Drive Problem; and, (c) Personnel Training.

(16) Fire Protection ~~System (Section 9.5)~~

TVA, to the satisfaction of the NRC, shall:

INSERT A

(a) Prior to June 1981, submit the following 3 items which deal with the Essential Raw Cooling Water (ERCW) supply: (a) enclose the necessary exposed conduit with 1 1/2-hour fire barrier; (b) reroute train B ERCW pump cables and ERCW transformer power cables to obtain a minimum 20-foot separation from train A; and, (c) enclose the ERCW junction box with 1-1/2-hour fire barrier;

(b) Prior to November 1, 1980, (1) install five fire dampers; and, (2) replace and relocate sprinkler heads in the auxiliary building.

R13 (c) By September 30, 1981, TVA shall replace the control room ceiling panels with panels acceptable to NRC.

INSERT A

TVA shall implement and maintain in effect all provisions of the approved fire protection program referenced in Sequoyah Nuclear Plant's Final Safety Analysis Report and as approved in NRC Safety Evaluation Reports contained in NUREG-0011, Supplements 1, 2, and 5, NUREG-1232, Volume 2, and NRC letters dated May 29 and October 6, 1986, subject to the following provision:

> TVA may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

15

NOV 16 1990

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

R65

BASES

This Specification is deleted. Table 3.3-11 is also deleted.

FIRE DETECTION INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.8 As a minimum, the fire detection instrumentation for each fire detection zone shown in Table 3.3-11 shall be OPERABLE.

APPLICABILITY: Whenever equipment protected by the fire detection instrument is required to be OPERABLE.#

ACTION:

With the number of OPERABLE fire detection instrument(s) less than the minimum number OPERABLE requirement of Table 3.3-11:

a. Within 1 hour establish a fire watch patrol to inspect the zone(s) with the inoperable instrument(s) at least once per hour, unless the instrument(s) is located inside the containment, then inspect the containment at least once per 8 hours or monitor the containment air temperature at least once per hour at the locations listed in Specification 4.6.1.5.

b. Restore the inoperable instrument(s) to OPERABLE status within 14 days or, in lieu of any other report required by Specification 6.6.1, prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within the next 30 days outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the instrument(s) to OPERABLE status. R

c. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.3.3.8.1 Each of the above required fire detection instruments which are accessible during operation shall be demonstrated OPERABLE at least once per 6 months by performance of a CHANNEL FUNCTIONAL TEST. Fire detection which are not accessible during plant operation shall be demonstrated OPERABLE by the performance of a CHANNEL FUNCTIONAL TEST during each COLD SHUTDOWN exceeding 24 hours unless performed in the previous 6 months.

4.3.3.8.2 The NFPA Code 72D supervised circuits supervision associated with the detector alarms of each of the above required fire detection instruments shall be demonstrated OPERABLE at least once per 6 months.

4.3.3.8.3 The non-supervised circuits between the local fire protection panels and actuated equipment shall be demonstrated OPERABLE at least once per 6 months.

#The fire detection instruments located within the containment are not required to be OPERABLE during the performance of Type A Containment Leakage Rate Tests.

TABLE 3.3-11

FIRE DETECTION INSTRUMENTS

Fire Zone	Instrument Location	Minimum Instruments Operable Ionization	Photoelectric	Thermal	Infrared	
1	Diesel Gen. Rm. 2B-B, El. 722			5		
2	Diesel Gen. Rm. 2B-B, El. 722			5		
3	Diesel Gen. Rm. 1B-B, El. 722			5		
4	Diesel Gen. Rm. 1B-B, El. 722			5		
5	Diesel Gen. Rm. 2A-A, El. 722			5		R101
6	Diesel Gen. Rm. 2A-A, El. 722			5		
7	Diesel Gen. Rm. 1A-A, El. 722			5		
8	Diesel Gen. Rm. 1A-A, El. 722			5		
9	Lube Oil Storage Rm. El. 722			1		
10	Lube Oil Storage Rm. El. 722			1		
11	Fuel Oil Transfer Rm. El. 722			1		
12	Fuel Oil Transfer Rm. El. 722			1		
13	Diesel Gen. Corridor, El. 722			6		
14	Air Intake & Exhaust Rm. 2B, El. 740.5			9		
15	Air Intake & Exhaust Rm. 1B, El. 740.5			9		
16	Air Intake & Exhaust Rm. 2A, El. 740.5			9		
17	Air Intake & Exhaust Rm. 1A, El. 740.5			9		R113
18	Diesel Gen. 2B-B Relay Bd., El. 722	3				
19	Diesel Gen. 1B-B Relay Bd., El. 722	3				
20	Diesel Gen. 2A-A Relay Bd., El. 722	3				R101
21	Diesel Gen. 1A-A Relay Bd., El. 722	3				
22	Diesel Gen. Board Rm. 2B-B, El. 740.5	2				R113
23	Diesel Gen. Board Rm. 2B-B, El. 740.5			2		R113
24	Diesel Gen. Board Rm. 1B-B, El. 740.5	2				R113
25	Diesel Gen. Board Rm. 1B-B, El. 740.5			2		R113

Delete Entire Page

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

Fire Zone	Instrument Location	Minimum Instruments Operable Ionization	Photoelectric	Thermal	Infrared
26	Diesel Gen. Board Rm. 2A-A, El. 740.5	2			
27	Diesel Gen. Board Rm. 2A-A, El. 740.5			2	
28	Diesel Gen. Board Rm. 1A-A, El. 740.5	2			
29	Diesel Gen. Board Rm. 1A-A, El. 740.5			2	
30	Cable Spreading Rm. C7-C11, El. 706	14			
31	Cable Spreading Rm. C7-C11, El. 706	14			
32	Cable Spreading Rm. C7-C11, El. 706	14			
33	Cable Spreading Rm. C7-C11, El. 706	14			
34	Cable Spreading Rm. C3-C7, El. 706	14			
35	Cable Spreading Rm. C3-C7, El. 706	14			
39	Cont. Spray Pump 1A-A, El. 653	2			
40	Cont. Spray Pump 1B-B, El. 653	2			
43	RHR Pump 1A-A, El. 653	2			
44	RHR Pump 1B-B, El. 653	2			
47	Aux. Bldg. Corridor, El. 653	10			
48	Corridor, Control Bldg. El. 669	4			
49	Corridor, Control Bldg. El. 669	4			
50	Mech. Equipm Rm. Col. C1, El. 669	2			
51	Mech. Equip. Rm. Col. C1, El. 669			2	

R113
R113
R113
R113
R101

Delete Entire Page

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

Fire Zone	Instrument Location	Minimum Instruments Operable: Ionization	Photoelectric	Thermal	Infrared
52	Mech. Equip. Rm. Col. C3, El. 669	2			
53	Mech. Equip. Rm. Col. C3, El. 669			2	
54	250-V Batt. Rm. 1, El. 669	3			
55	250-V Batt. Rm. 1, El. 669			3	
56	250-V Batt. Bd. Rm. 1, El. 669	2			
57	250-V Batt. Bd. Rm. 1, El. 669	2			
58	250-V Batt. Bd. Rm. 2, El. 669	2			
59	250-V Batt. Bd. Rm. 2, El. 669	2			
60	250-V Batt. Rm. 2, El. 669	3			
61	250-V Batt. Rm. 2, El. 669			3	
62	24-V & 48-V Batt. Rm. El. 669	3			
63	24-V & 48-V Batt. Rm. El. 669			3	
64	24-V & 48-V Batt. Bd. R , El. 669	2			
65	24-V & 48-V Batt. Bd. Rm., El. 669	2			
66	Communications Rm. El. 669	4			
67	Communications Rm. El. 669	4			
68	Mech. Equip. Rm. El. 669	2			
69	Mech. Equip. Rm. El. 669			2	
70	Aux. Bldg. A5-A11, Col. W-X, El. 669	5			
71	Aux. Bldg. A5-A11, Col. W-X, El. 669	5			
72	Aux. FW Pump Turbine 1A-S, El. 669	1			
73	Aux. FW Pump Turbine 1A-S, El. 669			1	
76	S. I. & Charging Pump Rms. El. 669			5	
77	S. I. Pump Rm. 1A, El. 669	1			
78	S. I. Pump Rm. 1B, El. 669	1			
79	Charging Pump Rm. 1C, El. 669	1			

Delete Entire Page

R101

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

Fire Zone	Instrument Location	Minimum Instruments Operable: Ionization	Photoelectric	Thermal	Infrared
80	Charging Pump Rm. 1B, El. 669	1			
81	Charging Pump Rm. 1A, El. 669	1			
88	Aux. Bldg. Corridor A1-A8, El. 669	8			
89	Aux. Bldg. Corridor A1-A8, El. 669	8			
90	Aux. Bldg. Corridor A8-A15, El. 669	8			
91	Aux. Bldg. Corridor A8-A15, El. 669	8			
92	Aux. Bldg. Corridor Col. U-W El. 669	4			
93	Aux. Bldg. Corridor Col. U-W, El. 669	4			
94	Valve Galley, El. 669	2			
95	Valve galley, El. 669	2			
98	Cntmt Purge Air Fltr., El. 690		2	2	
99	Cntmt Purge Air Fltr. El. 690		2	2	
102	Pipe Gallery, El. 690	4			
103	Pipe Gallery, El. 690	4			
106	Aux. Building, El. 690	8			
107	Aux. Building, El. 690	8			
108	Radio Chemical Lab. Area, El. 690	3			
109	Radio Chemical Lab. Area, El. 690	3			
110	Aux. Bldg. A1-A8, Col. Q-U, El. 690	10			
111	Aux. Bldg. A1-A8, Col. Q-U El. 690	10			
112	Aux. Bldg. A8-A15, Col. Q-U El. 690	9			
113	Aux. Bldg. A8-A15, Col. Q-U El. 690	9			
114	Waste Packaging Area El. 706	3			

DELETE ENTIRE PAGE

R101

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

Fire Zone	Instrument Location	Minimum Instruments Operable Ionization	Photoelectric	Thermal	Infrared	
115	Waste Packaging Area El. 706	3				R101
116	Cask Loading Area El. 706	2				
117	Cask Loading Area El. 706	2				
118	New Fuel Storage Area El. 706	2				
119	New Fuel Storage Area El. 706	2				
120	Aux. Bldg. Gas Trtmt. Fltr. El. 714		1	1		R113
121	Aux. Bldg. Gas Trtmt. Fltr. El. 714		1	1		R113
122	Add. Eqpt. Bldg. El. 706 & 717.5	6				
123	Volume Cont. Tank Rm. 1A, El. 690	1	1			R146
124	Additional Equip. Bldg. El. 706	6				
125	Volume Cont. Tank Rm. 1A, El. 690	1	1			R146
126	ABGTS Rm. El. 714	2				
127	ABGTS Rm. El. 714	2				
128	ABGTS Rm. El. 714	2				
129	ABGTS Rm. El. 714	2				
130	Ventilation & Purge Air Rm. El. 714	3				
131	Ventilation & Purge Air Rm. El. 714	3				
132	Ventilation & Purge Air Rm. El. 714	3				R101
133	Ventilation & Purge Air Rm. El. 714	3				
134	Aux. Bldg. A5-A11, Col. U-W, El. 714	7				
135	Aux. Bldg. A5-A11, Col. U-W, El. 714	7				
136	Heating & Vent. Rm. El. 714	4				
137	Heating & Vent. Rm. El. 714	4				
138	Heating & Vent. Rm. El. 714	4				

DELETE ENTIRE PAGE

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

Fire Zone	Instrument Location	Minimum Instruments Operable Ionization	Photoelectric	Thermal	Infrared
139	Heating & Vent. Rm. El. 714	4			
140	Above Hot Instr. Rm. El. 714	1			
141	Above Hot Instr. Rm. El. 714	1			
142	Aux. Bldg. A1-A8, Col. Q-U, El. 714	12			
143	Aux. Bldg. A1-A8, Col. Q-U, El. 714	12			
144	Aux. Bldg. A8-A15, Col. Q-U, El. 714	9			
145	Aux. Bldg. A8-A15, Col. Q-U, El. 714	9			
146	N_2 Storage Area, El. 706	4			
147	ABGTS filter El. 714		1	1	
148	ABGTS filter El. 714		1	1	
149	Cable Spreading Rm. C3-C7, El. 706	15			
150	Cable Spreading Rm. C3-C7, El. 706	15			
153	Add. Eqpt. Bldg. El. 740.5	4			
154	Add. Eqpt. Bldg. El. 740.5	6			
155	Refuel Rm. El. 734	19			
156	RB Access Rm. El. 734	2			
157	RB Access Rm. El. 734	2			
160	SG Blwdn. Rm. El. 734	4			
161	SG Blwdn. Rm. El. 734	4			
162	EGTS Rm. El. 734	3			
163	EGTS Rm. El. 734	3			
164	EGTS Fltr. A El. 734		1	2	
165	EGTS Fltr. A El. 734		1	2	
166	EGTS Fltr. B El. 734		1	2	
167	EGTS Fltr. B El. 734		1	2	
172	Mech. Eqpt. Rm. El. 734	1			
173	Mech. Eqpt. Rm. El. 734	1			

Delete Entire Page

R101

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

FIRE ZONE	INSTRUMENT LOCATION	MINIMUM INSTRUMENTS OPERABLE Ionization	Photoelectric	Thermal	Infrared
174	Mech. Eqpt. Rm. El. 734	1			
175	Mech. Eqpt. Rm. El. 734	1			
176	480-V Shtdn. Bd. Rm. 1A1, El. 734	2			
177	480-V Shtdn. Bd. Rm. 1A1, El. 734	2			
178	480-V Shtdn. Bd. Rm. 1A2, El. 734	2			
179	480-V Shtdn. Bd. Rm. 1A2, El. 734	2			
180	480-V Shtdn. Bd. Rm. 1B1, El. 734	2			
181	480-V Shtdn. Bd. Rm. 1B1 El. 734	2			
182	480-V Shtdn. Bd. Rm. 1B2 El. 734	3			
183	480-V Shtdn. Bd. Rm. 1B2 El. 734	3			
184	6.9-KV Shtdn. Bd. Rm. A El. 734	7			
185	6.9-KV Shtdn. Bd. Rm. A El. 734	7			
186	6.9-KV Shtdn. Bd. Rm. B El. 734	7			
187	6.9-KV Shtdn. Bd. Rm. B El. 734	7			
188	480-V Shtdn. Bd. Rm. 2A1 El. 734	2			
189	480-V Shtdn. Bd. Rm. 2A1 El. 734	2			
190	480-V Shtdn. Bd. Rm. 2A2 El. 734	3			
191	480-V Shtdn. Bd. Rm. 2A2 El. 734	3			
192	480-V Shtdn. Bd. Rm. 2B1 El. 734	2			

R101
R185
R101

Delete Entire Page

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

Fire Zone	Instrument Location	Minimum Instruments Operable: Ionization	Photoelectric	Thermal	Infrared
193	480-V Shtdn. Bd. Rm. 2B1 El. 734	2			
194	480-V Shtdn. Bd. Rm. 2B2 El. 734	2			
195	480-V Shtdn. Bd. Rm. 2B2 El. 734	2			
196	125-V Batt. Bd. Rm. I El. 734	1			
197	125-V Batt. Bd. Rm. I El. 734	1			
198	125-V Batt. Bd. Rm. II El. 734	1			
199	125-V Batt. Bd. Rm. II El. 734	1			
200	125-V Batt. Bd. Rm. III El. 734	1			
201	125-V Batt. Bd. Rm. III El. 734	1			
202	125-V Batt. Bd. Rm. IV El. 734	1			
203	125-V Batt. Bd. Rm. IV El. 734	1			
204	Aux. CR El. 734	2			
205	Aux. CR El. 734	2			
206	Aux. CR Inst. Rm. 1A El. 734	1			
207	Aux. CR Inst. Rm. 1A El. 734	1			
208	Aux. CR Inst. Rm. 1B El. 734	1			
209	Aux. CR Inst. Rm. 1B El. 734	1			
210	Aux. CR Inst. Rm. 2A El. 734	1			
211	Aux. CR Inst. Rm. 2A El. 734	1			
212	Aux. CR Inst. Rm. 2B El. 734	1			
213	Aux. CR Inst. Rm. 2B El. 734	1			
214	Mech. Eqpt. Rm. El. 732	5			
215	Mech. Eqpt. Rm. El. 732	5			
216	CR Fltr. B El. 732	1		1	
217	CR Fltr. B El. 732	1		1	

Delete Entire Page

R101

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

Fire Zone	Instrument Location	Minimum Instruments Operable: Ionization	Photoelectric	Thermal	Infrared
218	CR Fltr. A El. 732	1		1	
219	CR Fltr. A El. 732	1		1	
220	Main CR El. 732	25			
221	Technical Support Center, El. 732	5			
222	Technical Support Center, El. 732	5			
225	Relay Bd. Rm. El. 732	13			
226	Electric Cont. Bds. El. 732	11			
227	Oper. Living Area El. 732	7		1	
228	Oper. Living Area El. 732			8	
229	Main Cont. Bds. El. 732	9			
230	Aux. CR Bds. L-4A, 4C, 11A & 10, El. 734	9			
233	Ctrl. Rod Dr. Eqpt. Rm. El. 759	4			
234	Ctrl. Rod Dr. Eqpt. Rm. El. 759	4			
235	Ctrl. Rod Dr. Eqpt. Rm. El. 759	4			
236	Ctrl. Rod Dr. Eqpt. Rm. El. 759	4			
237	Mech. Eqpt. Rm. El. 749	1			
238	Mech. Eqpt. Rm. El. 749	1			
239	Mech. Eqpt. Rm. El. 749	2			
240	Mech. Eqpt. Rm. El. 749	2			
241	480-V XFMR Rm. 1A El. 749	3			
242	480-V XFMR Rm. 1A El. 749	3			
243	480-V XFMR Rm. 1B El. 749	3			
244	480-V XFMR Rm. 1B El. 749	3			
245	480-V xfmr Rm. 2A El. 749	3			
246	480-V xfmr Rm. 2A El. 749	3			
247	480-V xfmr Rm. 2B El. 749	3			
248	480-V xfmr Rm. 2B El. 749	3			
249	125-V Batt. Rm. I El. 749	1			
250	125-V Batt. Rm. I El. 749	1			
251	125-V Batt. Rm. II El. 749	1			
252	125-V Batt. Rm. II El. 749	1			
253	125-V Batt. Rm. III El. 749	1			
254	125-V Batt. Rm. III El. 749	1			

Delete Entire Page

R101

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

Fire Zone	Instrument Location	Minimum Instruments Operable Ionization	Photoelectric	Thermal	Infrared
255	125-V Batt. Rm. IV El. 749	1			
256	125-V Batt. Rm. IV El. 749	1			
257	480-V Bd. Rm. 1B El. 749	4			
258	480-V Bd. Rm. 1B El. 749	4			
259	480-V Bd. Rm. 1A El. 749	4			
260	480-V Bd. Rm. 1A El. 749	4			
261	480-V Bd. Rm. 2A El. 749	4			
262	480-V Bd. Rm. 2A El. 749	4			
263	480-V Bd. Rm. 2B El. 749	4			
264	480-V Bd. Rm. 2B El. 749	4			
267	Aux. Instr. Rm. El. 685	8			
268	Aux. Instr. Rm. El. 685			9	
269	Computer Rm. El. 685	4			
270	Computer Rm. El. 685			4	
271	Aux. Instr. Rm. El. 685	8			
272	Aux. Instr. Rm. El. 685			9	
273	Computer Rm. Corridor	3			
276	Intk. Pumping Sta. El 690 & 670.5	15			
277	ERCW Pump Sta. El. 704	21		8	
296	Aux. CR Bds. L-4B, 4D, & 11B, El. 734	6			
297	Main Cont. Bds.	9			
298	Common Main CR Bds. El 732	9			
330	Reactor Building Annulus		3		
331	Reactor Building Annulus		4		
352	Lwr. Compt. Coolers, El. 693		4		
354	Upr. Compt. Coolers, El. 778		4		
356	RCP 2, El. 693			2	
357	RCP 2, El. 693			2	
360	RCP 1, El. 693			2	
361	RCP 1, El. 693			2	
364	RCP 3, El. 693			2	
365	RCP 3, El. 693			2	
368	RCP 4, El. 693			2	

Delete Entire Page

R101

R11

R101

TABLE 3.3 (Continued)

FIRE DETECTION INSTRUMENTS

Fire Zone	Instrument Location	Minimum Instruments Operable: Ionization	Photoelectric	Thermal	Infrared
369	RCP 4, El. 693			2	
372	Reactor Bldg. Annulus		22		
373	Reactor Bldg. Annulus		21		
387	Turbine Cont. Bldg. Wall, El. 706			18	
427	125V Batt. Rm. V El. 749	2			
428	125V Batt. Rm. V El. 749	2			
458	Counting Room Ceiling El. 690	2			
462	480V Sd Bd Rm. 1B2 El. 734			1	
463	480V Sd Bd Rm. 2A2 El. 734			1	
465	Counting Room Ceiling El. 690	2			
466	480V Sd Bd Rm. 1B2 El. 734			1	
467	480V Sd Bd Rm. 1B2 El. 734			1	
468	480V Sd Bd Rm. 1B2 El. 734			1	
469	480V Sd Bd Rm. 2A2 El. 734			1	
470	480V Sd Bd Rm. 2A2 El. 734			1	
471	480V Sd Bd Rm. 2A2 El. 734			1	

R101

R113

R101

Delete Entire Page

Deleted

3/4.7.11 FIRE SUPPRESSION SYSTEMS

FIRE SUPPRESSION WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.11.1 The fire suppression water system shall be OPERABLE with:

a. Two fire suppression pumps, each with a capacity of 1653 gpm, with their discharge aligned to the fire suppression header, R70

b. An OPERABLE flow path capable of taking suction from the forebay and transferring the water through distribution piping with OPERABLE sectionalizing control or isolation valves up to the first valve off the loop header that isolate: R190

1. Spray and/or Sprinkler System(s) required to be OPERABLE per Specification 3.7.11.2 or

2. Hose standpipe(s) required to be OPERABLE per Specification 3.7.11.4.

APPLICABILITY: At all times.

ACTION:

a. With only one pump OPERABLE, restore the inoperable equipment to OPERABLE status within 7 days or, in lieu of any other report required by Specification 6.6.1, prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within the next 30 days outlining the plans and procedures to be used to restore the inoperable equipment to OPERABLE status or to provide an alternate backup pump or supply. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable. R40

b. With the fire suppression water system otherwise inoperable (the provisions of Specification 3.0.4 are not applicable): R190

1. Establish a backup fire suppression water system within 24 hours, and

2. In lieu of any other report required by Specification 6.6.1, submit a Special Report in accordance with Specification 6.9.2: R40

a) By telephone within 24 hours,

b) Confirmed by telegraph, mailgram or facsimile transmission no later than the first working day following the event, and

Delete Entire Page

ACTION: (Continued)

c) In writing within 14 days following the event, outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status.

SURVEILLANCE REQUIREMENTS

4.7.11.1 The fire suppression water system shall be demonstrated OPERABLE:

a. At least once per 31 days on a STAGGERED TEST BASIS by starting each electric motor driven pump and operating it for at least 15 minutes on recirculation flow.

b. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path is in its correct position.

* c. At least once per 6 months by performance of a system flush. R17

d. At least once per 12 months by cycling each testable valve in the flow path through at least one complete cycle of full travel.

e. At least once per 18 months by performing a system functional test which includes simulated automatic actuation of the system throughout its operating sequence, and:

1. Verifying that each automatic valve in the flow path actuates to its correct position,
2. Verifying that each pump develops at least 1653 gpm at a system head of 338 feet, R70
3. Cycling each valve in the flow path that is not testable during plant operation through at least one complete cycle of full travel, and
4. Verifying that the No. 1 fire pump starts to maintain the fire suppression water system pressure greater than or equal to 125 psig and that the No. 2 fire pump also starts automatically within 10 ± 2 seconds when the fire suppression water system is not maintained greater than or equal to 125 psig by the No. 1 pump.

f. At least once per 3 years by performing a flow test of the system in accordance with Chapter 5, Section 11 of the Fire Protection Handbook, 14th Edition, published by the National Fire Protection Association.

*Note: These flushes should coincide with the chlorination of the raw service and fire suppression water system. These flushes should be run, one between April 1 and June 30, and the other between September 1 and November 15. R17

Within the prescribed spring and fall test period, deviation from the six-month performance frequency is authorized.

SPRAY AND/OR SPRINKLER SYSTEMS

Deleted

LIMITING CONDITION FOR OPERATION

3.7.11.2 The following spray and/or sprinkler systems shall be OPERABLE:

a. Reactor Building - RC pump area, Annulus

b. Auxiliary Building - Elev. 669, 690, 706, 714, 734, 749, 759, ABGTS Filters, EGTS Filters, Cont. Purge Filters, and 125V Battery Rooms.

c. Control Building - Elev. 669, Cable Spreading Room, MCR air filters, and operator living area.

d. Diesel Generator Building - Corrider Area.

e. Turbine Building - Control Building Wall.

APPLICABILITY: Whenever equipment protected by the spray/sprinkler system is required to be OPERABLE.

ACTION:

a. With one or more of the above required spray and/or sprinkler systems inoperable, within one hour establish a continuous fire watch with backup fire suppression equipment for those areas in which redundant systems or components could be damaged; for other areas establish an hourly fire watch patrol. For Spray and/or Sprinkler Systems inside Containment which are inoperable as a result of inoperable fire detection instrumentation, a continuous or hourly fire watch is not required when complying with the ACTION requirements of Specification 3.3.3.8. Restore the system to OPERABLE status within 14 days or, in lieu of any other report required by Specification 6.6.1, prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within the next 30 days outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status. R190 R40

b. The provisions of Specification 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.11.2 Each of the above required spray and/or sprinkler systems shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path is in its correct position.

b. At least once per 12 months by cycling each testable valve in the flow path through at least one complete cycle of full travel.

Delete Entire Page

SURVEILLANCE REQUIREMENTS (Continued)

c. At least once per 18 months:

1. By performing a system functional test which includes simulated automatic actuation of the system, and:

   a) Verifying that the automatic valves in the flow path actuate to their correct positions on a cross zone or single zone detection test signal as designed, and

   b) Cycling each valve in the flow path that is not testable during plant operation through at least one complete cycle of full travel.

2. By visual inspection of the dry pipe, spray and sprinkler headers to verify their integrity, and

3. By visual inspection of each nozzle's spray area to verify the spray pattern is not obstructed.

MAR 25 1982

CO_2 SYSTEMS

Deleted

LIMITING CONDITION FOR OPERATION

3.7.11.3 The following low pressure CO_2 systems shall be OPERABLE.

a. Computer Room.

b. Auxiliary Instrument Room.

c. Diesel Generator Rooms.

d. Fuel Oil Pump Rooms.

e. Diesel Generator Building Electrical Board Rooms. R100

APPLICABILITY: Whenever equipment protected by the CO_2 systems is required to be OPERABLE.

ACTION:

a. With one or more of the above required CO_2 systems inoperable, within one hour establish a continuous fire watch with backup fire suppression equipment for those areas in which redundant systems or components could be damaged; for other areas, establish an hourly fire watch patrol. Restore the system to OPERABLE status within 14 days or, in lieu of any other report required by Specification 6.6.1, prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within the next 30 days outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status. R40

b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.11.3.1 Each of the above required CO_2 systems shall be demonstrated OPERABLE at least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path is in its correct position.

Delete Entire Page

SURVEILLANCE REQUIREMENTS (Continued)

4.7.11.3.2 Each of the above required low pressure CO_2 systems shall be demonstrated OPERABLE:

a. At least once per 7 days by verifying the CO_2 storage tank level to be greater than 50% and pressure to be greater than 270 psig, and

b At least once per 18 months by verifying:

1. The system valves and associated ventilation dampers and fire door release mechanisms actuate manually and automatically, upon receipt of a simulated actuation signal, and

2. Flow from each nozzle during a "Puff Test."

MAR 25 1982

FIRE HOSE STATIONS

Deleted

LIMITING CONDITION FOR OPERATION

3.7.11.4 The fire hose stations shown in Table 3.7-5 shall be OPERABLE.

APPLICABILITY: Whenever equipment in the areas protected by the fire hose stations is required to be OPERABLE.

ACTION:

a. With one or more of the fire hose stations shown in Table 3.7-5 inoperable, route an additional equivalent capacity fire hose to the unprotected area(s) from an OPERABLE hose station within 1 hour if the inoperable fire hose is the primary means of fire suppression; otherwise route the additional hose within 24 hours. Restore the fire hose station to OPERABLE status within 14 days or, in lieu of any other report required by Specification 6.6.1, prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within the next 30 days outlining the action taken, the cause of the inoperability, and the plans and schedule for restoring the station to OPERABLE status.

b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.11.4 Each of the fire hose stations shown in Table 3.7-5 shall be demonstrated OPERABLE: R147

a. At least once per 31 days by visual inspection of the stations accessible during plant operations to assure all required equipment is at the station.

b. At least once per 18 months by:

1. Visual inspection of the stations not accessible during plant operations to assure all required equipment is at the station,

2. Removing the hose for inspection and re-racking, and

3. Inspecting all gaskets and replacing any degraded gaskets in the couplings.

c. At least once per 3 years by:

1. Partially opening each hose station valve to verify valve OPERABILITY and no flow blockage.

2. Conducting a hose hydrostatic test at a pressure of 150 psig or at least 50 psig above maximum fire main operating pressure, whichever is greater.

Delete Entire Page

R17

TABLE 3.7-5

FIRE HOSE STATIONS

LOCATION	ELEVATION	HOSE RACK#
a. Reactor Building - Annulus Area		
Platform	778.5	1-26-1196
Platform	778.5	1-26-1197
Platform	778.5	1-26-1198
Platform	778.5	1-26-1199
Platform	759.5	1-26-1200
Platform	759.5	1-26-1201
Platform	759.5	1-26-1202
Platform	759.5	1-26-1203
Platform	740.5	1-26-1204
Platform	740.5	1-26-1205
Platform	740.5	1-26-1206
Platform	740.5	1-26-1207
Platform	721.5	1-26-1208
Platform	721.5	1-26-1209
Platform	721.5	1-26-1210
Platform	721.5	1-26-1211
Platform	701.5	1-26-1212
Platform	701.5	1-26-1213
Platform	701.5	1-26-1214
Platform	701.5	1-26-1215
Platform	679.78	1-26-1216
Platform	679.78	1-26-1217
Platform	679.78	1-26-1218
Platform	679.78	1-26-1219
b. Reactor Building - RCP & Lower Containment Air Filters Area		
Reactor Building	679.78	1-26-1220
Reactor Building	679.78	1-26-1221
Reactor Building	679.78	1-26-1222
Reactor Building	679.78	1-26-1223
Reactor Building	679.78	1-26-1224
Reactor Building	679.78	1-26-1225
c. Control Building		
Control Building	732	0-26-1186
Control Building	732	0-26-1191
Control Building	706	0-26-1187
Control Building	706	0-26-1192

MAY 4 1982

Delete Entire Page

TABLE 3.7-5 (Continued) R17

FIRE HOSE STATIONS

LOCATION	ELEVATION		HOSE RACK#
Control Building	685		0-26-1188
Control Building	685		0-26-1193
Control Building	669		0-26-1189
Control Building	669		0-26-1194
d. Diesel Generator Building			
Corridor	722		0-26-1077
Corridor	740.5		0-26-1080
Air Exhaust Rm.	740.5		0-26-1082
Lube Oil Storage Room 722.0-2	722		0-26-2337 R147
e. Additional Equipment Building - Unit 1			
South Wall	740.5		1-26-687
South Wall	706		1-26-686
f. Auxiliary Building			
	759		1-26-669
	749		2-26-664
	749		1-26-664
	734		2-26-670
	734		0-26-684
	734		1-26-670
	734		0-26-682
	734	Siamese Outlet	1-26-671
	734		1-26-672
	734		1-26-665
	714		0-26-660
	714		1-26-666
	714		0-26-677
	706		0-26-658
	690		0-26-690
	690		0-26-661
	690	Siamese Outlet	1-26-674
	690		1-26-675
	690		1-26-667
	669		1-26-668
	669		0-26-662
	669		0-26-680
	653		0-26-663
	653		0-26-691

Delete Entire Page

R17

TABLE 3.7-5 (Continued)

FIRE HOSE STATIONS

LOCATION	ELEVATION	HOSE RACK#
g. CCW Intake Pumping Station		
	690	0-26-866
	690	0-26-867
	690	0-26-868
	690	0-26-869
	690	0-26-870
h. ERCW Pumping Station		
	688	0-26-927
	688	0-26-926
	688	0-26-930
	704	0-26-931
	704	0-26-925
	704	0-26-928
	720	0-26-929
	720	0-26-924
	720	0-26-932

MAY 4 1982

3/4.7.12 FIRE BARRIER PENETRATIONS

Deleted

LIMITING CONDITION FOR OPERATION

3.7.12 All fire barrier penetrations (including cable penetration barriers, firedoors and fire dampers) in fire zone boundaries protecting safety related areas shall be functional.

APPLICABILITY: At all times.

ACTION:

a. With one or more of the above required fire barrier penetrations non-functional, within one hour either, establish a continuous fire watch on at least one side of the affected penetration, or verify the OPERABILITY of fire detectors on at least one side of the non-functional fire barrier and establish a hourly fire watch patrol. Restore the non-functional fire barrier penetration(s) to functional status within 7 days or, in lieu of any other report required by Specification 6.6.1, prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within the next 30 days outlining the action taken, the cause of the non-functional penetration and plans and schedule for restoring the fire barrier penetration(s) to functional status. R40

b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.12 Each of the above required fire barrier penetrations shall be verified to be functional:

a. At least once per 18 months by a visual inspection

b. Prior to returning a fire barrier penetration to functional status following repairs or maintenance by performance of a visual inspection of the affected fire barrier penetration(s).

This Specification is deleted

3/4.3.3.8 FIRE DETECTION INSTRUMENTATION

OPERABILITY of the fire detection instrumentation ensures that adequate warning capability is available for the prompt detection of fires. This capability is required in order to detect and locate fires in their early stages. Prompt detection of fires will reduce the potential for damage to safety related equipment and is an integral element in the overall facility fire protection program.

In the event that a portion of the fire detection instrumentation is inoperable, the establishment of frequent fire patrols in the affected areas is required to provide detection capability until the inoperable instrumentation is restored to OPERABILITY.

All hourly fire watch patrols require that a trained individual be in the specified area at intervals of 60 minutes with a margin of 15 minutes. BR-3

3/4.3.3.9

This Specification is deleted. R152

3/4.3.3.10 EXPLOSIVE GAS MONITORING INSTRUMENTATION

This instrumentation includes provisions for monitoring the concentrations of potentially explosive gas mixtures in the waste gas holdup system. The OPERABILITY and use of this instrumentation is consistent with the requirements for monitoring potentially explosive gas mixtures.

SNUBBERS (Continued)

location, etc.), and the recommendations of Regulatory Guide 8.8 and 8.10. The addition or deletion of any hydraulic or mechanical snubber shall be made in accordance with Section 50.59 of 10 CFR Part 50. R43

3/4.7.10 SEALED SOURCE CONTAMINATION

The limitations on removable contamination for sources requiring leak testing, including alpha emitters, is based on 10 CFR 70.39(c) limits for plutonium. This limitation will ensure that leakage from byproduct, source, and special nuclear material sources will not exceed allowable intake values. Sealed sources are classified into three groups according to their use, with surveillance requirements commensurate with the probability of damage to a source in that group. Those sources which are frequently handled are required to be tested more often than those which are not. Sealed sources which are continuously enclosed within a shielded mechanism (i.e., sealed sources within radiation monitoring or boron measuring devices) are considered to be stored and need not be tested unless they are removed from the shielded mechanism.

3/4.7.11 FIRE SUPPRESSION SYSTEMS (This Specification is deleted)

The OPERABILITY of the fire suppression systems ensures that adequate fire suppression capability is available to confine and extinquish fires occuring in any portion of the facility where safety related equipment is located. The fire suppression system consists of the water system, spray and/or sprinklers, CO_2, and fire hose stations. The collective capability of the fire suppression systems is adequate to minimize potential damage to safety related equipment and is a major element in the facility fire protection program.

In the event that portions of the fire suppression systems are inoperable, alternate backup fire fighting equipment is required to be made available in the affected areas until the inoperable equipment is restored to service. When the inoperable fire fighting equipment is intended for use as a backup means of fire suppression, a longer period of time is allowed to provide an alternate means of fire fighting than if the inoperable equipment is the primary means of fire suppression.

The surveillance requirements provide assurance that the minimum OPERABILITY requirements of the fire suppression systems are met.

In the event the fire suppression water system becomes inoperable, immediate corrective measures must be taken since this system provides the major fire suppression capability of the plant. The requirement for a twenty-four hour report to the Commission provides for prompt evaluation of the acceptability of the corrective measures to provide adequate fire suppression capability for the continued protection of the nuclear plant.

3/4.7.11 FIRE SUPPRESSION SYSTEMS (Continued)

All hourly fire watch patrols require that a trained individual be in the specified area at intervals of 60 minutes with a margin of 15 minutes.

A continuous fire watch requires that a trained individual be in the specified area at all times, that the specified area contain no impediment to restrict the movements of the continuous fire watch, and that each compartment within the specified area is patrolled at least once every 15 minutes with a margin of 5 minutes. BR-3

A specified area for a continuous fire watch is one or more fire zones within a single fire area, which are easily accessible to each other and can be patrolled within 15 minutes. Easy access is defined as: no locked doors or inoperable card reader, no C-Zone entry required, or no hazards that will interfere with the continuous fire watch activity being performed within the 15-minute period.

3/4.7.12 FIRE BARRIER PENETRATIONS

This Specification is deleted

The functional integrity of the fire barrier penetrations ensures that fires will be confined or adequately retarded from spreading to adjacent portions of the facility. This design feature minimizes the possibility of a single fire rapidly involving several areas of the facility prior to detection and extinguishment. The fire barrier penetrations are a passive element in the facility fire protection program and are subject to periodic inspections.

Fire barrier penetrations, including cable penetration barriers, fire doors and dampers are considered functional when the visually observed condition is the same as the as-designed condition. For those fire barrier penetrations that are not in the as-designed condition, an evaluation shall be performed to show that the modification has not degraded the fire rating of the fire barrier penetration.

During periods of time when a barrier is not functional, either, 1) a continuous fire watch is required to be maintained in the vicinity of the affected barrier, or 2) the fire detectors on at least one side of the affected barrier must be verified OPERABLE and a hourly fire watch patrol established, until the barrier is restored to functional status.

All hourly fire watch patrols require that a trained individual be in the specified area at intervals of 60 minutes with a margin of 15 minutes.

A continuous fire watch requires that a trained individual be in the specified area at all times, that the specified area contain no impediment to restrict the movements of the continuous fire watch, and that each compartment within the specified area is patrolled at least once every 15 minutes with a margin of 5 minutes. BR-3

A specified area for a continuous fire watch is one or more fire zones within a single fire area, which are easily accessible to each other and can be patrolled within 15 minutes. Easy access is defined as: no locked doors or inoperable card reader, no C-Zone entry required, or no hazards that will interfere with the continuous fire watch activity being performed within the 15-minute period.

c. A Radiological Control technician# shall be onsite when fuel is in the reactor. R62

d. All CORE ALTERATIONS shall be observed and directly supervised by either a licensed Senior Reactor Operator or Senior Reactor Operator Limited to Fuel Handling who has no other concurrent responsibilities during this operation. FP

Deleted

e. ~~A Fire Brigade of at least 5 members shall be maintained onsite at all times.# The Fire Brigade shall not include the Shift Operations Supervisor and 2 other members of the minimum shift crew necessary for safe shutdown of the unit or any personnel required for other essential functions during a fire emergency.~~ R182 R62

f. The Operations Superintendent shall hold a Senior Reactor Operator license. R160

g. Administrative procedures shall be developed and implemented to limit the working hours of unit staff who perform safety-related functions (i.e., senior reactor operators, reactor operators, assistant unit operators, Radiological Control, and key maintenance personnel).

Adequate shift coverage shall be maintained without routine heavy use of overtime. The objective shall be to have operating personnel work a normal 8-hour day, 40-hour week while the unit is operating. However, in the event that unforseen problems require substantial amounts of overtime to be used, or during extended periods of shutdown for refueling, major maintanance, or major plant modification, on a temporary basis the following guidelines shall be followed: R156

1. An individual should not be permitted to work more than 16 hours straight, excluding shift turnover time.

2. An individual should not be permitted to work more than 16 hours in any 24-hour period, nor more than 24 hours in any 48-hour period, nor more than 72 hours in any 7-day period, all excluding shift turnover time.

3. A break of at least 8 hours should be allowed between work periods, including shift turnover time.

4. Except during extended shutdown periods, the use of overtime should be considered on an individual basis and not for the entire staff on a shift.

Any deviation from the above guidelines shall be authorized in advance by the Plant Manager or his designee, in accordance with approved administrative procedures, or by higher levels of management, in accordance with established procedures and with documentation of the basis for granting the deviation. R182

Controls shall be included in the procedures such that individual overtime shall be reviewed monthly by the Plant Manager or his designee to assure that excessive hours have not been assigned. Routine deviation from the above guidelines is not authorized.

#The Radiological Control technician ~~and fire brigade composition~~ may be offsite ~~less than the minimum requirements~~ for a period of time not to exceed 2 hours in order to accommodate unexpected absence provided immediate action is taken to fill the required positions. R62

(13) Fire Protection ~~system (Section 9.5)~~ R2

INSERT A

a. TVA shall maintain in effect and fully implement all provisions of the approved fire protection plan and the NRC staff's Fire Protection Review in the Sequoyah Safety Evaluation Report and Supplements.

b. TVA shall replace the control room ceiling panels with panels acceptable to NRC by September 30, 1981.

c. TVA shall comply with Section III.G, III.J, III.L and III.O of Appendix R of 10 CFR 50, except where NRC has approved deviations, on a schedule consistent with that required for other operating reactors. By October 1, 1981, TVA shall submit a report that identifies and justifies differences between existing or proposed fire protection features and those features specified in Section III.G, III.J, III.L and III.O of Appendix R to 10 CFR Part 50.

(14) Compliance With Regulatory Guide 1.97

TVA shall implement modifications necessary to comply with Revision 2 of Regulatory Guide 1.97, "Instrumentation for Light Water Cooled Nuclear Power Plants to Assess Plant Conditions During and Following an Accident," dated December 1980 by startup from the Unit 2 Cycle 4 refueling outage. R45

(15) Corrosion of Carbon Steel Piping

TVA shall carry out a surveillance program on corrosion of carbon steel piping in accordance with TVA document SQRD-50-328/81-10 dated August 25, 1981, and procedures for implementation are to be submitted for NRC concurrence by October 15, 1981.

(16) NUREG-0737 Conditions (Section 22.2)

Each of the following conditions shall also be performed to the satisfaction of the NRC: R2

a. Shift Technical Advisor (Section 22.2. I.A.1.1)

TVA shall provide a fully-trained on-shift technical advisor to the shift operations supervisor. R169

b. Independent Safety Engineering Group (Section 22.2. I.B.1.2)

TVA shall have an onsite Independent Safety Engineering Group.

INSERT A

TVA shall implement and maintain in effect all provisions of the approved fire protection program referenced in Sequoyah Nuclear Plant's Final Safety Analysis Report and as approved in NRC Safety Evaluation Reports contained in NUREG-0011, Supplements 1, 2, and 5, NUREG-1232, Volume 2, and NRC letters dated May 29 and October 6, 1986, subject to the following provision:

> TVA may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

Deleted

BASES

This Specification is deleted Table 3.3-11 is also deleted

FIRE DETECTION INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.8 As a minimum, the fire detection instrumentation for each fire detection zone shown in Table 3.3-11 shall be OPERABLE.

APPLICABILITY: Whenever equipment protected by the fire detection instrument is required to be OPERABLE.#

ACTION:

With the number of OPERABLE fire detection instrument(s) less than the minimum number OPERABLE requirement of Table 3.3-11:

a. Within 1 hour establish a fire watch patrol to inspect the zone(s) with the inoperable instrument(s) at least once per hour, unless the instrument(s) is located inside the containment, then inspect the containment at least once per 8 hours or monitor the containment air temperature at least once per hour at the locations listed in Specification 4.6.1.5.

b. Restore the inoperable instrument(s) to OPERABLE status within 14 days or, in lieu of any other report required by Specification 6.6.1, prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within the next 30 days outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the instrument(s) to OPERABLE status. R28

c. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.3.3.8.1 Each of the above required fire detection instruments which are accessible during operation shall be demonstrated OPERABLE at least once per 6 months by performance of a CHANNEL FUNCTIONAL TEST. Fire detection which are not accessible during plant operation shall be demonstrated OPERABLE by the performance of a CHANNEL FUNCTIONAL TEST during each COLD SHUTDOWN exceeding 24 hours unless performed in the previous 6 months.

4.3.3.8.2 The NFPA Standard 72D supervised circuits supervision associated with the detector alarms of each of the above required fire detection instruments shall be demonstrated OPERABLE at least once per 6 months.

4.3.3.8.3 The non-supervised circuits between the local fire protection panels and actuated equipment shall be demonstrated OPERABLE at least once per 6 months.

#The fire detection instruments located within the containment are not required to be OPERABLE during the performance of Type A Containment Leakage Rate Tests.

TABLE 3.3-11

FIRE DETECTION INSTRUMENTS

FIRE ZONE	INSTRUMENT LOCATION	MINIMUM INSTRUMENTS OPERABLE Ionization	Photoelectric	Thermal	Infrared
1	Diesel Gen. Rm. 2B-B, El. 722			5	
2	Diesel Gen. Rm. 2B-B, El. 722			5	
3	Diesel Gen. Rm. 1B-B, El. 722			5	
4	Diesel Gen. Rm. 1B-B, El. 722			5	
5	Diesel Gen. Rm. 2A-A, El. 722			5	
6	Diesel Gen. Rm. 2A-A, El. 722			5	
7	Diesel Gen. Rm. 1A-A, El. 722			5	
8	Diesel Gen. Rm. 1A-A, El. 722			5	
9	Lube Oil Storage Rm. El. 722			1	
10	Lube Oil Storage Rm. El. 722			1	
11	Fuel Oil Transfer Rm. El. 722			1	
12	Fuel Oil Transfer Rm. El. 722			1	
13	Diesel Gen. Corridor, El. 722			6	
14	Air Intake & Exhaust Rm. 2B, El. 740.5			9	
15	Air Intake & Exhaust Rm. 1B, El. 740.5			9	
16	Air Intake & Exhaust Rm. 2A, El. 740.5			9	
17	Air Intake & Exhaust Rm. 1A, El. 740.5			9	
18	Diesel Gen. 2B-B Relay Bd. El. 722	3			
19	Diesel Gen. 1B-B Relay Bd. El. 722	3			
20	Diesel Gen. 2A-A Relay Bd. El. 722	3			
21	Diesel Gen. 1A-A Relay Bd. El. 722	3			
22	Diesel Gen. Bd. Rm. 2B-B, El. 740.5	2			
23	Diesel Gen. Bd. Rm. 2B-B, El. 740.5			2	
24	Diesel Gen. Bd. Rm. 1B-B, El. 740.5	2			
25	Diesel Gen. Bd. Rm. 1B-B, El. 740.5			2	
26	Diesel Gen. Bd. Rm. 2A-A, El. 740.5	2			
27	Diesel Gen. Bd. Rm. 2A-A, El. 740.5			2	
28	Diesel Gen. Bd. Rm. 1A-A, El. 740.5	2			
29	Diesel Gen. Bd. Rm. 1A-A, El. 740.5			2	

Delete Entire Page

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

FIRE ZONE	INSTRUMENT LOCATION	MINIMUM INSTRUMENTS OPERABLE Ionization	Photoelectric	Thermal	Infrared
30	Cable Spreading Rm. C7-C11, El. 706	14			
31	Cable Spreading Rm. C7-C11, El. 706	14			
32	Cable Spreading Rm. C7-C11, El. 706	14			
33	Cable Spreading Rm. C7-C11, El. 706	14			
34	Cable Spreading Rm. C3-C7, El. 706	14			
35	Cable Spreading Rm. C3-C7, El. 706	14			
41	Cont. Spray Pump 2A-A El. 653	2			
42	Cont. Spray Pump 2B-B El. 653	2			
45	RHR Pump 2A-A El. 653	2			
46	RHR Pump 2B-B El. 653	2			
47	Aux. Bldg. Corridor, El. 653	10			
48	Corridor, Control Bldg. El. 669	4			
49	Corridor, Control Bldg. El. 669	4			
50	Mech. Equip. Rm. Col. C1, El. 669	2			
51	Mech. Equip. Rm. Col. C1, El. 669			2	
52	Mech. Equip. Rm. Col. C3, El. 669	2			
53	Mech. Equip. Rm. Col. C3, El. 669			2	
54	250-V Batt. Rm. 1, El. 669	3			
55	250-V Batt. Rm. 1, El. 669			3	
56	250-V Batt. Bd. Rm. 1, El. 669	2			
57	250-V Batt. Bd. Rm. 1, El. 669	2			
58	250-V Batt. Bd. Rm. 2, El. 669	2			
59	250-V Batt. Bd. Rm. 2, El. 669	2			
60	250-V Batt. Rm. 2, El. 669	3			
61	250-V Batt. Rm. 2, El. 669			3	
62	24-V & 48-V Batt. Rm. El. 669	3			
63	24-V & 48-V Batt. Rm. El. 669			3	
64	24-V & 48-V Batt. Bd. Rm. El. 669	2			
65	24-V & 48-V Batt. Bd. Rm. El. 669	2			
66	Communications Rm. El. 669	4			
67	Communications Rm. El. 669	4			
68	Mech. Equip. Rm. El. 669	2			
69	Mech. Equip. Rm. El. 669			2	
70	Aux. Bldg. A5-A11, Col. W-X, El. 669	5			
71	Aux. Bldg. A5-A11, Col. W-X, El. 669	5			

Delete Entire Page

R86

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

FIRE ZONE	INSTRUMENT LOCATION	MINIMUM INSTRUMENTS OPERABLE Ionization	Photoelectric	Thermal	Infrared
74	Aux. FWPT 2A-S, El. 669	1			
75	Aux. FWPT 2A-S, El. 669			1	
82	SI & Chrg Pmp Rms. El 669			5	
83	SI Pump Rm. 2A, El. 669	1			
84	SI Pump Rm. 2B, El. 669	1			
85	Chrg. Pump Rm. 2A, El. 669	1			
86	Chrg. Pump Rm. 2B, El. 669	1			
87	Chrg. Pump Rm. 2C, El. 669	1			
88	Aux. Bldg. Corridor A1-A8, El. 669	8			
89	Aux. Bldg. Corridor A1-A8, El. 669	8			
90	Aux. Bldg. Corridor A8-A15, El. 669	8			
91	Aux. Bldg. Corridor A8-A15, El. 669	8			
92	Aux. Bldg. Corridor Col. U-W, El. 669	4			
93	Aux. Bldg. Corridor Col. V-W, El. 669	4			
96	Valve Galley, Elev. 669	2			
97	Valve Galley, Elev. 669	2			
100	Cont. Purge Air Filter, El. 690		2	2	
101	Cont. Purge Air Filter, El. 690		2	2	
104	Pipe Galley, El. 690	4			
105	Pipe Galley, El. 690	4			
106	Aux. Bldg., El. 690	8			
107	Aux. Bldg., El. 690	8			
108	Radio Chemical Lab. Area, El. 690	3			
109	Radio Chemical Lab. Area, El. 690	3			
110	Aux. Bldg. A1-A8, Col. Q-U, El. 690	10			
111	Aux. Bldg. A1-A8, Col. Q-U, El. 690	10			
112	Aux. Bldg. A8-A15, Col. Q-U, El. 690	9			
113	Aux. Bldg. A8-A15, Col. Q-U, El. 690	9			
114	Waste Pkg. Area, El. 706	3			
115	Waste Pkg. Area, El. 706	3			
116	Cask Loading Area, El. 706	2			
117	Cask Loading Area, El. 706	2			

Delete Entire Page

R86

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

FIRE ZONE	INSTRUMENT LOCATION	MINIMUM INSTRUMENTS OPERABLE Ionization	Photoelectric	Thermal	Infrared
118	New Fuel Storage Area, El. 706	2			
119	New Fuel Storage Area. El. 706	2			
120	ABGTS Filter, El. 714		1	1	
121	ABGTS Filter, El. 714		1	1	
122	Add. Eqpt. Bldg., El. 706 & 717.5	6			
124	Add. Equip. Bldg. El. 706	6			
126	ABGTS Rm., El. 714	2			
127	ABGTS Rm., El. 714	2			
128	ABGTS Rm., El. 714	2			
129	ABGTS Rm., El. 714	2			
130	Vent. & Purge Air Rm., El. 714	3			
131	Vent. & Purge Air Rm., El. 714	3			
132	Vent. & Purge Air Rm., El. 714	3			
133	Vent. & Purge Air Rm., El. 714	3			
134	Aux. Bldg. A5-A11, Col. U-W, El. 714	7			
135	Aux. Bldg. A5-A11, Col. V-W, El. 714	7			
136	Heat. & Vent. Rm., El. 714	4			
137	Heat. & Vent. Rm., El. 714	4			
138	Heat. & Vent. Rm., El. 714	4			
139	Heat. & Vent. Rm., El. 714	4			
140	Above Hot Instr. Rm., El. 714	1			
141	Above Hot Instr. Rm., El. 714	1			
142	Aux. Bldg. A1-A8, Col. Q-U, El. 714	12			
143	Aux. Bldg. A1-A8, Col. Q-U, El. 714	12			
144	Aux. Bldg. A8-A15, Col. Q-U, El. 714	9			
145	Aux. Bldg. A8-A15, Col. Q-U, El. 714	9			
146	N_2 Storage Area, El. 706	4			
147	ABGTS Filter, El. 714		1	1	
148	ABGTS Filter, El. 714		1	1	
149	Cable Spreading Rm. C3-C7, El. 706	15			
150	Cable Spreading Rm. C3-C7, El. 706	15			
151	VCT Room 2A, El. 690	1	1		
152	VCT Room 2A, El. 690	1	1		

Delete Entire Page

R86

R137

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

FIRE ZONE	INSTRUMENT LOCATION	MINIMUM INSTRUMENTS OPERABLE Ionization	Photoelectric	Thermal	Infrared
153	Add. Equip. Bldg., El. 740.5	4			
154	Add. Equip. Bldg., El. 740.5	6			
155	Refuel Rm. El. 734	19			
158	RB Access Rm. El. 734	2			
159	RB Access Rm. El. 734	2			
160	SG Blwdn. Rm. El. 734	4			
161	SG Blwdn. Rm. El. 734	4			
162	EGTS Rm. El. 734	3			
163	EGTS Rm. El. 734	3			
164	EGTS Filter A, El. 734		1	2	
165	EGTS Filter A, El. 734		1	2	
166	EGTS Filter B, El. 734		1	2	
167	EGTS Filter B, El. 734		1	2	
172	Mech. Equip. Rm., El. 734	1			
173	Mech. Equip. Rm., El. 734	1			
174	Mech. Eqpt. Rm. El. 734	1			
175	Mech. Eqpt. Rm. El.734	1			
176	480-V SD Bd. Rm. 1A1, El. 734	2			
177	480-V SD Bd. Rm. 1A1, El. 734	2			
178	480-V SD Bd. Rm. 1A2, El. 734	2			
179	480-V SD Bd. Rm. 1A2, El. 734	2			
180	480-V SD Bd. Rm. 1B1, El. 734	2			
181	480-V SD Bd. Rm. 1B1 El. 734	2			
182	480-V SD Bd. Rm. 1B2 El. 734	3			
183	480-V SD Bd. Rm. 1B2 El. 734	3			
184	6.9KV SD Bd. Rm. A El. 734	7			
185	6.9KV SD Bd. Rm. A El. 734	7			
186	6.9KV SD Bd. Rm. B El. 734	7			
187	6.9KV SD Bd. Rm. B El. 734	7			
188	480-V SD Bd. Rm. 2A1 El. 734	2			
189	480-V SD Bd. Rm. 2A1 El. 734	2			
190	480-V SD Bd. Rm. 2A2 El. 734	3			
191	480-V SD Bd. Rm. 2A2 El. 734	3			

Delete Entire Page

R86

R173

R86

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

FIRE ZONE	INSTRUMENT LOCATION	MINIMUM INSTRUMENTS OPERABLE Ionization	Photoelectric	Thermal	Infrared
192	480-V SD Bd. Rm. 2B1 El. 734	2			
193	480-V SD Bd. Rm. 2B1 El. 734	2			
194	480-V SD Bd. Rm. 2B2 El. 734	2			
195	480-V SD Bd. Rm. 2B2 El. 734	2			
196	125-V Batt. Bd. Rm. I, El. 734	1			
197	125-V Batt. Bd. Rm. I, El. 734	1			
198	125-V Batt. Bd. Rm. II, El. 734	1			
199	125-V Batt. Bd. Rm. II, El. 734	1			
200	125-V Batt. Bd. Rm. III, El. 734	1			
201	125-V Batt. Bd. Rm. III, El. 734	1			
202	125-V Batt. Bd. Rm. IV, El. 734	1			
203	125-V Batt. Bd. Rm. IV, El. 734	1			
204	Aux. CR El. 734	2			
205	Aux. CR El. 734	2			
206	Aux. CR Inst. Rm. 1A, El. 734	1			
207	Aux. CR Inst. Rm. 1A, El. 734	1			
208	Aux. CR Inst. Rm. 1B, El. 734	1			
209	Aux. CR Inst. Rm. 1B, El. 734	1			
210	Aux. CR Inst. Rm. 2A, El. 734	1			
211	Aux. CR Inst. Rm. 2A, El. 734	1			
212	Aux. CR Inst. Rm. 2B, El. 734	1			
213	Aux. CR Inst. Rm. 2B, El. 734	1			
214	Mech. Equip. Rm., El. 732	5			
215	Mech. Equip. Rm., El. 732	5			
216	CR Filter B, El. 732	1		1	
217	CR Filter B, El. 732	1		1	
218	CR Filter A, El. 732	1		1	
219	CR Filter A, El. 732	1		1	
220	Main CR, El. 732	25			
221	Technical Support Center, El. 732	5			
222	Technical Support Center, El. 732	5			
225	Relay Bd. Rm. El. 732	13			
226	Elec. Cont. Bds. El. 732	11			

Delete Entire Page

R86

R86

R86

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

FIRE ZONE	INSTRUMENT LOCATION	MINIMUM INSTRUMENTS OPERABLE Ionization	Photoelectric	Thermal	Infrared
227	Operator Living Area, El. 732	7		1	
228	Operator Living Area, El. 732			8	
229	Main CR Bds., El. 732	9			
230	Aux. CR Bds. L-4A, 4C, 11A & 10, El. 734	9			
233	CRDM Eqpt. Rm., El. 759	4			
234	CRDM Eqpt. Rm., El. 759	4			
235	CRDM Equip. Rm., El. 759	4			
236	CRDM Equip. Rm., El. 759	4			
237	Mech. Eqpt. Rm., El. 749	1			
238	Mech. Eqpt. Rm., El. 749	1			
239	Mech. Eqpt. Rm., El. 749	2			
240	Mech. Eqpt. Rm., El. 749	2			
241	480-V XFMR Rm. 1A, El. 749	3			
242	480-V XFMR Rm. 1A, El. 749	3			
243	480-V XFMR Rm. 1B, El. 749	3			
244	480-V XFMR Rm. 1B, El. 749	3			
245	480-V XFMR Rm. 2A, El. 749	3			
246	480-V XFMR Rm. 2A, El. 749	3			
247	480-V XFMR Rm. 2B, El. 749	3			
248	480-V XFMR Rm. 2B, El. 749	3			
249	125-V Batt. Rm. I, El. 749	1			
250	125-V Batt. Rm. I, El. 749	1			
251	125-V Batt. Rm. II, El. 749	1			
252	125-V Batt. Rm. II, El. 749	1			
253	125-V Batt. Rm. III, El. 749	1			
254	125-V Batt. Rm. III, El. 749	1			
255	125-V Batt. Rm. IV, El. 749	1			
256	125-V Batt. Rm. IV, El. 749	1			
257	480-V Bd. Rm. 1B, El. 749	4			
258	480-V Bd. Rm. 1B, El. 749	4			
259	480-V Bd. Rm. 1A, El. 749	4			
260	480-V Bd. Rm. 1A, El. 749	4			
261	480-V Bd. Rm. 2A, El. 749	4			

Delete Entire Page

R86

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

FIRE ZONE	INSTRUMENT LOCATION	MINIMUM INSTRUMENTS OPERABLE Ionization	Photoelectric	Thermal	Infrared
262	480-V Bd. Rm. 2A, El. 749	4			
263	480-V Bd. Rm. 2B, El. 749	4			
264	480-V Bd. Rm. 2B, El. 749	4			
267	Aux. Inst. Rm., El. 685	8			
268	Aux. Inst. Rm., El. 685			9	
269	Computer Rm. El. 685	4			
270	Computer Rm. El. 685			4	
271	Aux. Inst. Rm. El. 685	8			
272	Aux. Inst. Rm. El. 685			9	
273	Computer Rm. Corridor, El. 685	3			
276	Intake Pump Sta. El. 690 & 670.5	15			
277	ERCW Pump Sta. El. 704	21		8	
296	Aux. CR Bds. L-4B, 4D, & 11B El. 734	6			
297	Main CR Bds. El. 732	9			
298	Common MCR Bds. El. 732	9			
332	Reactor Building Annulus		3		
333	Reactor Building Annulus		4		
353	Lwr. Compt. Coolers, El. 693		4		
355	Upr. Compt. Coolers, El. 778		4		
358	RCP 2 El. 693			2	
359	RCP 2 El. 693			2	
362	RCP 1 El. 693			2	
363	RCP 1 El. 693			2	
366	RCP 3 El. 693			2	
367	RCP 3 El. 693			2	
370	RCP 4 El. 693			2	
371	RCP 4 El. 693			2	
374	Reactor Building Annulus		20		
375	Reactor Building Annulus		19		
387	Turbine Cont. Bldg. Wall, El. 706			18	
427	125-V Batt. Rm. V, El. 749	2			
428	125-V Batt. Rm. V, El. 749	2			

R86

Delete Entire Page

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

FIRE ZONE	INSTRUMENT LOCATION	MINIMUM INSTRUMENTS OPERABLE Ionization	Photoelectric	Thermal	Infrared
458	Counting Room Ceiling, El. 690	2			
462	480V Sd Bd Rm 1B2, El. 734			1	
463	480V Sd Bd Rm 2A2, El. 734			1	
465	Counting Room Ceiling, El. 690	2			
466	480V Sd Bd Rm 1B2, El. 734			1	
467	480V Sd Bd Rm 1B2, El. 734			1	
468	480V Sd Bd Rm 1B2, El. 734			1	
469	480V Sd Bd Rm 2A2, El. 734			1	
470	480V Sd Bd Rm 2A2, El. 734			1	
471	480V Sd Bd Rm 2A2, El. 734			1	

R86

Delete Entire Page

PLANT SYSTEMS

3/4.7.11 FIRE SUPPRESSION SYSTEMS

FIRE SUPPRESSION WATER SYSTEM

Deleted

LIMITING CONDITION FOR OPERATION

3.7.11.1 The fire suppression water system shall be OPERABLE with:

a. Two fire suppression pumps, each with a capacity of 1653 gpm, with their discharge aligned to the fire suppression header, and R58

b. An OPERABLE flow path capable of taking suction from the forebay and transferring the water through distribution piping with OPERABLE sectionalizing control or isolation valves up to the first valve off the loop header that isolate: R178

1. Spray and/or Sprinkler System(s) required to be OPERABLE per Specification 3.7.11.2 or

2. Hose standpipe(s) required to be OPERABLE per Specification 3.7.11.4.

APPLICABILITY: At all times.

ACTION:

a. With only one pump OPERABLE, restore the inoperable equipment to OPERABLE status within 7 days or, in lieu of any other report required by Specification 6.6.1, prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within the next 30 days outlining the plans and procedures to be used to restore the inoperable equipment to OPERABLE status or to provide an alternate backup pump or supply. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable. R28

b. With the fire suppression water system otherwise inoperable (the provisions of Specification 3.0.4 are not applicable): R178

1. Establish a backup fire suppression water system within 24 hours, and

2. In lieu of any other report required by Specification 6.6.1, submit a Special Report in accordance with Specification 6.9.2:

a) By telephone within 24 hours,

b) Confirmed by telegraph, mailgram or facsimile transmission no later than the first working day following the event, and

Delete Entire Page

ACTION: (Continued)

c) In writing within 14 days following the event, outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status.

SURVEILLANCE REQUIREMENTS

4.7.11.1 The fire suppression water system shall be demonstrated OPERABLE:

a. At least once per 31 days on a STAGGERED TEST BASIS by starting each electric motor driven pump and operating it for at least 15 minutes on recirculation flow.

b. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path is in its correct position.

* c. At least once per 6 months by performance of a system flush. R4

d. At least once per 12 months by cycling each testable valve in the flow path through at least one complete cycle of full travel.

e. At least once per 18 months by performing a system functional test which includes simulated automatic actuation of the system throughout its operating sequence, and:

1. Verifying that each automatic valve in the flow path actuates to its correct position,

2. Verifying that each pump develops at least 1653 gpm at a system head of 338 feet, R58

3. Cycling each valve in the flow path that is not testable during plant operation through at least one complete cycle of full travel, and

4. Verifying that the No. 1 fire pump starts to maintain the fire suppression water system pressure greater than or equal to 125 psig, and that the No. 2 fire pump starts automatically within 10 ± 2 seconds if the fire suppression water system is not maintained at greater than or equal to 125 psig by the No. 1 pump.

f. At least once per 3 years by performing a flow test of the system in accordance with Chapter 5, Section 11 of the Fire Protection Handbook, 14th Edition, published by the National Fire Protection Association.

*Note: These flushes should coincide with the chlorination of the raw service and fire suppression water system. These flushes should be run, one between April 1 and June 30, and the other between September 1 and November 15. R4

Within the prescribed spring and fall test period, deviation from the six-month performance frequency is authorized.

Deleted

SPRAY AND/OR SPRINKLER SYSTEMS

LIMITING CONDITION FOR OPERATION

3.7.11.2 The following spray and/or sprinkler systems shall be OPERABLE:

a. Reactor Building - RC pump area, Annulus

b. Auxiliary Building - Elev. 669, 690, 706, 714, 734, 749, 759, ABGTS Filters, EGTS Filters, Cont. Purge Filters, and 125V Battery Rooms.

c. Control Building - Elev. 669, Cable Spreading Room, MCR air filters, and operator living area.

d. Diesel Generator Building - Corrider Area.

e. Turbine Building - Control Building Wall.

APPLICABILITY: Whenever equipment protected by the spray/sprinkler system is required to be OPERABLE.

ACTION:

a. With one or more of the above required spray and/or sprinkler systems inoperable, within one hour establish a continuous fire watch with backup fire suppression equipment for those areas in which redundant systems or components could be damaged; for other areas establish an hourly fire watch patrol. For Spray and/or Sprinkler Systems inside Containment which are inoperable as a result of inoperable fire detection instrumentation, a continuous or hourly fire watch is not required when complying with the ACTION requirements of Specification 3.3.3.8. Restore the system to OPERABLE status within 14 days or, in lieu of any other report required by Specification 6.6.1, prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within the next 30 days outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status. R178 R28

b. The provisions of Specification 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.11.2 Each of the above required spray and/or sprinkler systems shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path is in its correct position.

b. At least once per 12 months by cycling each testable valve in the flow path through at least one complete cycle of full travel.

Delete Entire Page

SURVEILLANCE REQUIREMENTS (Continued)

c. At least once per 18 months:

1. By performing a system functional test which includes simulated automatic actuation of the system, and:

   a) Verifying that the automatic valves in the flow path actuate to their correct positions on a cross zone or single zone detection test signal as designed, and

   b) Cycling each valve in the flow path that is not testable during plant operation through at least one complete cycle of full travel.

2. By visual inspection of the dry pipe, spray and sprinkler headers to verify their integrity, and

3. By visual inspection of each nozzle's spray area to verify the spray pattern is not obstructed.

Deleted

CO_2 SYSTEMS

LIMITING CONDITION FOR OPERATION

3.7.11.3 The following low pressure CO_2 systems shall be OPERABLE.

a. Computer Room
b. Auxiliary Instrument Room
c. Diesel Generator Rooms
d. Fuel Oil Pump Rooms
e. Diesel Generator Building Electrical Board Rooms | R85

APPLICABILITY: Whenever equipment protected by the CO_2 systems is required to be OPERABLE.

ACTION:

a. With one or more of the above required CO_2 systems inoperable, within one hour establish a continuous fire watch with backup fire suppression equipment for those areas in which redundant systems or components could be damaged; for other areas, establish an hourly fire watch patrol. Restore the system to OPERABLE status within 14 days or, in lieu of any other report required by Specification 6.6.1, prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within the next 30 days outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status. | R28

b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.11.3.1 Each of the above required CO_2 systems shall be demonstrated OPERABLE at least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path is in its correct position.

4.7.11.3.2 Each of the above required low pressure CO_2 systems shall be demonstrated OPERABLE:

a. At least once per 7 days by verifying the CO_2 storage tank level to be greater than 50% and pressure to be greater than 270 psig, and

b. At least once per 18 months by verifying:

1. The system valves and associated ventilation dampers and fire door release mechanisms actuate manually and automatically, upon receipt of a simulated actuation signal, and

2. Flow from each nozzle during a "Puff Test."

Deleted

FIRE HOSE STATIONS

LIMITING CONDITION FOR OPERATION

3.7.11.4 The fire hose stations shown in Table 3.7-5 shall be OPERABLE.

APPLICABILITY: Whenever equipment in the areas protected by the fire hose stations is required to be OPERABLE.

ACTION:

a. With one or more of the fire hose stations shown in Table 3.7-5 inoperable, route an additional equivalent capacity fire hose to the unprotected area(s) from an OPERABLE hose station within 1 hour if the inoperable fire hose is the primary means of fire suppression; otherwise, route the additional hose within 24 hours. Restore the fire hose station to OPERABLE status within 14 days or, in lieu of any other report required by Specification 6.6.1, prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within the next 30 days outlining the action taken, the cause of the inoperability, and plans and schedule for restoring the station to OPERABLE status.

b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.11.4 Each of the fire hose stations shown in Table 3.7-5 shall be demonstrated OPERABLE:

a. At least once per 31 days by a visual inspection of the fire hose stations accessible during plant operations to assure all required equipment is at the station.

b. At least once per 18 months by:

1. Visual inspection of all the stations not accessible during plant operations to assure all required equipment is at the station.

2. Removing the hose for inspection and re-racking, and

3. Inspecting all gaskets and replacing any degraded gaskets in the couplings.

c. At least once per 3 years by:

1. Partially opening each hose station valve to verify valve OPERABILITY and no flow blockage.

2. Conducting a hose hydrostatic test at a pressure of 150 psig or at least 50 psig above maximum fire main operating pressure, whichever is greater. R32

Delete Entire Page

TABLE 3.7-5

FIRE HOSE STATIONS

LOCATION	ELEVATION	HOSE RACK#
a. Reactor Building - Annulus Area		
Platform	778.0	2-26-1196
Platform	778.0	2-26-1197
Platform	778.0	2-26-1198
Platform	778.0	2-26-1199
Platform	759.0	2-26-1200
Platform	759.0	2-26-1201
Platform	759.0	2-26-1202
Platform	759.0	2-26-1203
Platform	740.0	2-26-1204
Platform	740.0	2-26-1205
Platform	740.0	2-26-1206
Platform	740.0	2-26-1207
Platform	721.0	2-26-1208
Platform	721.0	2-26-1209
Platform	721.0	2-26-1210
Platform	721.0	2-26-1211
Platform	701.0	2-26-1212
Platform	701.0	2-26-1213
Platform	701.0	2-26-1214
Platform	701.0	2-26-1215
Platform	679.78	2-26-1216
Platform	679.78	2-26-1217
Platform	679.78	2-26-1218
Platform	679.78	2-26-1219
b. Reactor Building - RCP & Lower Containment Air Filters Area		
Reactor Building	679.78	2-26-1220
Reactor Building	679.78	2-26-1221
Reactor Building	679.78	2-26-1222
Reactor Building	679.78	2-26-1223
Reactor Building	679.78	2-26-1224
Reactor Building	679.78	2-26-1225
c. Control Building		
Control Building	732	0-26-1186
Control Building	732	0-26-1191
Control Building	706	0-26-1187
Control Building	706	0-26-1192

Delete Entire Page

Table 3.7-5 (Continued)

FIRE HOSE STATIONS

LOCATION	ELEVATION	HOSE RACK#
Control Building	685	0-26-1188
Control Building	685	0-26-1193
Control Building	669	0-26-1189
Control Building	669	0-26-1194
d. Diesel Generator Building		
Corridor	722	0-26-1077
Corridor	740.5	0-26-1080
Air Exhaust Rm.	740.5	0-26-1082
Lube Oil Storage Room 722.0-2	722	0-26-2337 R124
e. Additional Equipment Building - Unit 2		
North Wall	740.5	2-26-687
North Wall	706	2-26-686
f. Auxiliary Building		
	759	2-26-669
	749	2-26-664
	749	1-26-664 R104
	734	2-26-670
	734	0-26-684
	734	1-26-670
	734	0-26-682
	734 Siamese Outlet	2-26-671
	734	2-26-672
	734	2-26-665
	714	0-26-660
	714	2-26-666
	714	0-26-677
	706	0-26-658
	690	0-26-690
	690	0-26-661
	690 Siamese Outlet	2-26-674
	690	2-26-675
	669	2-26-667
	669	2-26-668
	669	0-26-662
	669	0-26-680
	653	0-26-663
	653	0-26-691

Delete Entire Page

Table 3.7-5 (Continued)

FIRE HOSE STATIONS

LOCATION	ELEVATION	HOSE RACK#
g. CCW Intake Pumping Station		
	690	0-26-866
	690	0-26-867
	690	0-26-868
	690	0-26-869
	690	0-26-870
h. ERCW Pumping Station		
	688	0-26-927
	688	0-26-926
	688	0-26-930
	704	0-26-931
	704	0-26-925
	704	0-26-928
	720	0-26-929
	720	0-26-924
	720	0-26-932

3/4.7.12 FIRE BARRIER PENETRATIONS

Deleted

LIMITING CONDITION FOR OPERATION

3.7.12 All fire barrier penetrations (including cable penetration barriers, firedoors and fire dampers) in fire zone boundaries protecting safety related areas, shall be functional.

APPLICABILITY: At all times.

ACTION:

a. With one or more of the above required fire barrier penetrations non-functional, within one hour either, establish a continuous fire watch on at least one side of the affected penetration, or verify the OPERABILITY of fire detectors on at least one side of the non-functional fire barrier and establish a hourly fire watch patrol. Restore the non-functional fire barrier penetration(s) to functional status within 7 days or, in lieu of any other report required by Specification 6.6.1, prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within the next 30 days outlining the action taken, the cause of the non-functional penetration and plans and schedule for restoring the fire barrier penetration(s) to functional status. [R28

b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.12 Each of the above required fire barrier penetrations shall be verified to be functional:

a. At least once per 18 months by a visual inspection.

b. Prior to returning a fire barrier penetration to functional status following repairs or maintenance by performance of a visual inspection of the affected fire barrier penetration(s).

This Specification is deleted

BASES

3/4.3.3.8 FIRE DETECTION INSTRUMENTATION

OPERABILITY of the fire detection instrumentation ensures that adequate warning capability is available for the prompt detection of fires. This capability is required in order to detect and locate fires in their early stages. Prompt detection of fires will reduce the potential for damage to safety related equipment and is an integral element in the overall facility fire protection program.

In the event that a portion of the fire detection instrumentation is inoperable, the establishment of frequent fire patrols in the affected areas is required to provide detection capability until the inoperable instrumentation is restored to OPERABILITY. R35

All hourly fire watch patrols require that a trained individual be in the specified area at intervals of 60 minutes with a margin of 15 minutes. BR-4

3/4.3.3.9

This Specification is deleted.

3/4.3.3.10 EXPLOSIVE GAS MONITORING INSTRUMENTATION R134

This instrumentation includes provisions for monitoring the concentrations of potentially explosive gas mixtures in the waste gas holdup system. The OPERABILITY and use of this instrumentation is consistent with the requirements for monitoring potentially explosive gas mixtures.

3/4.7.11 FIRE SUPPRESSION SYSTEMS

This Specification is deleted

The OPERABILITY of the fire suppression systems ensures that adequate fire suppression capability is available to confine and extinquish fires occuring in any portion of the facility where safety related equipment is located. The fire suppression system consists of the water system, spray and/or sprinklers, CO_2, and fire hose stations. The collective capability of the fire suppression systems is adequate to minimize potential damage to safety related equipment and is a major element in the facility fire protection program.

In the event that portions of the fire suppression systems are inoperable, alternate backup fire fighting equipment is required to be made available in the affected areas until the inoperable equipment is restored to service. When the inoperable fire fighting equipment is intended for use as a backup means of fire suppression, a longer period of time is allowed to provide an alternate means of fire fighting than if the inoperable equipment is the primary means of fire suppression.

The surveillance requirements provide assurance that the minimum OPERABILITY requirements of the fire suppression systems are met.

In the event the fire suppression water system becomes inoperable, immediate corrective measures must be taken since this system provides the major fire suppression capability of the plant. The requirement for a twenty-four hour report to the Commission provides for prompt evaluation of the acceptability of the corrective measures to provide adequate fire suppression capability for the continued protection of the nuclear plant.

All hourly fire watch patrols require that a trained individual be in the specified area at intervals of 60 minutes with a margin of 15 minutes.

A continuous fire watch requires that a trained individual be in the specified area at all times, that the specified area contain no impediment to restrict the movements of the continuous fire watch, and that each compartment within the specified area is patrolled at least once every 15 minutes with a margin of 5 minutes. BR-4

A specified area for a continuous fire watch is one or more fire zones within a single fire area, which are easily accessible to each other and can be patrolled within 15 minutes. Easy access is defined as: no locked doors or inoperable card reader, no C-Zone entry required, or no hazards that will interfere with the continuous fire watch activity being performed within the 15-minute period.

3/4.7.12 FIRE BARRIER PENETRATIONS

This Specification is deleted

The functional integrity of the fire barrier penetrations ensures that fires will be confined or adequately retarded from spreading to adjacent portions of the facility. This design feature minimizes the possibility of a single fire rapidly involving several areas of the facility prior to detection and extinguishment. The fire barrier penetrations are a passive element in the facility fire protection program and are subject to periodic inspections.

Fire barrier penetrations, including cable penetration barriers, fire doors and dampers are considered functional when the visually observed condition is the same as the as-designed condition. For those fire barrier penetrations that are not in the as-designed condition, an evaluation shall be performed to show that the modification has not degraded the fire rating of the fire barrier penetration.

During periods of time when a barrier is not functional, either, 1) a continuous fire watch is required to be maintained in the vicinity of the affected barrier, or 2) the fire detectors on at least one side of the affected barrier must be verified OPERABLE and a hourly fire watch patrol established, until the barrier is restored to functional status.

All hourly fire watch patrols require that a trained individual be in the specified area at intervals of 60 minutes with a margin of 15 minutes.

A continuous fire watch requires that a trained individual be in the specified area at all times, that the specified area contain no impediment to restrict the movements of the continuous fire watch, and that each compartment within the specified area is patrolled at least once every 15 minutes with a margin of 5 minutes. BR-4

A specified area for a continuous fire watch is one or more fire zones within a single fire area, which are easily accessible to each other and can be patrolled within 15 minutes. Easy access is defined as: no locked doors or inoperable card reader, no C-Zone entry required, or no hazards that will interfere with the continuous fire watch activity being performed within the 15-minute period.

c. A Radiological Control technician# shall be onsite when fuel is in the reactor. R50

d. All CORE ALTERATIONS shall be observed and directly supervised by either a licensed Senior Reactor Operator or Senior Reactor Operator Limited to Fuel Handling who has no other concurrent responsibilities during this operation.

Deleted

e. ~~A Fire Brigade of at least 5 members shall be maintained onsite at all times#. The Fire Brigade shall not include the Shift Operations Supervisor and 2 other members of the minimum shift crew necessary for safe shutdown of the unit or any personnel required for other essential functions during a fire emergency.~~ R169

f. The Operations Superintendent shall hold a Senior Reactor Operator license. R145

g. Administrative procedures shall be developed and implemented to limit the working hours of unit staff who perform safety-related functions (i.e., senior reactor operators, reactor operators, assistant unit operators, Radiological Control, and key maintenance personnel). R142

Adequate shift coverage shall be maintained without routine heavy use of overtime. The objective shall be to have operating personnel work a normal 8-hour day, 40-hour week while the unit is operating. However, in the event that unforseen problems require substantial amounts of overtime to be used, or during extended periods of shutdown for refueling, major maintanance, or major plant modification, on a temporary basis the following guidelines shall be followed:

1. An individual should not be permitted to work more than 16 hours straight, excluding shift turnover time.

2. An individual should not be permitted to work more than 16 hours in any 24-hour period, nor more than 24 hours in any 48-hour period, nor more than 72 hours in any 7-day period, all excluding shift turnover time.

3. A break of at least 8 hours should be allowed between work periods, including shift turnover time.

4. Except during extended shutdown periods, the use of overtime should be considered on an individual basis and not for the entire staff on a shift.

Any deviation from the above guidelines shall be authorized in advance by the Plant Manager or his designee, in accordance with approved administrative procedures, or by higher levels of management, in accordance with established procedures and with documentation of the basis for granting the deviation. R169

Controls shall be included in the procedures such that individual overtime shall be reviewed monthly by the Plant Manager or his designee to assure that excessive hours have not been assigned. Routine deviation from the above guidelines is not authorized. R142

#The Radiological Control technician ~~and fire brigade composition~~ may be offsite ~~less than the minimum requirements~~ for a period of time not to exceed 2 hours in order to accommodate unexpected absence provided immediate action is taken to fill the required positions. R50

ENCLOSURE 2

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE

SEQUOYAH NUCLEAR PLANT (SQN) UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

(TVA-SQN-TS-96-04)

DESCRIPTION AND JUSTIFICATION FOR

REMOVAL OF FIRE PROTECTION REQUIREMENTS

Introduction

TVA proposes to modify the Sequoyah Nuclear Plant (SQN) Units 1 and 2 technical specifications (TSs) and fire protection license conditions based on guidance provided by Generic Letters (GLs) 86-10 and 88-12.

By letter dated April 24, 1986, NRC issued GL 86-10, "Implementation of Fire Protection Requirements." This letter requested that licensees incorporate the Fire Protection Program into their Final Safety Analysis Report (FSAR). It also encouraged licensees, upon completion of this program, to apply for an amendment to their operating license to replace current fire protection license conditions with a new standard license condition and amend TSs to delete fire protection requirements from TS. Guidance for implementation of GL 86-10 was provided on August 2, 1988, by the issuance of GL 88-12, "Removal of Fire Protection Requirements from the Technical Specifications." TVA's proposed amendment request has been developed based on guidance given in GL 88-12.

Following implementation of this proposed change, a significant reduction in the content of the fire protection related TSs will be achieved. Such action is consistent with the NRC goal of TS Improvement Program by reducing the size and complexity of current TSs without a reduction in the level of fire safety.

Description of Change

The following is a description of the proposed TS revisions included in Enclosure 1.

1. Section 3/4.3.3, "Monitoring Instrumentation," that contains limiting conditions for operation (LCO) and surveillance requirements (SRs) for fire protection instrumentation is deleted in its entirety. The associated Table 3.3-11 is also removed in its entirety. These specifications are relocated to SQN's Fire Protection Report.

2. Section 3/4.7.11, "Fire Protection Systems," that contains LCOs and SRs for SQN's Fire Suppression Water System, Spray and/or Sprinkler Systems, CO_2 Systems, and Fire Hose Stations is deleted in its entirety. These specifications are relocated to SQN's Fire Protection Report.

3. Section 3/4.7.12, "Fire Barrier Penetrations," that contains LCO and SRs for SQN's fire barrier penetrations is deleted in its entirety. This specification is relocated to SQN's Fire Protection Report.

4. Section 6.2.2, "Facility Staff," that contains item (e) for addressing fire brigade staffing requirements is deleted and relocated to SQN's Fire Protection Report.

5. Index pages V, IX, and XIV are revised to reflect the above changes.

6. SQN's current License Conditions 2.C(16) for Unit 1 and 2.C(13) for Unit 2 contain commitments from 1980-1981 that are associated with modifications to SQNs fire protection system that were completed. The proposed change deletes these license conditions in their entirety and replaces them with a new standard license condition that reads:

   TVA shall implement and maintain in effect all provisions of the approved fire protection program referenced in Sequoyah Nuclear Plant's Final Safety Analysis Report and as approved in NRC Safety Evaluation Reports contained in NUREG-0011, Supplements 1, 2, and 5, NUREG-1232, Volume 2, and NRC letters dated May 29 and October 6, 1986, subject to the following provision:

   TVA may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

Reason for Change

In 1991, TVA developed a Fire Protection Improvement Plan that contained major work activities to correct weaknesses in SQN's fire protection program. The plan was divided into four phases with scheduled completion dates for each phase. Since 1991, periodic status reports on the completion of each phase have been provided to NRC. The last status report dated December 1, 1995, noted that Phases 1, 2, and 3 were complete. The completion of Phase 4 involved submittal of SQN's Fire Protection Report to NRC. This report was provided to NRC by letter dated August 30, 1996. Included with the report was a proposed change to incorporate by reference, SQN's Fire Protection Program into Section 9.5.1 of SQN's FSAR. Following the incorporation of the Fire Protection Program within the FSAR, GLs 86-10 and 88-12 encourage licensees to amend their operating licenses to: (1) replace current license conditions regarding fire protection with a new standard license condition, and (2) relocate fire protection requirements from TSs.

Pursuant to the GL guidance, TVA is submitting the proposed TS change. The proposed change is being submitted at this time to coincide with NRC review of SQN's Fire Protection Report and to coincide with TVA's Fire Protection Improvement Plan schedule.

In addition, the proposed TS change is considered a line-item TS improvement that provides requirements consistent with the Westinghouse Standard Technical Specifications (NUREG-1431, R1). TVA also considers the proposed TS change to be a CBLA (Cost Beneficial Licensing Action) item as it is estimated to save TVA $450,000 over the life of the plant.

Justification for Changes

This proposed amendment removes the fire protection requirements from TS in the major areas of fire detection instrumentation, fire suppression systems, fire barriers, and fire brigade staffing requirements and adds administrative controls to address the Fire Protection Program consistent with requirements for other programs. The proposed changes are based on guidance provided in GL 88-12. The following discussion addresses each proposed change relative to the elements of GL 88-12.

1. GL 88-12 states:

   "First, the NRC approved Fire Protection Program[1] must be incorporated into the FSAR and submitted with the certification required by 10 CFR 50.71(e)(2), as requested by Generic Letter 86-10. The FSAR update includes the incorporation of the Fire Protection Program, including the fire hazards analysis and major commitments that form the basis for the NRC-approved Fire Protection Program. This may be accomplished by referencing the documents which define the licensee's Fire Protection Program as identified in the NRC's Safety Evaluation Reports.

   "The staff does not intend to repeat its review of the approved Fire Protection Program incorporated in the updated FSAR. The staff may audit the updated FSARs to assure that they have incorporated the approved Fire Protection Program. Licensees should not use this FSAR incorporation as an opportunity to make changes in the approved Fire Protection Program. Licensees should wait until the standard license condition is in place and then use the procedures described in the license condition to make any necessary changes in the Fire Protection Program."

   Section 9.5.1 of the SQN FSAR references SQN's Fire Protection Report that contains the administrative and technical controls, operating requirements, tests and inspection requirements, fire brigade staffing requirements, fire hazard analysis, and major commitments that form the basis for SQN's Fire Protection Program (reference TVA letter to NRC dated August 30, 1996).

   The requirements that are removed from TSs as part of this change letter are located in Part II, Section 14.0 of SQN's Fire Protection Report.

   The SERs associated with SQN's Fire Protection Program are as follows: NUREG-0011, Supplements 1, 2, and 5, NUREG-1232, Volume 2, and NRC letters dated May 29 and October 6, 1986. Changes to SQN's Fire Protection Program have occurred subsequent to the issuance of these SERs. These changes are reflected in TVA's Fire Protection Report provided in TVA's August 30, 1996 letter. The evaluation of these changes conclude that there is no adverse affect on the plants ability to reach and maintain a fire safe shutdown condition.

2. GL 88-12 states:

   "Second, the Limiting Conditions for Operation (LCO) and Surveillance Requirements associated with fire detection systems, fire suppression systems, fire barriers, and the administrative controls that address specifications is provided in Enclosure 2. The existing administrative controls related to fire protection audits are to be retained in TS. Also, any specifications related to the capability for safe shutdown following a fire, e.g., see Item 8(j) in Enclosure 1 to Generic Letter 81-12, are to be retained in TS."

   SQNs current TS LCOs and SRs for Fire Protection Instrumentation (TS 3.3.3.8), Fire Suppression Water Systems (TS 3.7.11.1), Spray and/or Sprinkler Systems (TS 3.7.11.2), CO_2 Systems (TS 3.7.11.3), Fire Hose Stations (3.7.11.4), Fire Barrier Penetrations (TS 3.7.12), related Bases sections, and fire brigade staffing requirements are removed from the SQN TSs. These requirements are relocated by reference into Section 9.5.1 of the SQN FSAR. A markup of the proposed FSAR change is contained in the SQN Fire Protection Report that was submitted to NRC by letter dated August 30, 1996.

   The administrative controls related to fire protection audits were proposed to be relocated from the SQN TSs to TVA's Quality Assurance Plan. This proposed change was submitted to NRC by letter dated June 7, 1996 (SQN TS Change 95-19). The fire protection audit requirements proposed for relocation to TVA's Quality Assurance Plan remain unchanged and are provided below:

   a. The fire protection programmatic controls including the implementing procedures at least once per 24 months,

   b. An independent fire protection and loss prevention program inspection and audit shall be performed annually utilizing either qualified off-site license personnel or an outside fire protection firm, and

   c. An inspection and audit of the fire protection and loss prevention program shall be performed by an outside qualified fire consultant at intervals no greater that three years.

   In addition, any other current TSs related to safe shutdown capability following a fire that are not already described in this submittal remain unchanged.

3. GL 88-12 states:

   "Third, all operational conditions, remedial actions, and test requirements presently included in the TS for these systems, as well as the fire brigade staffing requirements, shall be incorporated into the Fire Protection Program. In this manner, the former TS requirements will become an integral part of the Fire Protection Program and changes subsequent to this amendment will be subject to the standard license condition. These remedial actions include shutdowns currently required by TS 3.0.3 when an LCO and its associated Action Requirements cannot be met."

Operational conditions, remedial actions, and test requirements as wel: as the fire brigade staffing requirements removed from TSs are an integral part of SQN's Fire Protection Program. Plant procedures that implement SQN's Fire Protection Program provide specific instructions for operational conditions, remedial actions and testing.

4. GL 88-12 states:

"Fourth, the standard fire protection license condition in Generic Letter 86-10 must be included in the license. Any other current fire protection license conditions shall be removed. This license condition precludes changes to the approved Fire Protection Program without prior Commission approval if those changes would adversely affect the ability to achieve and maintain safe shutdown conditions in the event of a fire."

The standard fire protection license condition in GL 86-10 is adopted and included in this amendment request. The new standard license condition will replace current License Conditions 2.C(16) for Unit 1 and 2.C(13) for unit 2 of Sequoyah's Facility Operating Licenses DPR-77 and DPR-79.

5. GL 88-12 states:

"Finally the Administrative Controls Section of the TS shall be augmented to support the Fire Protection Program. This shall be accomplished by additions to two specifications. First, the Unit Review Group (Onsite Review Group) shall be given responsibility for the review of the Fire Protection Program and implementing procedures and the submittal of recommended changes to the Company Nuclear Review and Audit Group (Offsite or Corporate Review Group). Second, Fire Protection Program implementation shall be added to the list of elements for which written procedures shall be established, implemented and maintained.

"The Emergency Plan and the Security Plan were used as models to determine the appropriate administrative control for the Fire Protection Program. These additions will provide administrative controls for the Fire Protection Program that are equivalent to those for other programs that are implemented by license condition."

And,

"if the plant's TS differ from the STS, additions to the administrative controls for the Fire Protection Program should be proposed that are consistent with the administrative controls for the Emergency and Security Plans."

And,

"In Generic Letter 86-10, licensees were reminded of their responsibilities to report deficiencies in the Fire Protection Program which meet the criteria of 10 CFR 50.72 and 10 CFR 50.73. Other conditions which represent deficiencies of this program and are not encompassed by the above reporting criteria should be evaluated by the licensees to determine appropriate corrective action."

SQN's current TSs under Section 6.0, Administrative Controls, already support the Fire Protection Program. Although SQN TSs differ from the STS, the current administrative controls for the Fire Protection Program are consistent with the administrative controls for the Emergency and Security plans.

With regard to the Unit Review Group responsibilities, the SQN Plant Operations Review Committee (PORC) is responsible for reviewing the site's Fire Protection Program and implementing procedures. This responsibility is a new responsibility for the SQN PORC that is being added to TVA's Quality Assurance Plan (TVA-NQA-PLN89-A, Revision 7) and is similar in format to the PORC responsibilities established for TVA's Watts Bar Nuclear Plant. The PORC responsibilities were proposed to be relocated from SQN TSs to TVA's Quality Assurance Plan under TS Change 95-19 dated June 7, 1996.

With regard to the Offsite Review Group responsibilities, TVA's Nuclear Safety Review Board provides overview of PORC activities, including receiving written minutes of the SQN PORC meetings and activities. Accordingly, TVA's NSRB will have oversight of proposed changes to SQN's Fire Protection Program.

With regard to written procedures, TS Section 6.8, Procedures and Programs, contains requirements for establishing written procedures for implementing the Fire Protection Program, as appropriate.

With regard to reporting, TVA is adopting the guidance of GL 86-10 for reporting deficiencies in the Fire Protection Program which meet the criteria of 10 CFR 50.72 and 10 CFR 50.73. Other conditions which represent deficiencies of this program will be addressed under TVA's corrective action program, as appropriate.

In summary, the changes in the proposed amendment are consistent with requirements outlined in GL 88-12. The proposed amendment will (1) reference TVA's Fire Protection Report submittal that provides for incorporation of SQN's Fire Protection Program into the FSAR, (2) incorporate the operational conditions, remedial actions, tests, inspections and fire brigade staffing requirements that are removed from TSs into the Fire Protection Program, and (3) include a license amendment to adopt the standard fire protection license condition. The current Administrative Controls in Section 6.0 of SQN's TS and Nuclear Quality Assurance Plan assure a multi-discipline review of any proposed changes to SQN's Fire Protection Program and to requirements in the FSAR or plant procedures.

Environmental Impact Evaluation

The proposed change does not involve an unreviewed environmental question because operation of SQN Units 1 and 2 in accordance with this change would not:

1. Result in a significant increase in any adverse environmental impact previously evaluated in the Final Environmental Statement (FES) as modified by NRC's testimony to the Atomic Safety and Licensing Board, supplements to the FES, environmental impact appraisals, or decisions of the Atomic Safety and Licensing Board.

2. Result in a significant change in effluents or power levels.

3. Result in matters not previously reviewed in the licensing basis for SQN that may have a significant environmental impact.

ENCLOSURE 3

PROPOSED TECHNICAL SPECIFICATION CHANGE

SEQUOYAH NUCLEAR PLANT (SQN) UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

(TVA-SQN-TS-96-04)

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

Significant Hazards Evaluation

TVA has evaluated the proposed technical specification (TS) change and has determined that it does not represent a significant hazards consideration based on criteria established in 10 CFR 50.92(c). Operation of Sequoyah Nuclear Plant (SQN) in accordance with the proposed amendment will not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated.

   The proposed TS change implements the guidance of NRC Generic Letter 86-10, "Implementation of Fire Protection Requirements," and GL 88-12," Removal of Fire Protection Requirements from the Technical Specifications." TVA's proposed change is administrative in nature since no technical requirements are being changed. The current technical specifications associated with fire protection are removed and are relocated to the SQN FSAR. In addition, implementation of the proposed standard fire protection license condition provides assurance that any future changes to the SQN Fire Protection Program would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire. Since the technical content of the Fire Protection requirements have not changed, this amendment does not involve a significant increase in the probability or consequences of an accident proviously evaluated.

2. Create the possibility of a new or different kind of accident from any previously analyzed.

   The proposed changes to the fire protection requirements in this proposed amendment are administrative in nature. Technical requirements associated with SQN's Fire Protection Systems have not been altered. Accordingly, the amendment does not create the possibility of a new or different kind of accident from any previously analyzed.

3. Involve a significant reduction in a margin of safety.

   The technical requirements for fire protection are relocated from the TSs to the FSAR by reference to the Fire Protection Report for Sequoyah Nuclear Plant. This report was submitted to NRC by letter dated August 30, 1996. The report contains the technical requirements for SQN's Fire Protection Program. Under TVA's proposed TS change, the operational conditions, testing and remedial action requirements, that are removed from TSs and relocated to the Fire Protection Report remain unchanged. The existing plant procedures will continue to provide the specific instructions for implementing these technical requirements. Since technical requirements are not changed, the proposed change does not involve a reduction in the margin of safety.

ENCLOSURE 4

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE

SEQUOYAH NUCLEAR PLANT (SQN) UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

(TVA-SQN-TS-96-04)

REVISED TS PAGES

(c) By no later than June 30, 1982, all safety-related electrical equipment in the facility shall be qualified in accordance with the provisions of: Division of Operating Reactors "Guidelines for Evaluating Environmental Qualification of Class IE Electrical Equipment in Operating Reactos" (DOR Guidelines); or, NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," December 1979. Copies of these documents are attached to the Order for Modification of Licence DPR-77 dated November 6, 1980. R4

(13) Loss of Non-Class IE Instrumentation and Control Room System Bus During Operation (Section 7.10)

Prior to exceeding five percent power, TVA must complete revisions to plant emergency procedures to the satisfaction of the NRC.

(14) Engineering Safety Feature (ESF) Reset Controls (Section 7.11)

In conformance with IE Bulletin 80-06, TVA shall test the system to identify any further areas of concern, and TVA shall review the control schemes to determine that they are the best in terms of equipment control and plant safety. The results of these test and review efforts shall be provided to the NRC in accordance with the bulletin.

(15) Diesel Generator Reliability (Section 8.3.1)

Prior to operation following the first refueling, TVA shall implement the following design and procedure modifications as outlined in Section 8.3.1 of SER Supplement No. 2. These include: (a) Moisture in Air Starting System; (b) Turbocharger Gear Drive Problem; and (c) Personnel Training.

(16) Fire Protection

TVA shall implement and maintain in affect all provisions of the approved fire protection program referenced in Sequoyah Nuclear Plant's Final Safety Analysis Report and as approved in NRC Safety Evaluation Reports contained in NUREG-0011, Supplements 1, 2, and 5, NUREG-1232, Volume 2, and NRC letters dated May 29 and October 6, 1986, subject to the following provision:

> TVA may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

BASES

SECTION		PAGE

FIRE DETECTION INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.8 This Specification is deleted.

TABLE 3.3-11

FIRE DETECTION INSTRUMENTS

This Table is deleted.
(Pages 3/4 3-59 through 3/4 3-69 deleted)

3/4.7.11 FIRE SUPPRESSION SYSTEMS

FIRE SUPPRESSION WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.11.1 This Specification is deleted.

Pages 3/4 7-31 and 3/4 7-32 are deleted.

SPRAY AND/OF SPRINKLER SYSTEMS

LIMITING CONDITION FOR OPERATION

3.7.11.2 This Specification is deleted.

Pages 3/4 7-33 and 3/4 7-34 are deleted.

LIMITING CONDITION FOR OPERATION

3.7.11.3 This Specification is deleted.

Pages 3/4 7-35 and 3/4 7-36 are deleted.

FIRE HOSE STATIONS

LIMITING CONDITION FOR OPERATION

3.7.11.4 This Specification is deleted.

TABLE 3.7-5

FIRE HOSE STATIONS

This Table is deleted
(Pages 3/4 7-38 through 3/4 7-40 are deleted)

3/4.7.12 FIRE BARRIER PENETRATIONS

LIMITING CONDITION FOR OPERATION

3.7.12 This Specification is deleted.

3/4.3.3.8 FIRE DETECTION INSTRUMENTATION

This Specification is deleted.

3/4.3.3.9

This Specification is deleted.

3/4.3.3.10 EXPLOSIVE GAS MONITORING INSTRUMENTATION

R152

This instrumentation includes provisions for monitoring the concentrations of potentially explosive gas mixtures in the waste gas holdup system. The OPER-ABILITY and use of this instrumentation is consistent with the requirements for monitoring potentially explosive gas mixtures.

SNUBBERS (Continued)

location, etc.), and the recommendations of Regulatory Guide 8.8 and 8.10. The addition or deletion of any hydraulic or mechanical snubber shall be made in accordance with Section 50.59 of 10 CFR Part 50. R43

3/4.7.10 SEALED SOURCE CONTAMINATION

The limitations on removable contamination for sources requiring leak testing, including alpha emitters, is based on 10 CFR 70.39(c) limits for plutonium. This limitation will ensure that leakage from byproduct, source, and special nuclear material sources will not exceed allowable intake values. Sealed sources are classified into three groups according to their use, with surveillance requirements commensurate with the probability of damage to a source in that group. Those sources which are frequently handled are required to be tested more often than those which are not. Sealed sources which are continuously enclosed within a shielded mechanism (i.e., sealed sources within radiation monitoring or boron measuring devices) are considered to be stored and need not be tested unless they are removed from the shielded mechanism. BR-3

3/4.7.11 FIRE SUPPRESSION SYSTEMS

This Specification is deleted.

3/4.7.12 FIRE BARRIER PENETRATIONS

This Specification is deleted.

c. A Radiological Control technician# shall be onsite when fuel is in the reactor. R62

d. All CORE ALTERATIONS shall be observed and directly supervised by either a licensed Senior Reactor Operator or Senior Reactor Operator Limited to Fuel Handling who has no other concurrent responsibilities during this operation. FP

e. Deleted

f. The Operations Superintendent shall hold a Senior Reactor Operator license. R160

g. Administrative procedures shall be developed and implemented to limit the working hours of unit staff who perform safety-related functions (i.e., senior reactor operators, reactor operators, assistant unit operators, Radiological Control, and key maintenance personnel).

Adequate shift coverage shall be maintained without routine heavy use of overtime. The objective shall be to have operating personnel work a normal 8-hour day, 40-hour week while the unit is operating. However, in the event that unforseen problems require substantial amounts of overtime to be used, or during extended periods of shutdown for refueling, major maintenance, or major plant modification, on a temporary basis the following guidelines shall be followed:

1. An individual should not be permitted to work more than 16 hours straight, excluding shift turnover time.
2. An individual should not be permitted to work more than 16 hours in any 24-hour period, nor more than 24 hours in any 48-hour period, nor more than 72 hours in any 7-day period, all excluding shift turnover time. R156
3. A break of at least 8 hours should be allowed between work periods, including shift turnover time.
4. Except during extended shutdown periods, the use of overtime should be considered on an individual basis and not for the entire staff on a shift.

Any deviation from the above guidelines shall be authorized in advance by the Plant Manager or his designee, in accordance with approved administrative procedures, or by higher levels of management, in accordance with established procedures and with documentation of the basis for granting the deviation. R182

Controls shall be included in the procedures such that individual overtime shall be reviewed monthly by the Plant Manager or his designee to assure that excessive hours have not been assigned. Routine deviation from the above guidelines is not authorized.

#The Radiological Control technician may be offsite for a period of time not to exceed 2 hours in order to accommodate unexpected absence provided immediate action is taken to fill the required positions.

(13) Fire Protection

TVA shall implement and maintain in effect all provisions of the approved fire protection program referenced in Sequoyah Nuclear Plant's Final Safety Analysis Report and as approved in NRC Safety Evaluation Reports contained in NUREG-0011, Supplements 1, 2, and 5, NUREG-1232, Volume 2, and NRC letters dated May 29, and October 6, 1986, subject to the following provision:

> TVA may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

(14) Compliance With Regulatory Guide 1.97

TVA shall implement modifications necessary to comply with Revision 2 of Regulatory Guide 1.97, "Instrumentation for Light Water Cooled Nuclear Power Plants to Assess Plant Conditions During and Following an Accident," dated December 1980 by startup from the Unit 2 Cycle 4 refueling outage. R45

(15) Corrosion of Carbon Steel Piping

TVA shall carry out a surveillance program on corrosion of carbon steel piping in accordance with TVA document SQRD-50-328/81-10 dated August 25, 1981, and procedures for implementation are to be submitted for NRC concurrence by October 15, 1981.

(16) NUREG-0737 Conditions (Section 22.2)

R2

Each of the following conditions shall also be performed to the satisfaction of the NRC:

a. Shift Technical Advisor (Section 22.2, I.A.1.1)

   TVA shall provide a fully-trained on-shift technical advisor to the shift operations supervisor. R169

b. Independent Safety Engineering Group (Section 22.2, I.B.1.2)

   TVA shall have an onsite Independent Safety Engineering Group.

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

BASES

SECTION | PAGE

FIRE DETECTION INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.8 This Specification is deleted.

TABLE 3.3-11
FIRE DETECTION INSTRUMENTS

This Table is deleted.
(Pages 3/4 3-60 through 3/4 3-67a)

3/4.7.11 FIRE SUPPRESSION SYSTEMS

FIRE SUPPRESSION WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.11.1 This Specification is deleted.

Pages 3/4 7-43 and 3/4 7-44 are deleted.

LIMITING CONDITION FOR OPERATION

3.7.11.2 This Specification is deleted.

Pages 3/4 7-45 and 3/4 7-46 are deleted.

CO_2 SYSTEMS

LIMITING CONDITION FOR OPERATION

3.7.11.3 This Specification is deleted.

FIRE HOSE STATIONS

LIMITING CONDITION FOR OPERATION

3.7.11.4 This Specification is deleted.

TABLE 3.7-5

FIRE HOSE STATIONS

This Table is deleted
(Pages 3/4 7-49 through 3/4 7-51)

PLANT SYSTEMS

3/4.7.12 FIRE BARRIER PENETRATIONS

LIMITING CONDITION FOR OPERATION

3.7.12 This Specification is deleted.

3/4.3.3.8 FIRE DETECTION INSTRUMENTATION

This Specification is deleted.

3/4.3.3.9

This Specification is deleted.

3/4.3.3.10 EXPLOSIVE GAS MONITORING INSTRUMENTATION R134

This instrumentation includes provisions for monitoring the concentrations of potentially explosive gas mixtures in the waste gas holdup system. The OPERABILITY and use of this instrumentation is consistent with the requirements for monitoring potentially explosive gas mixtures.

3/4.7.11 FIRE SUPPRESSION SYSTEMS

This Specification is deleted.

3/4.7.12 FIRE BARRIER PENETRATIONS

This Specification is deleted.

c. A Radiological Control technician# shall be onsite when fuel is in the reactor. R50

d. All CORE ALTERATIONS shall be observed and directly supervised by either a licensed Senior Reactor Operator or Senior Reactor Operator Limited to Fuel Handling who has no other concurrent responsibilities during this operation.

e. DELETED

f. The Operations Superintendent shall hold a Senior Reactor Operator license. R145

g. Administrative procedures shall be developed and implemented to limit the working hours of unit staff who perform safety-related functions (i.e., senior reactor operators, reactor operators, assistant unit operators, Radiological Control, and key maintenance personnel).

Adequate shift coverage shall be maintained without routine heavy use of overtime. The objective shall be to have operating personnel work a normal 8-hour day, 40-hour week while the unit is operating. However, in the event that unforseen problems require substantial amounts of overtime to be used, or during extended periods of shutdown for refueling, major maintenance, or major plant modification, on a temporary basis the following guidelines shall be followed: R142

1. An individual should not be permitted to work more than 16 hours straight, excluding shift turnover time.

2. An individual should not be permitted to work more than 16 hours in any 24-hour period, nor more than 24 hours in any 48-hour period, nor more than 72 hours in any 7-day period, all excluding shift turnover time.

3. A break of at least 8 hours should be allowed between work periods, including shift turnover time.

4. Except during extended shutdown periods, the use of overtime should be considered on an individual basis and not for the entire staff on a shift.

Any deviation from the above guidelines shall be authorized in advance by the Plant Manager or his designee, in accordance with approved administrative procedures, or by higher levels of management, in accordance with established procedures and with documentation of the basis for granting the deviation. R169

Controls shall be included in the procedures such that individual overtime shall be reviewed monthly by the Plant Manager or his designee to assure that excessive hours have not been assigned. Routine deviation from the above guidelines is not authorized. R142

#The Radiological Control technician may be offsite for a period of time not to exceed 2 hours in order to accommodate unexpected absence provided immediate action is taken to fill the required positions.

ENCLOSURE 5

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE

SEQUOYAH NUCLEAR PLANT (SQN) UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

(TVA-SQN-TS-96-04)

REVISED FSAR PAGES

2.2.3.9 Evaluation of Potential Fire and Smoke Hazard from Onsite Oil Storage Facilities

The onsite storage facilities for d sel fuel oil are described in detail in Sections 9.5.4.1 and 9.5.4.2. The maximum amount of fuel oil stored at the plant is 68,000 gallons in each of four storage tanks within the diesel generator building. Two 550-gallon "day" tanks are also located within ~~the~~ each diesel generator ~~building~~ room. ~~In addition,~~ two storage tanks with a capacity of 71,000 gallons each are located south-southeast of the diesel generator building. The storage sites are approximately 260 and 300 meters from the control building, respectively.

A postulated fire involving the oil storage facilities which are located south-southeast of the diesel generator building should have no consequences other than the effects of dense smoke. These tanks are separated from other facilities and are surrounded by a high dike.

The oil storage tanks in the diesel generator building (DGB) are embedded in a concrete substructure of a class I seismic building. The storage tanks and diesel generators are separated by thick concrete walls. ~~In the event of a fire in any cubicle involving any storage tank, the fire would be restricted to its cubicle and be mitigated by a qualified CO_2 fire extinguishing system. Hence, the effect of a fire would be the loss of one redundant train.~~ Fire protection for the DGB is described in the fire protection report (sec 9.5.1)

An evaluation of the hazard to personnel in the control room from a release of dense smoke is given in Section 6.4.1.2.

2.2.4 Forest Fires

Further clearing has taken place since the time of plant construction. For the most part, the ground has been cleared for two thousand feet around the plant buildings. There are no wooded areas close enough to present a hazard from forest fires. 6

2.2.5 References

1. TIC-ECS-27 R2, "Main Control Room Habitability During Hazardous Chemical Releases at or Near the Plant." 7

2.4.11.3 Historical Low Water

From the beginning of stream gauge records at Chattanooga in 1874 until the closure of Chickamauga Dam in January 1940, the lowest daily flow in the Tennessee River at Sequoyah Nuclear Plant site was 3,200 cfs on September 7 and 13, 1925. The next lowest daily flow of 4,600 cfs occurred in 1881 and also in 1883.

Since January 1942, low flows at the site have been regulated by TVA reservoirs, particularly by Watts Bar and Chickamauga Dams. Under normal operating conditions, there may be periods of several hours daily when there are no releases from either or both dams, but average daily flows at the site have been less than 5,000 cfs only 0.2 percent of the time and have been less than 10,000 cfs, 1.3 percent of the time.

On March 30 and 31, 1968, during special operations for the control of watermilfoil, there were no releases from either Watts Bar or Chickamauga Dams during the two-day period. The previous minimum daily flow was 700 cfs on November 1, 1953.

Since January 1940, water levels at the plant have been controlled by Chickamauga Reservoir. Since then, the minimum level at the dam was 673.3 on January 21, 1942.

2.4.11.4 Future Control

Future added controls which could alter low flow conditions at the plant are not anticipated because no sites that would have a significant influence remain to be developed.

2.4.11.5 Plant Requirements

2.4.11.5.1 Two-Unit Operation

The safety related water supply systems requiring river water are: the essential raw cooling water (ERCW) (Subsection 9.2.2), and that portion of the high-pressure fire-protection system (HPFP) (Subsection ~~9.5.1~~) supplying emergency feedwater to the steam generators. The high-pressure fire protection pumps are submersible pumps located in the intake pumping station. Reference Figures 1.2.3-14 and 1.2.3-15. The intake pumping station sump is at elevation 648. The entrances to the suction pipes for the HPFP pumps are at elevation 651 feet 0 inches which is 32 feet and 24 feet, respectively, below the maximum normal water elevation of 683.0 and the minimum normal water elevation of 675.0. ~~For flow requirements of the HPFP during engineering safety feature operation, see subsection 9.5.1~~. The ERCW pump sump in this independent station is at elevation 625.0, which is 58.0' below maximum normal water elevation, 50.0' below minimum normal water elevation, and 14.0' below the 639.0' minimum possible elevation of the river. For the flow requirements for the ERCW system, see Subsection 9.2.2. | 11

Since the ERCW pumping station has direct communication with the river for all water levels and is above probable maximum flood, the ERCW system for two-unit plant operation always operates in an open cooling cycle.

2.4.11.6 Heat Sink Dependability Requirements

The ultimate heat sink, its design bases and its operation, under all normal and credible accident conditions is described in detail in Subsection 9.2.5. As discussed in Subsection 9.2.5, the sink was modified by a new essential raw cooling water (ERCW) pumping station before unit 2 began operation. The design basis and operation of the ERCW system, both with the original ERCW intake station and with the new ERCW intake station, is presented in Subsection 9.2.2. As described in these sections, the new ERCW station is designed to guarantee a continued adequate supply of essential cooling water for all plant design basis conditions. This position is further assured since additional river water may be provided from TVA's upstream multiple-purpose resevoirs, as previously discussed during Low Flow in Rivers and Streams. 11

2.4.11.6.1 Loss of Downstream Dam

The loss of downstream dam will not result in any adverse effects on the availability of water to the ERCW system or these portions of the original HPFP supplying emergency feedwater to the steam generator.

2.4.11.6.2 Adequacy of Minimum Flow

The cooling requirements for plant safety-related features are provided by the ERCW system. The required ERCW flow rates under the most demanding modes of operation (including loss of downstream dam) are given in Subsection 9.2.2.

Two other safety-related functions may require water from the ultimate heat sink; these are fire protection water (refer to Subparagraph 2.4.11.6.3) and emergency steam generator feedwater (refer to Subsection 10.4.7). These two functions have smaller flow requirements than the ERCW systems. Consequently, the relative abundance of the river flow, even under the worst conditions, assures the availability of an adequate water supply for all safety-related plant cooling water requirements.

2.4.11.6.3 Fire-Protection Water

Refer to the Fire Protection Report discussed in section 9.5.1.

~~Submersible pumps located at the original ERCW intake station provide the plant's fire protection water. For all events except failure of the downstream dam, the fire protection pumps have an unlimited water supply via the river.~~

2.4.12 Environmental Acceptance of Effluents

The ability of surface waters near Sequoyah Nuclear Plant (SQN), located on the right bank near Tennessee River Mile (TRM) 484.5, to dilute and disperse radioactive liquid effluents accidentally released from the plant is discussed herein. Routine radioactive liquid releases are discussed in Section 11.2.

damaging steps necessary to have the plant in the flood mode when the flood exceeds plant grade. The onsite HPFPs may ~~FP system water (sub- section 9.5.1) will~~ supply ~~replace~~ auxiliary feedwater for reactor cooling. Other essential plant cooling loads will be transferred from the com- ponent cooling water to the ERCW System (subsection 9.2.2). The Radio- active Waste (Chapter 11) System will be secured by filling tanks below DBF level with enough water to prevent flotation; one exception is the waste gas decay tanks, which are sealed and anchored against flotation. The CVCS hold up tank will also be filled and sealed to prevent flotation.
Some power and communication lines running beneath the DBF and not designed for submerged operation will require disconnection. Batteries beneath the DBF will be disconnected.

2.4A.4.2 Reactor Initially Refueling

If time permits, fuel will be removed from the unit(s) undergoing refueling and placed in the spent fuel pit; otherwise fuel cooling will be accomplished as described in subsection 2.4A.2.2. If the refueling canal is not already flooded, the mode of cooling described in subsection 2.4A.2.2 requires that the canal be flooded with borated water from the refueling water storage tank. If the flood warning occurs after the reactor vessel head has been removed or at a time when it could be removed before the flood exceeds plant grade, the flood mode reactor cooling water will flow directly from the vessel into the refueling cavity. If the warning time available does not permit this, then the upper head injection piping will be disconnected above the vessel head to allow the discharge of water through the four upper head injection stand- pipes. Additionally, it is required that the prefabricated piping be installed to connect the RHR and SFPC Systems, and that ERCW be directed to the secondary side of the RHR System and SFPC System heat exchangers.

2.4A.4.3 Plant Preparation Time

All steps needed to prepare the plant for flood mode operation can be accomplished within 24 hours of receipt of the initial warning that a flood above plant grade is possible. An additional 3 hours are available for contingency margin before wave runup from the rising flood might enter the buildings. Site grading and building design prevent any flooding before the end of the 27 hour preflood period.

2.4A.5 Equipment

Both normal plant components and specialized flood-oriented supplements will be utilized in coping with floods. All such equipment required in the flood mode is either located above the DBF or is within a nonflooded structure or is designed for submerged operation. Systems and components needed only in the preflood period are protected only during that period.

of fires on structures, systems, and components important to safety. Fire-fighting systems shall be designed to assure that their rupture or inadvertent operation does not significantly impair the safety capability of these structures, systems, and components.

Compliance

The plant is designed to minimize the probability of fires and explosions, and in the event of such occurrences to minimize the potential effects of such events to plant safety-related equipment and personnel. Prime consideration is given these requirements throughout the design process by providing for the duplication and physical separation of components in plant design and the use of materials classified as noncombustible and/or fire resistant wherever practical in all areas of the plant. Equipment and facilities for fire protection, including detection, alarm, and extinguishment, are provided to protect both plant equipment and personnel from fire, explosion, and the resultant release of toxic vapors. Fire-fighting systems are designed to assure that their rupture or inadvertent operation will not impair systems important to safety. All portions of the Fire Protection Systems necessary to protect safety-related equipment in Class I structures are designed to seismic requirements.

The Fire Protection Systems provided are:

1. High-pressure water,
2. Carbon dioxide, and
3. Portable extinguishers. as described in the Fire Protection Report (see 9.5.1

All systems are ~~designed~~ and installed in accordance with ~~the~~ applicable requirements ~~of the National Fire Protection Association as discussed in the references in subsection 9.5.1.3~~. The Fire Protection System is designed such that a failure of any component of the system or inadvertent operation: 4

1. Will not cause a nuclear accident or significant release of radioactivity to the environment.

2. Will not impai. the ability of equipment to safely shut down and isolate the reactor or limit the release of radioactivity to the environment in the event of a postulated accident.

The Fire Protection Systems for the Sequoyah Nuclear Plant are discussed in the Fire Protection Report ~~subsection 9.5.1~~. Protection from fire in the control room is also discussed in subsection 6.4 (Habitability Systems).

Criterion 4 - Environmental and Missile Design Bases.

Structures, systems, and components important to safety are designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including LOCA. These structures, systems and components shall be appropriately protected against dynamic effects,

Personnel Access Doors in Crane Wall

See Figures 3.8.3-10 through 3.8.3-12.

Four access doors in the lower half of the crane wall are provided in each Reactor Building at the following locations:

Floor Elevation	Azimuth
679.78	221°
679.78	299°
693.00	114° 16'-11"
722.00	299°

The doors provide passageways 3 feet-0 inch wide by 6 feet-6 inches high through the concrete crane wall for workmen and tools. When closed, the doors seal the passageways against steam jets, pressure, and missiles that may originate from pipe rupture in the compartment inside the crane wall.

Each door is manually operated and hinged to a steel frame embedded in the concrete wall. Each door consists of a steel skin plate stiffened by horizontal framing. The skin plate is faced with a cushioning structure of vertically arranged square, steel tubing separated from the doors skin plate by a collapsible latticework of steel bars, the purpose of which is to absorb the energy of missiles striking the door. The cushioning structure is covered with sheet steel for appearance. Bearing of the door against the frame is through steel bars. An elastomer seal is attached to the periphery of the door to reduce the possibility of damage from jets to items beyond the door. Two lever-type latches operable from either side hold the door in the closed position. Hinges on the doors are provided with graphite impregnated bushings.

The doors, under normal operating conditions, provide an effective seal against airflow and can be operated and secured by one man from either side. For pipe rupture accidents, the doors seal the passageways in the crane wall against missiles, jets, and pressure that may originate within the crane wall enclosure, thus preventing consequent damage to the containment vessel and to piping and machinery between the crane wall and containment vessel.

The doors will maintain their integrity and seal for not less than the first 12 hours following an accident. Limited leakage during this period is permissible.

~~All parts of the doors, except the seals, are fireproof. Increased leakage may occur during a fire. It is assumed that a fire and an accident which require sealing will not occur simultaneously since the reactors will be shut down immediately if a fire develops~~.

significant

(Refer to the SQN Fire Protection Report Section 9.5.1)

accident is the introduction of moderation into the vault. "Optimum moderation" as described in ANSI N18.2-1973 is not a realistic problem because physically achievable water densities are considerably too low (< 0.01 gm/cm³) to yield K_{eff} values higher than full density water. Also, administrative controls have been instituted to prevent the use of water fog or spray to combat a fire in the new fuel storage vault. In addition, metal covers will be placed over the vault when fuel handling operations are not being performed. Thus, a full density value of 1.0 gm/cm³ was used for water in the calculations.

Thus, for normal operations, using the method described above including all the biases and uncertainties mentioned, the K_{eff} of the new fuel storage racks is determined to be 0.9343. This meets the criteria stated in Section 4.3.1.5.

Spent Fuel Storage - Wet

The reactivity of the spent fuel storage racks was calculated (reference 32) using the SCALE system of codes for cross section generation and KENO for reactivity determination. The fuel assemblies were assumed to be enriched to 5.0 weight percent U235, and of the VANTAGE 5H design. For the purposes of this analysis, the V5H fuel design was more reactive than standard fuel. The moderator was assumed to be pure water at the most reactive temperature (68 F) within the design limits of the pool. No dissolved boron was used in the water. A conservative minimum B10 loading of 0.0233 gm/cm² in the Boral plates was assumed.

Using a radially infinite array of fresh fuel assemblies, the enrichment of the spent fuel racks cannot be increased above 4.0 weight percent U235. Therefore this analysis took credit for reactivity decrease due to burnup of the stored fuel, and for administrative controls on fuel placement. Burnup in discharged fuel was treated by an "equivalent enrichment" technique based on depletion calculations by CASMO.

Mechanical uncertainties and biases because of mechanical tolerances during construction, for example variations in the storage lattice pitch, were treated by using the worst case conditions in the KENO calculations.

The calculation method and cross section values were verified by comparison with a set of critical experiments analyzed using KENO and SCALE. This benchmarking data was sufficiently diverse to establish that the method bias and uncertainty will apply to rack conditions which include strong neutron absorbers and large water gaps. A bias for the KENO/SCALE method, for the extrapolation of the benchmarking data to 5.0 weight percent U235, and for boron particle self-shielding was calculated. A total bias of 0.01345 (added to the KENO k-effective) was found. Uncertainties arising from the statistics of the KENO run, from the KENO method and enrichment extrapolation, from mechanical tolerances, and from the CASMO burnup calculation were calculated. A total uncertainty (squared, summed, and rooted) of 0.01454 was found. 8

The Technical Specifications require that any fuel assembly with enrichment greater than 4.0 weight percent and burnup less than 7500 MWD/MTU be placed in spent fuel storage rack locations that face adjacent cells filled with water or with fuel assemblies with at least 22,000 MWD/MTU. A multi-cell KENO model was used which conservatively modeled the most reactive spent fuel pit configuration allowed by the Technical Specifications.

The multi-cell KENO model consisted of four quarter fuel assemblies of two different enrichments, four quarter storage cells, and the water region between them in an infinite lateral array. The infinite array results in a checkerboard configuration containing the two fuel enrichments, fresh 5.0 weight percent and an equivalent enrichment. The equivalent enrichment was chosen to conservatively model 5.0 weight percent fuel burned to 20,000 MWD/MTU.

The building construction employs monolithic pours of concrete. This approach for structures of this type produces a very low leakage barrier. The low leakage characteristics of this barrier help to reduce the rate at which purified annulus air must be released to maintain the enclosed volume at a negative pressure. This factor contributes significantly to keeping the exclusion area boundary and the low population zone (LPZ) dosage levels within 10 CFR 100 guidelines. | 10

The size of the annular region between the primary containment and the shield building assures a residence time for all leakage into the annulus. The residence time will average about 90 minutes and is a significant factor in reducing exclusion area boundary and LPZ dosages. This factor is neglected in the accident dosage analyses given in Subsection 15.4.1 and Appendix 15B and this tends to make these analyses more conservative. | 10

Penetrations

The shield building wall is provided with more than 200 penetrations to accommodate mechanical equipment piping, cable trays, and electrical conduit which leave and enter the shield building. Leakage through the shield building wall when the annulus is at a negative pressure is expected to be restricted almost entirely to openings in these penetrations. The allowable leakage rates for these penetrations are given in Subsection 6.2.1.2. The design thus assures that penetration leakage will not exceed predetermined quantities. Such a capability ensures that the inleakage will be sufficiently low to keep the dose contributions at the exclusion area boundary and to the LPZ within 10 CFR 100 guidelines. | 10

Openings in mechanical piping penetrations are sealed typically as shown in Figure 6.2.1-1A through H. The seals are some combination of silicone room temperature vulcanizing (RTV) foam, slygard 170 silocine elastomer, a flexible membrane boot type on the inside and/or outside of the shield wall, welded plates, or single gaskets which ~~incorporate fire resistant materials and~~ are designed to withstand the combinations of shield building and piping movements in the SSE and retain their functional integrity. In addition, seals at or below elevation 724.0 are designed to be water tight for flood static head and surge forces. All seals, where possible, are installed outside the shield building such that whether during normal operation, accidents, or flood, the differential pressures will tend to enhance the tightness of the seal. The Shield Building penetration seal materials have been selected to sustain the integrated doses for 40 years normal plant operation and LOCA/HELB events.

Cables routed in cable trays pass through the shield building wall through rectangular cable sleeve penetrations as shown in Figure 6.2.1-3. The single interior metal barrier plate of the penetration assembly, containing the metal cable sleeves, effectively seals most of the open space within the wall opening for cable trays. The sealant material installed around cables within the cable sleeves is

Fire protection requirements for penetrations are discussed in the Fire Protection Report (see 9.5.1).

Penetrations

Seals for mechanical penetrations are a flexible membrane type or single gaskets. They are designed to withstand auxiliary building and piping movements on the SSE and retain their structural integrity. ~~The materials chosen for the seals are fire resistant~~. All seals, where possible, are designed such that whether during normal operation or accidents, the differential pressures will tend to enhance the tightness of the seal. Sealing methods for electrical penetrations are similar to those for the shield building electrical penetrations.

The ventilation duct isolation dampers are double-tracked with one inside and one outside the containment barrier for physical separation. The dampers have resilient blade end and blade edge seals which will retain their functional characteristics indefinitely over the operational temperature extremes. The motor operators for these dampers have been sized to tightly close the damper blades against their resilient seals. The entire damper and motor operator assembly is designed to operate during and after the SSE. 6

P — Fire protection requirements for penetrations are discussed in the Fire Protection Report (see 9.5.1).

6.2.1.3.3 Containment Pressure Transients - Short Term Analysis

Description of Analysis

Calculating pressure and temperature transients following a loss of coolant accident is a three-step process involving the computer codes and a calculation for the compression ratio.

During the first few seconds of the blowdown period of the reactor coolant system, the TMD computer code (References 14 and 15) with unaugmented critical flow and the Y compressibility factor is used to calculate pressure and temperature transients. It is during this period that the peak transient pressures, differential pressures, temperature and blowdown loads occur. 6

The containment pressure at or near the end of blowdown is calculated by the containment compression ratio analysis described in Subparagraph 6.2.1.3.4. Although the TMD code can be run to the end of the blowdown, this is not normally done, because the TMD code assumptions, such as no structural heat sinks and no containment sprays, become important in a long transient. The TMD code can conservatively compute the RCS blowdown transient.

The LOTIC code (References 18 and 30) does not calculate containment pressure during the RCS blowdown. The containment pressure calculation in LOTIC begins after blowdown. 6

At the end of the blowdown phase, the containment pressure is inputed at the compression ratio value. The containment upper and lower compartment temperatures are calculated based on this compression. These temperatures are not necessarily the same as that predicted by the TMD code.

Little contamination is expected to enter the main control room habitability system area during ingress or egress activities during the emergency operating mode. The basis for this position is that during this brief period when the door is open the air flow will be from inside the main control room habitability system area to the outside. Since the pressure will never be below atmospheric in the main control room habitability system area during this interval, little contamination is expected to leak into the area. In such circumstances the makeup air input of up to 1000 cfm to the main control room habitability system area is considered sufficient to prevent significant infiltration. | 10

Offices including the technical support center, living accommodations, and emergency equipment and supplies are also important features in the Main Control Room Habitability System. The scope of the office and living accommodations provided is shown in Figure 1.2.3-3. This shows that sanitary facilities provided include a toilet, shower, and locker room. Also provided is a kitchen that is equipped with a microwave, refrigerator, cabinet space, and a sink. Cabinets located within a main control room contain emergency supplies, first aid equipment, full coverage goggles, contamination clothing for whole body protection from beta radiation, face masks, self-contained breathing apparatus, and emergency radiation monitoring equipment to support possible emergency operations. The self-contained breathing apparatus is effective against smoke, airborne radioactive contamination, oxygen deficient atmosphere. | 10

Fire protection for the main control room is ~~provided by the use of noncombustible equipment in the room and by administrative control over the use of papers, manuals, and log sheets for day-to-day operations~~. | 10

described in the Fire Protection Report (see 9.5.1)

Protection is also afforded by small hand-held fire extinguishers for local fire protection.

Face masks and self-contained breathing apparatus are provided to permit emergency operation. Ionization type smoke detectors are installed in the control room as shown in Figure 7.1.4-1 (sheet 1). Upon detection of smoke in the control room, an alarm is sounded; the detectors do not affect operation of the ventilation system, except to isolate the supply air duct between the Main Control Room and non-essential areas of the El. 732 Control Building via an electrically-released fire damper. 6

6

The operator is responsible for taking appropriate action to extinguish a fire. If he is unable to do so, he may transfer control to the Auxiliary Control Room located in the auxiliary building adjacent to, but separate from, the main control room.

Safe shutdown (ie alternate shutdown) can be achieved and maintained from the backup control center even with the main control room building completely destroyed. (The design basis accident and the loss of main control room habitability are not assumed to occur simultaneously.) The backup control center is described in detail in subsection 7.4.2. Alternate shutdown is described in the Fire Protection Report (see 7.5.1).

Environmental parameters for equipment in the Main Control Room are described in subsection 3.11. The operator is responsible for judging whether or not fire- damaged equipment requires transfer of control to the auxiliary control room. Details on the noncombustible control panels and consoles and on the fire resistant wiring installed in the Main Control Room are given in subsection 7.4.1.1. 6

The hazard to the control room from potential smoke generated by outside facilities (see subsection 2.2.3.5) is minimal due to the distance of separation between the sites and the control building air intake. The capabilities described above in Subsection 6.4.1.2, System Design, provide for the mitigation of consequences from smoke intrusion into the control room from any source.

6.4.1.3 Design Evaluation

The Main Control Room Habitability System has several features that collectively provide the capability needed to satisfy Criterion 19 (10 CFR 50, appendix A). An evaluation of this system, therefore, must take into consideration the contribution provided by the:

1. Shielding enclosing the main control room. Analyses presented in subsection 12.1.2 show that this shielding reduces the control room personnel dosages from external sources created during a LOCA to a small fraction of that permitted.

top deck structure will withstand these loads and remain within the allowable limits established in the Design Criteria.

Design Considerations

1. The blanket panels are hinged on top of the crane wall. The major loads are applied directly into the crane wall.

2. A blanket panel must be flexible, i.e., be capable of deforming out of its plane in response to relatively low forces without disintegrating. Deformation of panels during DBA is permissible, but formation of missiles must be averted.

3. The deck forms an integral part of ice condenser performance during DBA. Structural loads are a function of air pressure and flow relationships, which in turn are affected by deck characteristics.

4. The top deck structures are subjected to loads from the air handling unit.

Material Consideration

1. Refer to Subsection 3.8.3 of the Design Criteria for steel structures.

2. Blanket material must be fire resistant by its own composition or by means of a suitable cover sheet.

INFO ONLY no change

3. Blanket material must not be significant source of halides in gaseous form, either by gradual diffusion of inherent ingredients or by radiolysis of component materials following a DBA.

4. Blanket material must not be a significant source of leachable halides during exposure to containment spray following a DBA.

Thermal and Hydraulic Performance Requirements

1. Heat input to the plenum through the top deck assembly is limited to 13.5 BTU/hr-ft^2.

2. Resistance to air flow during DBA is minimized, in terms of both inertia of panels and obstruction by grating. Panels may reclose or remain open following DBA. Panels open on low differential pressure for small flow rates.

3. A vapor barrier is established on the upper surface of the blanket panels.

Interface Requirements

1. In the process of opening, adjacent blanket panels will interfere with each other. This is acceptable in view of their flexibility.

b. Separate routing of the reactor trip signals from the redundant logic system cabinets is maintained, and in addition, they are separated from the four process channel sets.

2. Engineered Safety Features Actuation System

a. Separate routing is maintained for the four basic sets of ESF Actuation System process sensing signals, comparator output signals and power supplies for such systems. The separation of these four channel sets is maintained from sensors to instrument racks to logic system cabinets. 8

b. Separate routing of the ESF actuation signals from the redundant logic system cabinets is maintained and is separated from the four process channel sets. 8

c. Separate routing of control and power circuits associated with the operation of engineered safety features equipment is required to retain redundancies provided in the system design and power supplies.

3. Vital Power Supply System

The separation criteria presented also apply to the power supplies for the load centers and busses distributing power to redundant components and to the control of these power supplies.

Reactor Trip System and Engineered Safety Features Actuation System process circuits may be routed in the same wireways provided circuits have the same power supply and channel set identity (I, II, III or IV). 8

7.1.2.2.3 Fire Protection

Details of fire protection are provided in ~~Subsection 9.5.1~~ the Fire Protection Report (see 9.5.1).

7.1.2.3 Physical Identification of Safety Related Equipment

Adequate identification is provided to distinguish Reactor Trip, Engineered Safety Features and Instrumentation and Control Power Supply Systems as safety related. As previously stated there are four protection channel set racks. A color coded nameplate on each rack of each set is used to identify the protection sets. The color coding of the protection set nameplates is:

Protection Set	Color Coding
I	Red with white lettering
II	Black with White lettering
III	Blue with white lettering
IV	Yellow with black lettering

7.2.1.2.3 Spatially Dependent Variables

The following variable is spatially dependent:

1. Reactor coolant temperature: See Paragraph 7.3.1.2 for a discussion of this variable spatial dependence.

7.2.1.2.4 Limits, Margins and Levels

The parameter values that will require reactor trip are given in the SNP Technical Specifications, and in Chapter 15, Safety Analysis. Chapter 15 demonstrates that the setpoints used in the SNP Technical Specifications are conservative. (Refer also to Subparagraph 7.1.2.1.9)

The setpoints for the various functions in the Reactor Trip System have been analytically determined such that the operational limits so prescribed will prevent fuel rod clad damage and loss of integrity of the Reactor Coolant System as a result of any Condition II incident (anticipated malfunction). As such, the Reactor Trip System limits the following parameters to:

1. Minimum DNBR - 1.30 6
2. Maximum System Pressure - 2750 psia
3. Fuel rod maximum linear power - maximum rated power. 6

The accident analyses described in Section 15.2 demonstrate that the functional requirements as specified for the Reactor Trip System are adequate to meet the above considerations, even assuming, for conservatism, adverse combinations of instrument errors (Refer to Table 15.1.3-1). Safety limits associated with the reactor core and Reactor Coolant System, plus the Limiting Safety System Setpoints, are presented in the SNP Technical Specifications.

7.2.1.2.5 Abnormal Events

The malfunctions, accidents or other unusual events which could physically damage Reactor Trip System components or could cause environmental changes are as follows:

1. Earthquake (discussed in Chapter 2 and Chapter 3).
2. Fire (See ~~Section~~ the Fire Protection Report, 9.5.1)
3. Explosion (Hydrogen buildup inside containment). (See Section 6.2).
4. Missiles (See Sections 3.5 and 10.2.3).
5. Flood (See Chapter 2 and 3).
6. Wind and Tornadoes (See Section 3.3).

All instrumentation, control and communication lines that will be required for operation in the flood mode are either above the design basis 6

b. Containment pressure (not required for Steam Generator tube rupture) 6

2. Secondary System Accidents

   a. Pressurizer pressure
   b. Steam line pressures
   c. Steam line pressure rate
   d. Reactor coolant average temperature (T_{avg}) 8
   e. Containment pressure

7.3.1.2.3 Spatially Dependent Variables

The only variable sensed by the Engineered Safety Features Actuation System which has spatial dependence is reactor coolant temperature. The effect on the measurement is negated by taking multiple samples from the reactor coolant hot leg and electronically averaging these samples in the process protection system. 8

7.3.1.2.4 Limits, Margins and Levels

Prudent operational limits, available margins and setpoints before onset of unsafe conditions or requiring protective action are discussed in Chapters 15 and the SQN Technical Specifications. (Refer also to Subparagraph 7.1.2.1.9)

7.3.1.2.5 Abnormal Events

The malfunctions, accidents, or other unusual events which could physically damage protection system components or could cause environmental changes are as follows:

1. Loss of coolant accident (See Sections 15.3 and 15.4)
2. Steam breaks (See Sections 15.3 and 15.4)
3. Earthquakes (See Chapter 3 and Chapter 2)
4. Fire (See Subsection 9.5.1) OK- info only
5. Explosion (Hydrogen buildup inside containment) (See Section 15.4)
6. Missiles (See Section 3.5 and 10.2.3)
7. Flood (See Chapters 2 and 3)

7.3.1.2.6 Minimum Performance Requirements

Minimum performance requirements are as follows:

1. System response times:

   The Engineered Safety Features actuation system response time, or time delay, is defined as the interval required for the Engineered Safety Features sequence to be initiated subsequent to the point in time that the appropriate variables(s) exceed setpoint(s). The delay

Results

RCS Inventory and Pressure Control

The pressurizer PORV's might be subject to inappropriate opening due to environmental effects which could exist from high energy pipe breaks inside containment. Such inappropriate opening has been judged to be acceptable because (1) adequate annunciation is provided to alert the operator to the event, (2) adequate time is available for operator action, and (3) the control system design is such that operator action is possible.

RCS inventory and pressure control could also be jeopardized by inappropriate control circuit actuations which would lead to a reactor coolant pump (RCP) seal failure. Control system modifications have been made to both the component cooling water system, which supplies cooling to the pumps thermal barrier and to the chemical and volume control system (CVCS), which supplies seal injection water to assure seal integrity in the presence of fire-induced spurious control system actuations. In that these modifications would also render the seals immune to damage due to pipe break induced inappropriate actuations, this feature was judged to be assured without further evaluation.

Steam Generator Inventory and Pressure Control

The control system for the SG power operated relief valves (PORV's) could be affected by high energy pipe breaks in the main steam valve room. This inappropriate opening is considered to be acceptable because (1) adequate annunciation is provided to alert the operator to the event, (2) adequate time is available for operator action, and (3) the control system design assures that the operator can override the inappropriate open signal. For a steamline breaks (1.4 ft^2) downstream of the flow restrictor coupled with a spurious opening of a steam generator power operated relief valve and its failure to close the steamline break analysis performed for a break upstream of the flow restrictor (4.6 ft^2) is bounding. 1

An inappropriate opening of a main steam isolation valve bypass valve would defeat steam generator isolation. Normally the control circuits for these valves are deenergized by opening a handswitch in the MCR after the valves are closed during plant startup. ~~It was discovered during the SQN 10CFR50 Appendix R evaluation that a fire in the MCR could cause spurious opening of these valves. This failure was addressed by removing the fuses to the control circuits of these valves in the event of a fire in the MCR.~~ 6

ECCS Response

An inappropriate actuation of the reactor building auxiliary flow and equipment drain sump pump could jeopardize long term ECCS response by pumping water out of the ECCS active sump. This actuation is considered to be acceptable because (1) adequate indication is provided to alert the operator to the event, (2) adequate time is available for operator action, and (3) control system design is such that operator action is possible.

7.4 SYSTEMS REQUIRED FOR SAFE SHUTDOWN

The process signals and information necessary for safe shutdown are available from instrumentation channels that are associated with major systems in both the primary and secondary sides of the Nuclear Steam Supply System. These channels are normally aligned to serve a variety of operational functions, including startup and shutdown as well as protective functions.

The instrumentation and control capability which is identified as being required for maintaining safe shutdown of the reactor is by definition, the minimum under nonaccident conditions. This capability will permit the necessary operations that will:

1. Prevent the reactor from achieving criticality in violation of the Technical Specifications and

2. Provide an adequate heat sink such that design and safety limits are not exceeded.

The designation of systems that can be used for maintaining a safe shutdown by providing the necessary functions depends on identifying those systems which provide the following capabilities:

1. Boration.

2. Residual heat removal.

Discussions of the systems required for a safe shutdown, which are identified in Section 7.4.1, together with the applicable codes, criteria, and guidelines are contained in other sections of the Safety Analysis Report and the Fire Protection Report (see 9.5.1).

7.4.1 Description

7.4.1.1 Control Room Availability

The main control room is located in the Control Building, which is a Seismic Category I Structure, at elevation 732. The Main Control Room Ventilation System, is described in detail in Section 9.4.1, is designed to maintain habitability in accordance with GDC-19 during essentially all conditions.

Extensive fire in the Main Control Room could, however, force its evacuation. In that unlikely event, control will be transferred to the Auxiliary Control Room located in the Auxiliary Building. The auxiliary controls provide a capability to bring the units to and maintain them at a safe shutdown condition. Auxiliary controls are discussed ~~in Sections 7.4.1.2, 7.4.1.3, and 7.4.1.4. A main control room fire coincident with another serious emergency is not considered credible~~ below and in the Fire Protection Report (see 9.5.1).

The construction materials used in the main control room are noncombustible. The main control boards are of steel and the internal surface is painted with a fire-retardant paint. Electrical wiring is flame resistant as shown by the vertical flame test as described in the Insulated Power Cable Engineer's Association, IPCEA, Publications and the American Society for Testing Materials, ASTM D 470-64T.

Each control and electrical panel is monitored by a combustion product ionization-type detector which annunciates in the Main Control Room in case of fire or smoke. The location of these detectors is shown in Figure 7.1.4-1. | 10

For details on the habitability systems of the main control room, see Section 6.4.

7.4.1.2 Auxiliary Controls

In case it becomes necessary to evacuate the main control room due to fire or smoke, the capability exists to establish and maintain the reactor(s) in a safe shutdown condition from locations outside the Main Control Room. This capability is discussed in the Fire Protection Report (see 9.5.1).

~~The electrical controls are located on appropriate 480-volt MCC boards, 480-volt shutdown boards or 6900 volt shutdown boards. These boards are located in the Auxiliary Building on Elevations 734 and 749. The auxiliary control room is located in the Auxiliary Building on Elevation 734 adjacent to the Control Building.~~

~~The auxiliary control boards in the auxiliary control room are separated by a firewall to protect redundant functions and electrical separation is maintained.~~ | 10

Each auxiliary control function is designed with a transfer switch to disconnect it from the main control room. Placing the transfer switch in the local operating position will give an annunciating alarm in the control room and will turn off the motor control position lights on the control room panel. For certain systems the purpose of this transfer switch is to prevent actuation of the system due to a spurious signal caused by fire.

Any exceptions to the above are evaluated and documented on design criteria SQN-DC-V-2.17 and SQN-DC-V-12.2.

7.4.1.3 Systems Available for Hot Shutdown

To achieve and maintain hot shutdown for various nonaccident reactor conditions, essential control functions are provided both inside and outside the main control room for the following systems:

	System	FSAR Reference Section
1.	Reactor Coolant System	Chapter 5
2.	Chemical and Volume Control System	Section 9.3.4
3.	Residual Heat Removal System	Section 5.5.7

Systems and instrumentation required for fire safe shutdown is described in the Fire Protection Report (see 9.5.1).

4. Component Cooling System — Section 9.2.1

5. Main Steam System — Section 10.3

6. Ventilation System — Section 9.4

7. Essential Raw Cooling Water System — Section 9.2.2

8. Auxiliary Feedwater System — Section 10.4.7.2

9. Diesel Generators — Chapter 8

In addition to the functions indicated above, the turbine may be tripped in the main control room or at the turbine; the reactor may be tripped in the main control room or at the reactor trip switchgear; and all automatic systems continue functioning as discussed in Section 7.3.

~~Other systems are disconnected from the main control room to prevent inadvertent operation due to a fire.~~

7.4.1.3.1 Main Controls

The indicators and controls available in the main control rooms are discussed in Section 7.1.4.

7.4.1.3.2 Auxiliary Controls

The indicators and controls available outside of the main control room are described in this section.

1. Reactor Coolant (RC) System
   The following information is available to the operator in the auxiliary control room:

   a. RC temperature.
   b. Pressurizer pressure.
   c. Pressurizer level.
   d. Pressurizer relief tank level.
   e. Pressurizer relief tank pressure.

   Controls for the RC System pumps, the oil-lift pumps, the valves necessary to vent the pressurizer, and the pressurizer heaters are available outside of the main control room.

2. Chemical and Volume Control System

   The operator can control the following functions and equipment from outside the main control room:

   a. Charging and letdown flow.
   b. Demineralizer bypass. 6

c. Divert flow to the holdup tank.
d. Charging pumps.
e. Boric acid tank flow.
f. Seal flow. 6

3. Residual Heat Removal (RHR) System

To achieve and maintain hot shutdown, the only function required of this system is to ensure enclosure of the RHR isolation valves. ~~The operator can control these valves and prevent inadvertent operation due to fire from outside the MCR~~.

4. Component Cooling System (CCS)

The header pressures and flows are indicated on the auxiliary control room panels. Controllers for the following functions and equipment are located outside the main control room:

a. The main CCS pumps.
b. The booster pumps.
c. All header flow control.
d. Diversion valves to the component coolers.

5. Main Steam System

The steam generator pressures are displayed in the auxiliary control room. The steam flow to the auxiliary feed pump turbine, the operation of the power relief valves, and the cessation of blowdown and sampling can be controlled from the panels outside the main control room. 6

6. Ventilation System

The containment pressure is displayed on auxiliary control panels for both units.

The controllers needed to control the lower compartment cooler units, the control rod driver cooler units, and the recirculation valves are located on panels outside the main control room.

7. Essential Raw Cooling Water (ERCW) System

From outside of the main control room, the operator has control of the following:

a. ERCW pumps.
b. Header flow.
c. Header isolation.
d. Header pressure.
e. Header diversion valves.
f. Cooler discharge flow valves.

8. Auxiliary Feedwater (AFW) System

Panels outside the main control room contain the displays and controls for the following equipment and functions:

a. AFW pumps.
b. ERCW supply header isolation valves.
c. Steam generator level control.
d. AFW pump discharge pressure.
e. Steam generator levels. 6
f. AFW flow to each steam generator.
g. Total turbine-driven pump header flow.

The steam generator levels are provided by two channels of instrumentation.

9. Diesel Generators

The operator has the ability to initiate emergency start and emergency stop of the diesel generators from outside the main control room.

7.4.1.4 Systems Available for Cold Shutdown

The systems available to achieve and maintain hot shutdown are available also for cold shutdown.

7.4.1.4.1 Main Controls

The indicators and controls available in the main control room are discussed in Section 7.1.4.

7.4.1.4.2 Auxiliary Controls

In addition to the functions that are available outside the main control room discussed in Section 7.4.1.3.2, the operator is provided with control of the following RHR functions and equipment:

1. Inflow valves.
2. RHR pumps.
3. Recirculation flow.
4. Cross flow.
5. Outlet flow.
6. Outlet temperature.

To achieve cold shutdown the operator must be able to defeat the safety injection signal trip circuit and close the accumulator isolation valves or vent the accumulators to decrease their pressure. The instrumentation and controls for certain systems may require some modification in order that their functions may be performed outside the control room. Note that the plant design does not preclude attaining the cold shutdown condition from outside the control room. An

and repairs can be made

assessment of plant conditions can be made ~~on a long term basis (a week or more) to establish procedures for making the necessary physical modifications to instrumentation and control equipment~~ in order to attain cold shutdown. During such time the plant could be safely maintained at hot shutdown condition.

~~Detailed procedures to be followed in effecting cold shutdown from outside the control room are given in AOI-27.~~ 6

7.4.1.5 Additional Systems Available Outside the Main Control Room

The following systems are not required for safe shutdown but are provided with controls both inside and outside the main control room so essential functions can be maintained:

1. Containment Spray System, Section 6.2.2.
2. Safety Injection System, Section 6.3.
3. Waste Disposal System, Chapter 11.

7.4.1.5.1 Main Controls

The indicators and controls available in the main control room are discussed in Section 7.1.4.

7.4.1.5.2 Auxiliary Controls

1. Containment Spray System

   The controllers for the containment spray pumps, the spray header flow, and the supply flow are available outside the main control room.

2. Safety Injection System

   From panels located outside the main control room, the following functions and equipment can be controlled:

   a. Accumulator tank pressure.
   b. Accumulator filling flow.
   c. Flow to the cold legs of the RC System.
   d. Accumulator tank to RCDT flow.
   e. Flow to the RHR heat exchangers.
   f. SIS pumps.
   g. Flow from the refueling water storage tank.
   h. Flow to the CCP injection tank. 8
   i. Containment sump discharge.

3. Waste Disposal System

   The Gaseous and Liquid Processing Systems and the boron recycle panels are local panels located in the Auxiliary Building. The sump

pump and isolation valves are controlled from panels in the vicinity of the auxiliary control room.

7.4.2 Analysis

Hot shutdown is a stable plant condition, automatically reached following a plant shutdown. The hot shutdown condition can be maintained safely for an extended period of time either automatically or manually. In the unlikely event that access to the control room is restricted, the plant can be safely kept at hot shutdown or taken to cold shutdown by the use of the monitoring indicators and the controls listed in Sections 7.4.1.3 and 7.4.1.4. These indicators and controls are provided outside as well as inside the control room.

The safety evaluation of the maintenance of a shutdown from the main control room has included consideration of the accident consequences that might jeopardize safe shutdown conditions. The accident consequences that are germane are those that would tend to degrade the capabilities for boration, adequate supply for auxiliary feedwater and residual heat removal.

The results of the accident analyses are presented in Chapter 15. Of these, the following produce the most severe consequences that are pertinent:

1. Uncontrolled boron dilution.
2. Loss of normal feedwater.
3. Loss of external electrical load and/or turbine trip.
4. Loss of all alternating current power to the station auxiliaries (station blackout).

It is shown by these analyses that safety is not compromised by these incidents with the associated assumptions being that the instrumentation and controls indicated in Section 7.1.4 are available to control and/or monitor shutdown. These available systems will allow a maintenance of hot shutdown even under the accident conditions listed above which would tend toward a return to criticality or a loss of heat sink.

Fire Safe Shutdown Analysis is discussed in the Fire Protection Report (see 9.5.1)

receive power from the 120V AC backup source under operator control. The transfer breakers are mechanically interlocked to prevent paralleling the inverters with the backup source.

Therefore no single failure in the Instrumentation and Control Vital Power Supply System or its associated power supplies can cause a loss of power to more than one of the redundant loads.

The inverters are designed to maintain their outputs within the limits of 60 Hz ± 1.0 percent and 120V AC ± 2 percent. The loss of the alternating-current or direct-current inputs are alarmed in the control room, as is the loss of an inverter's output. There are no inverter breaker controls on the control board, as no manual transfers are necessary in the event of loss of the 480V AC preferred power source.

Physical separation and provisions to protect against fire are discussed in Chapter 8 and the Fire Protection Report (see 9.5.1)

Based on the scope definitions presented in Reference 1 (IEEE 308- September, 1971), Reference 2 (IEEE 279-1971), and References 3 (IEEE 338-1971), the criteria which are applicable to the Instrumentation and Control Vital Power Supply System are IEEE 308-Sept., 1971 and Regulatory Guide 1.6 (March, 1971). Availability of this system is continuously indicated by the operational status of the system and is verified by periodic testing as discussed in sections 8.3.1.1 and 8.3.2.1.

7.6.2 Residual Heat Removal Isolation Valves

7.6.2.1 Description

There are two motor operated gate valves (FCV 74-1 (8702) and FCV 74-2 (8701) as shown in logic diagram, Figure 5.5.7-3) in series in the inlet line from the Reactor Coolant System to the Residual Heat Removal System. They are normally closed and are only opened for residual heat removal after system pressure is reduced below 380 psig and system temperature has been reduced to approximately 350°F. (See Chapter 5 for details of the Residual Heat Removal System). They are the same type of valve and motor operator as those used for accumulator isolation, but they differ in their controls and indications in the following respect:

The pump suction isolation valve adjoining the Reactor Coolant System is interlocked with a pressure signal to prevent its being opened whenever the system pressure is greater than 380 psig. There are also interlocks which prevent its begin opened unless the RWST suction valve (FCV-63-1) and containment sump isolation valve (FCV-63-72) are fully closed. During normal plant operation, power is removed from the valve control circuit to prevent inadvertent opening of the valve. Valve status indication is provided at the control switch onthe Main Control Board at all times.

During residual heat removal operations, power is restored to the valve and it is opened from the
control switch on the Main Control Board. Annunciation to warn against system overpressurization
is provided to the operator by a high RHR suction pressure alarm. This alarm is actuated from any 10
one of two pressure switches located on the RHR common header suction piping.

The other pump suction isolation valve, adjoining the Residual Heat Removal System, is similarly interlocked to prevent opening closed with

Electrical Penetration Assemblies

The Westinghouse canister type electrical penetration assemblies have been tested to TVA specification requirements which conform to IEEE-317, 1971, "IEEE Standard for Electrical Penetration Assemblies in Containment Structures for Nuclear Power Generating Stations." The Conax and Westinghouse modular electrical penetration assemblies meet the 1976 version of IEEE-317. 11

The documentation of successful completion included certified test reports of all tests required and listed in the specifications and quality assurance appendix, and applicable TVA inspector's reports.

Each electrical penetration assembly furnished has been shop inspected by a commissioned representative of the National Board of Boiler and Pressure Vessel Inspectors. Each assembly has been Code stamped, in accordance with the 1971 Edition ASME Boiler and Pressure Vessel Code, Section III.

The dose rate at which TVA has conducted 100 hour tests on materials and equipment is 10^6 Rad/hr dose rate that may occur during the first hour of a LOCA. It is the TVA position that a factor of 5 in dose rate is not significant in this region. There is no mechanism that TVA is aware of that would tend to produce significant increases in degradation in the region between 10^6 and 10^7 Rad/hr. However, radiation-induced oxidation of materials can become an important damage mechanism at lower exposure rates and consequent longer exposure times. Therefore, IEEE 278, "Guide For Classifying Electrical Insulating Materials Exposed to Neutron and Gamma Radiation," recommend using exposure rates above 10^7 Rad/hr. It is the TVA position that 10^6 Rad/hr for 100 hours represents a reasonable and conservative combination of dose rate and exposure time for radiation testing.

Cable terminations to low voltage power, control, and indication penetration assemblies are generally made in all metal splice boxes. However, in a number of instances on the outboard side of containment electrical penetrations, field cables were spliced to the penetration pigtails in cable trays. In these cases, a special enclosure was used to act as a qualified fire stop (refer to Figure 8.3.1-37, -38, and -39). These particular splices are located within the last 5-foot section of the cable tray. The trays in the annulus area of containment containing these splices are fitted with solid top and bottom covers in the immediate area of these splices. A qualified fire barrier made of silicone foam and ceraform/kaowool fiberboard was installed on the side of the splice opposite to the penetration as shown on Figure 8.3.1-37, -38, and -39. On the other side of the splice in the tray (end of tray runs toward the electrical penetration), kaowool materials were inserted in the voids between conductors, and all the exposed conductors to the electrical penetration were covered with Flamemastic material. This configuration constitutes a qualified fire barrier which in the unlikely event of a fire in the splice area, will contain and isolate the fire from adjacent trays of electrical equipment.

Splices were made in accordance with vendor-recommended splicing procedures, and fully meet the environmental qualifications required for this location. The fire barrier and the electrical penetration splice box designs are based upon tests performed by Factory Mutual and TVA on full scale mockups. The TVA test results have been reviewed and approved by the NRC.

8.3.1.3 Conformance with Appropriate Quality Assurance Standards 5

Conformance with appropriate quality assurance is described in Chapter 17 and the Nuclear Quality
Assurance Plan. 8

8.3.1.4 Independence of Redundant AC Power Systems

The criteria and their bases which have been used to establish the minimum requirements for
preserving the independence of redundant Class 1E electric systems are stated in IEEE-308 and 5
Regulatory Guide 1.6, Rev. 0. The TVA Nuclear Quality Assurance Plan describes the
administrative responsibility and control that has been provided to assure compliance with these 8
criteria during the design and installation.

The nuclear power generating station protection system (GSPS) includes the reactor protection
system (RPS), engineered safety features (ESF), essential supporting auxiliary systems (ESAS), and 5
Class 1E electric systems. These systems are required for the safe shutdown of the reactor.
Redundant systems are provided so that single failures, including failure of a redundant subsystem,
will not result in failure to safely shutdown the reactor.

The reactor protection system (RPS) is the overall complex of instrument channels, power supplies, logic channels, and actuators together with their interconnecting wiring, involved in producing a reactor trip.

The engineered safety features (ESF) and essential supporting auxiliary systems (ESAS), as elements of the nuclear power generating station protection system, are the systems which take automatic action to isolate the reactor and to provide the cooling necessary to remove the thermal energy and thus enable the containment of fission products within the reactor vessel and primary containment in the event of a serious reactor accident. Certain ESAS systems may also be on continuous duty to prevent as well as to mitigate reactor accidents. Examples of ESAS systems are component cooling, emergency raw cooling water, together with their supporting electrical power and control systems.

These ESF systems consist of sensor instrument channels, power supplies, actuation channels, and actuators together with their interconnecting wiring involved in the operation of engineered safety features are actuated by the separate actuation channels. Each coincidence network energizes an engineered safety features actuation device that operates the associated safety features equipment (e.g., motor starter, valve operator, etc.).

INFO ONLY

8.3.1.4.2 Cable Routing and Separation Criteria

Electrical wiring for the GSPS, which includes the RPS, ESF, ESAS, and Class 1E electric systems, are segregated into separate divisions of separation (channels or trains) such that no single event, such as a short circuit, fire, pipe rupture, missile, etc., is capable of disabling sufficient equipment to prevent safe shutdown of the reactor, removal of decay heat from the core, or to prevent isolation of the primary containment. The degree of separation required for GSPS electrical cables varies with the potential hazards in a particular zone or area of the power plant. These criteria do not attempt to classify every area of the nuclear plant, but specifies minimum requirements and guidelines that have been applied with good engineering judgment as an aid to prudent and conservative layout of electrical cable trays, wireways, conduits, etc., throughout the plant (both inside and outside the containment).

Mechanical Damage (Missile) Zone

Zones of potential missile damage exist in the vicinity of heavy rotating machinery or near other sources of mechanical energy, such as pipe whip, steam release, or pipes carrying liquids under high pressure. Layout and arrangement of cable trays, conduit, wireways, etc., are such that no locally generated force or missile can destroy both redundant engineered safety feature functions. In rooms or compartments having heavy rotating machinery, such as the reactor coolant pumps, the reactor feedwater turbines, or in rooms containing high-pressure feedwater piping or high-pressure steam lines, a minimum separation of 20 feet, or a minimum 6-inch thick reinforced concrete wall is provided between trays containing cables of different divisions. In an area containing an operating crane, such as the upper compartment of the reactor building, there is a minimum horizontal separation of 20 feet or a minimum 6-inch thick reinforced concrete wall between trays containing cables of the different divisions of separation.

Fire Hazard Zone

The electrical cabling has been arranged so as to eliminate, insofar as is practical, all potential for fire damage to cables and to separate the redundant divisions of generating station protection system (GSPS) cabling. Such arrangement ensures that fire in one division will not cause damage to cables in another division. Routing of power or control cable for GSPS through rooms or spaces where there is potential for accumulating large quantities (gallons) of oil or other combustible fluids through leakage or rupture of lube oil or cooling systems is avoided where possible. In cases where it is impossible to provide other routing, only one division of GSPS cables are allowed in any such space, and the cables are protected from dripping oil by the use of conduits or flanged covered cable trays designed to prevent oil from reaching the cables. No GSPS cables are routed through rooms containing oil storage tanks. In any room (except the auxiliary instrument room and the annulus) or space in which the only source of fire is of an electrical

nature, cable trays carrying redundant divisions of GSPS cables have a minimum horizontal separation of 3 feet if no physical barrier exists between the trays. If a horizontal separation of at least 3 feet is not attainable, a fire-resistant barrier is provided. This barrier is either a 1/2-inch minimum thickness of Marinite-36 (or its equivalent), or a fire-resistant barrier of two sheets of minimum l4-gauge steel with a minimum 1-inch air space separating the two sheets of steel, extending at least 1 foot above (or to the ceiling) and 1 foot below (or to the floor) the line-of-sight communication between the two trays. Vertical stacking of trays carrying cables of different divisions of GSPS cables is avoided whenever possible. However, whenever it becomes necessary to stack open- top trays vertically, one above the other, there is a minimum vertical separation of 5 feet between trays carrying cables of different divisions. The lower tray has a solid steel cover and the upper tray has a solid steel bottom. If 5 feet is not attainable, then a fire-resistant barrier is provided. This barrier is either a 1/2-inch minimum thickness of Marinite-36 (or its equivalent), or two sheets of minimum 14-gauge steel with a minimum 1-inch air space separating the two sheets of steel. This barrier extends a minimum of 3 feet (or to nearest wall) on each side of the tray edge. In cases where trays carrying cables of different divisions of separation cross, there is a minimum vertical separation of 12 inches (tray top of lower tray to tray bottom of upper tray) with the bottom tray covered with a solid steel cover and the top tray provided with a solid steel bottom for a minimum distance of 3 feet on each side of the tray crossing.
Additional information on electrical cable separation and fire protection features provided can be found in the Fire Protection Report (see 9.5.1).

Cable Spreading Room

The cable spreading room is the area provided under the main control room where cables leaving the various control board panels are dispersed into cable trays or conduits for routing to all parts of the plant. Since the cable spreading room is protected from missiles by its seismic Category I walls and there are no internal sources of missiles, such as high-pressure piping or heavy rotating machinery, the only potential source of damage to redundant cables is from fire. ~~Smoke detectors and a fire protection suppression system have been installed ensuring that potential for fire damage to cables will be minimized in the cable spreading room~~. Where GSPS cables of different divisions (train A or train B) of separation approach the same or adjacent unit control panel (see the Main Control Room discussion) with spacing less than 3 feet, these cables are run in metal (rigid or flexible) conduit or enclosed wireway to a point where 3 feet of separation exists. A minimum horizontal separation of 3 feet separates trays carrying cables of different divisions (channels or trains) if no physical barrier exists between the trays. Where a horizontal separation of 3 feet does not exist, a fire-resistant barrier of either a 1/2-inch minimum thickness of Marinite-36 (or its equivalent), or two sheets of steel (minimum 14 gauge) with a minimum 1-inch air space separating the two sheets of steel, extending at least one foot above (or to the ceiling) and one foot below (or to the floor) the line-of-sight communication between the two trays. Vertical stacking of cable trays carrying cables of different divisions of separation has been avoided

Fire protection features provided for the cable spreading room are described in the Fire Protection Report (see 9.5.1).

whenever possible. However, whenever it becomes necessary to stack open trays vertically, one above the other, there is a minimum vertical separation of five feet between trays carrying cables of different divisions of separation. The lower tray has a solid steel cover and the upper tray has a solid steel bottom. If five feet is not attainable, then a fire-resistant barrier is provided. This barrier is either a 1/2-inch minimum thickness of Marinite-36 (or its equivalent), or two sheets of steel (minimum 14 gauge) with a minimum 1-inch air space separating the two sheets of steel. This barrier extends a minimum of 1 foot (or to the nearest wall) on each side of the tray edge.

In cases where trays carrying cables of different divisions of GSPS cables cross horizontally, there shall be a minimum vertical separation of 1 foot (tray top of lower tray to tray bottom of upper tray). The bottom tray shall be covered with a solid steel cover, and the top tray provided with a solid steel bottom for a minimum distance of 3 feet on each side of the tray crossing or to the wall(s). 6

Auxiliary Instrument Room and Reactor Building Annulus 6

The auxiliary instrument room is the area under the cable spreading room. Since the auxiliary instrument room is protected from missiles by its seismic Category I walls and there are no internal sources of missiles, such as high-pressure piping or heavy rotating equipment, the only potential source of damage to redundant cables is from fire. No ~~combustible materials are stored in this room, and no~~ power cables that have a protective device rated greater than 30 ampere are routed in this room unless they are in separate conduits. F~~ire and smoke detectors with control room alarm, and a carbon dioxide fire protection system with hose rack as backup, have been installed~~. 6

The auxiliary instrument room contains the process instrument racks, the solid-state protection racks, and associated instrument and relay racks.

Solid-bottom type cable trays with solid steel flanged covers have been used where a minimum horizontal separation of 1 foot and a minimum vertical separation of 3 feet cannot be maintained. A minimum horizontal separation of 1 foot is provided between trays carrying cables of different divisions (channels or trains) if no physical barrier exists between them. If required the same barriers as in the cable spreading room are provided. Whenever it becomes necessary to stack train A or B trays vertically, one above the other, there is a minimum separation of 3 feet between these trays carrying cables of different divisions. If 3 feet is not attainable, then a fire-resistant barrier is provided. Whenever it becomes necessary to stack channel I, II, III, or IV trays vertically, one above the other, there is a minimum separation of 1 foot between the tray top of lower tray and the tray bottom of upper tray. If 1 foot is not attainable, then a fire-resistant barrier is provided. These barriers for trays (trains or channels) stacked vertically are equivalent to either a 1/2-inch minimum thickness of Marinite-36 (or its equivalent), or two sheets of steel. This barrier extends a minimum of 1 6

Fire protection features provided for the auxiliary instrument room are described in the Fire Protection Report (see 9.5.1).

foot (or to nearest wall) on each side of the tray edge. In cases where redundant trays cross, there is a minimum vertical separation of 1 foot (tray top of lower tray to tray bottom of upper tray) with covers and bottoms 3 feet on each side of crossing. 6 As the cable trays or enclosed wireways leave the solid-state protection system racks, they are spread as soon as possible to attain these separations.

The Annulus

The annulus is the area in the reactor building between the steel containment vessel and the concrete shield building. Cables leaving the various electrical penetrations in the annulus are dispersed into cable trays or conduit for routing through the shield building wall to other areas of the plant. Since the annulus is missile protected by its seismic Category I wall and there are no internal sources of missiles 6 such as rotating heavy machinery, the only potential source of damage to redundant cables would be from fire. Separation requirements for raceways containing redundant divisions of GSPS cables are the same as the Auxiliary Instrument Room. Fire protection features provided for the Annulus are described in the Fire Protection Report (see 9.5.1).

Main Control Room and Auxiliary Control Room

Redundant GSPS cables enter the main control room through separate floor openings. Each unit control panel, which has redundant components, has a minimum of three separate vertical and/or horizontal risers (enclosed wireways) from each of the respective terminal block groups to the control room floor (or bottom of walk space). 6 Non-safety related cables are routed through one or more riser(s), preferably near the center of the control panel. 6 The redundant GSPS cables (train A or train B separation) are routed separately in each of the other two or more risers, preferably one near each end of the control panel. Risers of like trains of separation have been arranged such that the adjacent panel has a corresponding like train riser (i.e., train A in one panel has train A nearest it in the adjacent panel).

The minimum separation distance between redundant Class 1E circuits internal to Control Boards, Panels, Relay Racks, etc., is 6 inches of free air space. Wherever this separation distance is not maintained, barriers are provided between redundant Class 1E wiring. Within the Westinghouse supplied main and auxiliary control room panels, braided sheath material, such as Belden Braid, is an acceptable barrier for reducing the redundant Class 1E separation to less than 6 inches. The braid is used only over wire with teflon or other approved insulation. 6 Braid covered wiring for redundant Class 1E circuits are restrained such that their braids do not touch nor are they able to migrate with time to touch.

Within an enclosure containing multiple divisions of wiring the redundant divisions of Class 1E wiring are separated from non-divisional wiring by a 6-inch air space or barrier, except as described below. If non-divisional wiring must be terminated on a Class 1E (divisional) component

INFO ONLY

(switch, relay, terminal block, etc.), the component must be rated for the maximum voltage and current which could be applied to the non-divisional component and the non-divisional circuit is run with the divisional wiring, terminated on the divisional riser, and treated as a non-divisional cable routed with divisional (GSPS) cables per cable tray and conduit systems separation requirements.

Most Class 1E panels and enclosures contain wiring for only one division of redundant Class 1E circuits and wiring for non-divisional circuits. For these enclosures the non-divisional circuit wiring is assumed to be in close proximity to the wiring for the single division of Class 1E circuits in the enclosure. Therefore, the entire non-divisional circuit (including external cabling) is separated from all wiring and cabling of the opposite redundant division of Class 1E circuits. All non-divisional cables routed to the enclosure are treated as "non-divisional cables routed with divisional (GSPS) cables" per cable tray and conduit systems separation requirements. Also see section 7.7.1.10 for electrical separation in the panels. 6

If both non-divisional wiring and divisional wiring are terminated on the same component (switch, relay, terminal block, etc.), the component must be rated for the maximum current and voltage that could be applied to the non-divisional circuit. For example, a Train "A" valve limit switch enclosure may contain Class 1E wiring for annunciation or valve position status lights. The non-divisional wiring is in close proximity to the Train "A" wiring and must not be routed with Train "B" cables or routed to Train "B" equipment.

Wiring for utility power outlets and lighting circuits installed in control boards, panels, or enclosures are in dedicated conduits to provide separation from Class 1E and Non-Class 1E wiring.

Non-safety related functions that are derived from Class 1E circuits must employ adequate isolation. Isolation is adequate if no credible failure on the non-Class 1E circuit prevents the Class 1E circuit from performing its design basis function. Credible failures include short circuits, open circuits, grounds, and the application of the maximum credible AC or DC potential.

Separation of Class 1E Electric Equipment

All Class 1E electric equipment has physical separation, redundancy, and a controlled environment to prevent the occurrence of an external event that would threaten the safe shutdown of the reactor. No internally generated fault can propagate from Class 1E electric equipment to its redundant equipment during any design basis event. All Class 1E electric equipment that has to operate during a flood has been located above maximum possible flood level unless it is designed to operate submerged in water.

Separation for fire protection is provided as described in the Fire Protection Rpt (see 9.5.1).

INFO ONLY

The Class 1E electrical loads are separated into two or more redundant load divisions (channels or trains) of separations. The number of divisions has been determined by the number of independent sources of power required for a given function. The electric ipment that accommodates these redundant divisions is separated by sufficient physical distance or protective barriers. The separation distance has been determined by the severity and location of hazards. The environment in the vicinity of the equipment is controlled or protection provided such that no environmental change or accident will adversely affect the operation of the equipment.

The physical identification of safety-related electrical equipment is in accordance with Paragraph 8.3.1.5.

6900-Volt Equipment

The diesel generators and 6900-volt shutdown boards are designed for a two-division (train A and train B) separation. The 6900-volt equipment is located in seismic Category I structures. The diesel generators are located in the diesel generator building at approximately elevation 722 and have reinforced concrete barriers separating each unit from all other units and have no single credible hazard available that would jeopardize more than one unit. The diesel generator arrangements are shown in Figure 8.3.1-1.

The 6900-volt shutdown boards are located in the auxiliary building at approximately elevation 734 (See Figure 8.3.1-2). A minimum distance of 10 feet separates shutdown board 1A-A from board 2A-A, and shutdown board 1B-B from 2B-B. An 8 inch reinforced concrete block wall extending to the ceiling is used to separate 6900-volt shutdown boards 1A-A and 2A-A from shutdown boards 1B-B and 2B-B.

480-Volt Equipment

The 480-volt shutdown boards, 480-volt reactor MOV boards, 480-volt reactor vent boards, and control and auxiliary building vent boards are separated into train A and B groupings by 8 inch reinforced concrete block walls extending to the ceiling between redundant trains. The 480-volt shutdown board transformers associated with each power train are separated from the transformers associated with other power trains by 8 inch reinforced concrete block walls extending to the ceiling. The 480-volt equipment is located in the auxiliary building on elevations 734 and 749. The location of these boards is shown in Figure 8.3.1-2. |6

125-Volt DC Equipment

The 125-volt vital batteries are located in the auxiliary building on elevation 749 and are divided into four divisions (channels I, II, III, and IV) of separation. Each 125-volt vital battery is separated from all other 125-volt vital batteries by providing individual rooms for each battery with 8 inch reinforced concrete block walls extending to the

ceiling. The ventilation system is designed to remove and dissipate the hydrogen given off by the batteries (see Section 9.4 for ventilation system description). The 125-volt vital battery boards are located in the auxiliary building on elevation 734 and are also divided into four divisions of separation. Each 125-volt vital battery board is separated from all other 125-volt vital battery boards by 8 inch reinforced concrete block wall extending to the ceiling. The location of these batteries and boards is shown in Figure 8.3.1-28.

The fifth vital battery system ~~shall~~ consists of a 125-V dc battery along with the appropriate battery rack, charger, board, distribution panels, cabling, instrumentation, and protective devices necessary to ensure continued operation of the two unit plant should vital battery I, II, III, or IV become disabled for longer than the technical specification period. This system provides (1) a highly reliable source of low noise direct-current power, (2) proper power distribution to any assigned primary vital battery board loads, and (3) sufficient capacity to supply the worse case loading conditions of any single primary vital battery system.

120-Volt AC Equipment

The vital inverters are located in the auxiliary building on elevation 749 and are divided into four divisions (channels I, II, III, and IV) of separation. The channels I and II inverters are located in the Unit 1 area while the channels III and IV inverters are located in the Unit 2 area. The channels I and II inverters are separated from the channels III and IV inverters by an 8 inch reinforced concrete block wall extending to the ceiling. The channel I and the channel III inverters are separated from the channel II and the channel IV inverters, respectively, by a distance of 60 feet. The location of the inverters is shown in Figure 8.3.1-28.

Auxiliary Control Board

Shutdown from remote locations outside the main control room due to the main control room, cable spreading room, or the auxiliary instrument room becoming uninhabitable or inoperable is performed in auxiliary control board. This remote shutdown auxiliary control is fully described in section 7.4 and the Fire Protection Report (see 9.5.1).

Electrical Penetrations of Primary Containment

Redundant GSPS cables enter the containment via separate electrical penetrations. Where possible, redundant GSPS cables utilize electrical penetrations spaced horizontally instead of vertically. Where redundant GSPS cables are installed in electrical penetrations spaced vertically, power cables carrying high energy are located above low energy circuits, or barriers are provided between the high energy and low energy circuits where the vertical spacing is less than 3 feet. Two or more areas have

INFO ONLY

been provided for electrical penetrations so that redundant GSPS cables can be installed in separate penetration areas. Cables through penetrations of the primary containment are grouped in such an arrangement that failure of all cables in a single penetration cannot prevent a RPS or engineered safety features action. The penetration areas are shown on Figures 8.3.1-37 and 8.3.1-38.

8.3.1.4.3 <u>Sharing of Cable Trays and Routing of Nonsafety Related Cables</u>

There are five different cable tray systems, namely: 6900-volt, 480- volt, control, medium-level signal, and low-level signal trays. The 6900-volt trays carry only 6900-volt cables and are located in the highest level position of stacked trays. All 480-volt power cables, lighting cabinet feeders, and DC power cables that have a protective device rated greater than 30 amperes are run in 480-volt trays. Medium-level signal trays carry the following cables: signal cables for inputs to and outputs from the computer other than thermocouples; instrument transmitter, recorders, RTD's greater than 100 millivolts, tachometers, and indicators; rotor eccentricity and vibration detectors; and shielded annunciator cables used with solid-state equipment. Signal cables for thermocouples, strain gauges, thermal converters, and RTD's that are 100 millivolts or less are run in low level signal trays which occupy the lowest level in a stack of trays. All other cables are run in control trays. Any exceptions to the above must be evaluated and documented by TVA in design criteria SQN-DC-V-12.2 and SQN-DC-V-11.3. | 9

Within a division the minimum standard spacing between trays stacked vertically is 9 inches, tray bottom to tray bottom. Within a division, the minimum standard spacing between trays installed side by side is 6 inches. The trays are constructed of galvanized steel, 6 to 18 inches wide and approximately 4 inches deep. All cable tray systems located in Category I structures, except those in the intake structure, have seismic Category I supports as described in Subsection 3.10.2. | 6

RPS cables (channels I, II, III, and IV), inside and outside containment are routed in cable trays and/or conduits that are designated for their respective division of separation.

ESF and essential supporting auxiliary system (ESAS) cables (trains A and B) are routed in 6900-volt, 480-volt, or control trays and/or conduits that are designated for their respective division of separation. | 6

RPS and ESF analog circuits may be routed in the same conduits, cable trays, or wireways provided the circuits have the same characteristics such as power supply and channel identity (I, II, III, or IV). Vital instrument cables for the generating station protection system (GSPS) which includes the RPS and ESF may be routed in the same conduits, wireways, or cable trays provided the circuits have the same characteristics such as power supply and channel identity (I, II, III, or IV).

Automatic actuation and power circuits for the generating station protection systems which includes the RPS, ESAS, reactor scram logic, | 6

The GSPS receives its power supply from preferred (off-site) and the standby (onsite) sources. The normal power and control circuits from the preferred source are routed in conduits or cable trays separate from the alternate power and control circuits. These circuits are identified by a suffix S1 or S2 added to their respective cable numbers, except for the circuits involved with the primary of common station service transformer (CSST) which are identified by suffix S3.

The circuits associated with the standby power sources (Class 1E electric systems) are separated into two or more redundant divisions. The circuits between the diesel generators and the 6900-volt shutdown boards are designed for a two divisional separation (train A and train B).

The feeder circuits from the 125-volt vital battery boards to the control buses in the shutdown boards are separated into four divisions (Channels I, II, III, and IV). Feeder cables to the control buses in the train A shutdown boards are supplied from battery boards I and III and the feeder cables to the control buses in the train B shutdown boards are supplied from battery boards II and IV. The Channels I, II, III, and IV vital instrument power systems are supplied from vital battery boards I, II, III, and IV, respectively, and have been physically separated and routed independently from each other.

8.3.1.4.4 Fire Detection and Protection in Areas Where Cables Are Installed

A fire and smoke detection system is installed to provide immediate detection and identification of fire and/or smoke in hazardous areas. Some area where smoke detectors with control room alarm are installed are:

1. Main control room ceiling
2. Main control panels in control room
3. Relay boards in relay room
4. Cable spreading room
5. Computer room ceiling
6. Auxiliary instrument room ceiling
7. Electrical shutdown board room ceiling
8. Vital battery rooms
9. Auxiliary control room
10. Diesel Generator Bldg.

A High Pressure Fire Protection Suppression System is installed as the primary means of fire suppression with a carbon dioxide fire protection system with manual control installed in the cable spreading room as a backup. 10

A carbon dioxide system with automatic control is installed in each of the diesel-generator rooms, in each of the diesel-generator electrical board rooms, in the oil pump room of the diesel-generator building, in the auxiliary instrument rooms, and computer room of the control building. 10

In addition, portable chemical dry powder and CO_2 fire extinguishers and a high-pressure water fire protection system are located throughout

Fire protection features provided in areas where cables are installed is described in the Fire Protection Report (see 9.5.1).

the plant. Refer to Subsection 9.5.1 for a detailed description of the fire protection system.

The design of the wall and floor electrical penetration fire stops through fire barriers utilize a separate cable sleeve for each cable tray. The design and installation of these penetration fire stops employ Dow Corning 3-6548 silicone RTV foam (components A and B) as the sealant material and a combination of fire barrier material. This material in its cured foam state is noncorrosive and fire retardant. From each side of the wall or floor opening, the cables are separated within the cable sleeve using an inorganic fiber. The sealant material is then installed within the cable sleeve and is confined by the fiber. The opening at the cable sleeve opening is covered with a fire barrier board that is cut to fit around the cables and cable tray configuration. 6

In addition, the exposed surfaces of cables are coated from the fire barrier board for a minimum distance of 5 feet or to the nearest electrical panel or enclosure with an ablative material that is approved by Factory Mutual Research Corporation. Typical electrical penetration firestops through walls and floors that are designated fire barriers and pressure barriers are shown in Figure 6.2.1-3.

Conduit penetrations, containing cables, through designated fire barriers utilize General Electric RTV-106 silicone rubber Dow Corning 3-6548 silicon foam, or equivalent as the sealant material. This material is installed around the cables in either the end of the conduit termination or in the nearest available conduit box on each side of the barriers. Inorganic fiber is used on each side of the sealant material. Spare conduits are plugged or capped until used. 6

A sample of this material has been tested by an independent laboratory according to ASTM E84, standard method of testing of "Surface Burning Characteristics of Building Materials." The result of the test was that the material has a flame spread of 20. In addition, Dow Corning has conducted a flammability (vertical burn) test on samples of the cured foam in accordance with a corporate test method which is comparable to Underwriters Laboratories, UL 94.

The following results were obtained:

Flammability (Vertical Burn)

Time in Flame	Average Time to Flame - & Glow-Out	Average Percent Weight Loss
15 seconds	7.2 seconds	1.3
60 seconds	15.6 seconds	13.5

The results from the vertical burn test show that the material self-extinguishes after flame source is removed.

The fire barrier materials used in the design and installation of the penetration fire stops employ a combination of inorganic fiber and fiber board. These materials are made from exceptionally high purity alumina and silica constituents and are capable of withstanding continuous exposure to a temperature range of 2000°F to 2300°F.

Chapter 17, "Quality Assurance," describes the administrative responsibility and control used to verify that penetration fire stops and seals have been properly installed. The procedure for installation of silicone RTV foam sealant requires a control sample be made, prior to production installation of seals, to establish the range of proper density, cell structure and color of the material in its expanded state. The procedure also requires a random inspection of the cable coating material to ensure an acceptable thickness is applied.

TVA has conducted fire tests on full scale assemblies of electrical penetration fire stops that must seal against air pressure. The required differential air pressure across the penetration under test was maintained by adjusting a normal damper together with an exhaust fan in the exhaust duct. An external gas burner was located under the cable outside the area of coated cables. The burner was ignited on the fire side of test facility and allowed to burn for 30 minutes before shutoff. The fire was allowed to self-extinguish, therefore no water spray test was conducted.

The results of the tests were that no fire burned through the penetration onto the cold side of the test facility and the pressure seal maintained its integrity. The results from the tests demonstrate that the design provides an effective fire stop and pressure seal under simulated conditions when tested as a completed system.

In addition, fire tests on similar designs using the same type of sealant material have been conducted by others. Test results are recorded in report serial No. 26543 dated October 28, 1975, of Factor Mutual Research Corporation.

During periodic testing of secondary containment, if any appreciable leakage is observed then a visual inspection will be made to identify any open or deteriorated penetration fire stops and pressure seals. Any defective seals and penetration fire stops that are found will be repaired or replaced as necessary to ensure the integrity of the penetration fire stops and pressure seals over the life of the plant.

~~A procedure (PHYSI-13) specifies requirements for breaching penetration fire stops~~. 16

~~For further fire protection details, see section 9.5.1~~. 16

8.3.1.4.7 Fire Barriers and Separation Between Redundant Trays

The criteria for separation between redundant trays for various zones or areas of the plant is described in Subparagraph 8.3.1.4.2. Where the physical separation between redundant trays could not be attained, fire barriers have been provided. These fire barriers for various zones or areas of the plant are also described in Subparagraph 8.3.1.4.2. Fire barriers for safe shutdown requirements of 10CFR50 Appendix R and Appendix A to BTP 9.5.1 are described in the Fire Protection Report (see 9.5.1). Cable fire stops for redundant cable tray runs through openings in floors and openings in walls between building have been provided. Also, fire barriers have been installed in floor openings for redundant cables entering the main control room. These barriers are described in Subparagraph 8.3.1.4.4 and the Fire Protection Report (see 9.5.1). 6

8.3.1.5 Physical Identification of Safety-Related Equipment in AC Power Systems

The onsite power system equipment and associated field wiring is identified so that two factors are physically apparent to plant operating and maintenance personnel:

1. That equipment and wiring is safety related and

2. That equipment and wiring is properly identified as part of a particular division of separation.

The scheme used to physically identify major safety-related AC electrical equipment employs a suffix label. The suffix label added to the equipment name is -A or -B, which represents train A or train B diesel-generator power source. For example, 6900-volt shutdown board 1A-A is safety-related equipment, where the 1 indicates Unit 1, the A represents board A, and the -A is assigned to train A.

The 125-volt DC vital system is shared between both units and divided into four channels. The 125-volt vital charger, 125-volt vital battery board, and 125-volt vital battery of each channel is physically identified in its label by I, II, III, or IV, respectively. 6

The 120-volt AC vital instrumentation and control power system is divided into four channels. Four each of the 120-volt AC vital inverters and vital instrument power boards are identified by Unit 1 or 2 prefix and a -I, -II, -III, or -IV suffix, respectively. For example, 120-volt AC vital instrument power 1-I is safety-related equipment, where the 1 indicates Unit 1, and the -I is assigned to Channel I.

To further physically identify, the onsite power system equipment, a color coding scheme is used. Nameplates, tags, or markings on exterior surfaces of this equipment are color coded respective to its division of separation as described in Subparagraph 8.3.1.4.5, except in the unit control and auxiliary (backup) control rooms. The mimic buses or modules on these boards are color coded by systems. The component nameplates on

The components comprising the Preferred Power System have been arranged to provide sufficient independence (both physical and functional) to minimize the likelihood of simultaneous outage of both preferred circuits.

Functional independence has been achieved by providing separate control circuits, powered by separate DC sources. The single line diagrams of these non-safety related 250V DC Systems are included as Figures 8.2.1-3 and 8.2.1-4.

8.2.1.2 <u>Transmission Lines, Switchyard, and Transformers</u>

The eight 161-kV and the five 500-kV lines connecting the plant with the TVA transmission network are indicated functionally on Figure 8.2.1-1. The onsite transmission line arrangement is shown on Figure 8.2.1-2 and the offsite transmission line routing in the vicinity of the switchyard is shown on Figure 8.2.1-5. These lines are routed to minimize the likelihood of their simultaneous failure.

The physical separation of the most widely spaced transmission lines at a point on a circle with a radius of one mile from the plant center exceeds 1/4 mile. From reviewing Figure 8.2.1-5, it is evident that this separation requirement from Regulatory Guide 1.155 is met. 10

Physical arrangement of the equipment is shown on Figure 8.2.1-2. Normally, total functional independence is not maintained in the switchyard itself, due to the fact that all bus sections are electrically connected together. However, in the event of an electrical fault, electrical separation is established in a few cycles by circuit breaker operation. The fault isolation and bus transfer scheme is designed to permit automatic fault isolation while still maintaining multiple connections from the 161-kV switchyard to the grid. Thus, both independent circuits providing preferred power will remain energized. Switchyard control and functional independence is further discussed in Paragraph 8.2.1.5.

It is also possible to isolate the incoming circuit associated with a Common Station Service transformer from the other incoming transmission lines. This makes it possible to functionally isolate the transformer on a single hydro unit either at the Watts Bar or Chickamauga Hydro Station, which itself has been isolated from the grid.

Location of Common Station Service Transformers and CCW cooling tower transformers is shown on Figure 8.2.1-2. Physical separation between common station service transformers A, B, and C is a minimum of 65 feet, centerline-to-centerline and 35 feet between closest parts. No missile barrier is required between the Common Station Service Transformers to protect one transformer in the event of a failure of the other transformer. The physical arrangement is based on TVA's experience and the analysis of previous failures on transformers with similar construction. A fire is the major concern relative to a transformer failure. In addition to the physical separation, automatic fire protection has been provided ~~(see FSAR Subsection 9.5.1)~~. Also, the yard area is covered with a thick layer of loose limestone gravel which is designed to limit the spread of transformer oil should a transformer tank rupture. There- fore, these three design features provide the necessary protection to minimize to the extent practical the likelihood of the simultaneous

as described in the Fire Protection Report (see 9.5.1)

LIST OF FIGURES (Continued)

LIST OF FIGURES (Continued)

LIST OF FIGURES (Continued)

The ACS includes the following equipment:

1. Four full-capacity auxiliary charging pumps (two per unit)

2. Auxiliary makeup tank

3. Filter

4. Demineralizer

5. Two auxiliary charging booster pumps

Each auxiliary charging pump (ACP) capacity is 100 gal/h and each auxiliary charging booster pump capacity is 300 gal/h. Both capacities are several times greater than the maximum leakage loss from the primary system. Leakage loss is based on No. 2 and No. 3 seal leakage (576 gal/d) with No. 1 seal injection and return lines isolated and an RCS pressure of 500 lb/in^{2}g (maximum during "flood mode"), plus the remainder of recoverable and nonrecoverable leakage, 215 and 30 gal/d respectively, based on the average annual rates for normal power operation (at full RCS pressure).

The auxiliary makeup tank (AMT) has a capacity of 384 gal to provide a minimum of 24 hours makeup based on the above leakage loss.

A filter and demineralizer are provided for cleanup of makeup water. The filter and demineralizer are designed for flow rates of 10 gal/min and 27 gal/min, respectively.

9.3.5.2 <u>System Design Description</u>

The ACS is shown on Figure 9.3.6-1. The initial supply of auxiliary makeup water is from the demineralized water tanks. The majority of leakage, from RCS pump seals, etc., is collected in the reactor coolant drain tank (RCDT) and is pumped by the RCDT pumps to the AMT. This recoverable leakage is the main preferred source of makeup water. Additional makeup water is supplied from other preferred sources: (1) accumulator tanks via the RCDT pumps, (2) pressurizer relief tank via the RCDT pumps, and (3) demineralized water tanks.

The above preferred sources of makeup water are backed up by the ~~essential fire pumps~~ fire protection system which can ~~pump river~~ supply river water to the AMT. To prevent inadvertent injection ~~of raw water~~ into the primary system, this source is connected, via fire hose, only if it is needed.

Auxiliary makeup water is borated to the extent necessary to maintain refueling shutdown concentration in the RCS. Hydrazine and lithium hydroxide are added to makeup water as required. Boric acid and hydrazine are added and mixed with the makeup water in the AMT in a batch process.

west, and exhaust fans on the roof; elevation 732.0. A total of 412,000 cfm is exhausted, and a total of 412,000 cfm outside air is supplied.

Four centrifugal, belt-driven, two-speed supply fans, located in elevation 773.0 fan room, deliver equal quantities of air to the east side of elevation 706.0 and elevation 685.0 rooms through four independent duct systems. Each fan serving elevation 706.0 is rated at 68,000 cfm at 1.0 inch water gauge static pressure and is powered by a 25 hp motor. Each fan serving elevation 685.0 is rated at 68,000 cfm at 1.5 inch water gauge static pressure, and is powered by a 30 hp motor. These fans are located in elevation 773.0 fan rooms. | 6

Four centrifugal, belt-driven, two-speed supply fans, located in the elevation 732.0 fan rooms, deliver equal quantities of air to the middle of elevation 706.0 and elevation 685.0 rooms through four independent duct systems. Each fan serving elevation 706.0 is rated at 35,000 cfm at 3/4 inch water gauge static pressure, and is powered by a 10 hp motor. Each fan serving the elevation 685.0 floor is rated at 35,000 cfm at 1.0 inch water gauge static pressure, and is powered by a 15 hp motor. | 6

Thirty-six propeller fans, installed in pairs in exhaust housings on the roof, elevation 732.0 exhaust air from the two floors below. Each propeller fan is rated for 11,500 cfm at 1/4 inch water gauge static pressure, and is powered by a 1.5 hp motor.

During cold weather, all supply and exhaust systems can be closed off by motor operated dampers to conserve heat. However, the two supply fans serving east elevation 685.0 floor may be operated at half speed since two hot water heating coils located in the supply duct connected to each of these fans are designed to heat the incoming air from 15°F to 60°F. With no exhaust fan running, the operation of these two supply fans will pressurize the entire Turbine Building to prevent infiltration of cold outside air.

Turbine Bldg

9.4.4.2.3 Miscellaneous Ventilating Systems

The three toilet rooms, and three janitor's closets are each ventilated by roof-mounted, roof-ventilator type exhaust fans. Plant air enters each room through a louvered door and is exhausted to the plant. Approximately 270 cfm is exhausted from each toilet room, and approximately 90 cfm from each janitor's closet.

The lubricating oil purification room at elevation 685 is ventilated by a centrifugal fan mounted on the room roof which discharges to the outdoors by means of a duct routed to a basement exhaust housing.

~~Approximately 1,300 cfm of plant air is exhausted through the fire damper, mounted in the exhaust opening, and the room firedoor are designed to shut off all airflow in case of fire~~.

9.4.5 Diesel Generator Building | 11

9.4.5.1 Design Bases

The Diesel Generator Building Ventilating Systems are designed to maintain an acceptable building environment for the protection of the diesel generators, electrical boards and equipment, batteries, and for the safety of operating personnel.

Each diesel generator unit room is separately ventilated to limit the room maximum ambient temperature to 120°F when the entering air is 97°F and the diesel generator is operating.

Battery areas are ventilated at all times for hydrogen removal and electrical board rooms are ventilated to limit the room ambient temperature to 104°F when the entering air is 97°F.

9.4.5.2 System Description

The Diesel Generator Building Heating and Ventilating Systems are shown on Figures 9.4.5-1 through 9.4.5-3.

Two diesel generator room exhaust fans, one battery hood exhaust fan, and one electrical board room exhaust fan are located in the fan room at elevation 740.5 for each of the four diesel generator units. These centrifugal type exhaust fans discharge to the outdoors.

One generator and electrical panel ventilation fan is provided within each diesel room at the air supply opening to the room. These fans deliver cooling air to the generator air intake and to the interior of the generator's electrical control panel.

Each of the diesel generator room fans is connected to its respective diesel generator engineered safety power supply. One exhaust fan will automatically start upon diesel generator start. The generator and electrical panel ventilation fan will run when either of the exhaust fans is running. Approximately 40,000 cfm of fresh air is routed through each diesel generator room when one exhaust fan is operating. ~~Fire dampers, provided in each air supply and exhaust opening to the room, will automatically close to isolate the room in case of fire.~~

Each diesel generator unit is provided with separate fans designed to exhaust 1000 cfm of air from the battery area hood at elevation 722 and approximately 3500 cfm of air from the elevation 740.5 electrical board room. A roof mounted air intake admits outdoor air to each electrical board room. Other building exhaust fans provide ventilation for the lubricating oil storage room, fuel oil transfer room, CO_2 storage room, toilet room, radiation shelter room, and muffler rooms.

The battery hoods, toilet rooms, oil rooms, and storage rooms are ventilated at all times while the electrical board rooms and muffler rooms are ventilated as required to remove heat during warm weather. However, the battery hoods CO_2 and lube oil rooms diesel generator rooms and electrical board rooms exhaust fans are stopped during a CO_2 initiation. 5

Each exhaust fan and the corridor air intake vent is provided with motor-operated shutoff dampers designed to close tight when the fan is not running. 6

A backdraft damper is installed in the duct between the air intake room 1A-A and the CO_2 storage room in order to prevent CO_2 backflow into the diesel generator air intake room in the event of a CO_2 system rupture.

Thermostatically controlled electric unit heaters are located within the diesel generator rooms, equipment access corridor, storage rooms, radiation shelter room, electrical board rooms, and toilet room. These heaters are designed to maintain the rooms at not less than 50°F when 15°F outdoors. 6

Thermostats in each air exhaust room are designed to stop all operating diesel generator room fans upon a drop in room exhaust air temperature to below 40°F. The thermostats will automatically start the exhaust fans and the generator and electrical panel ventilation fan upon room temperature rise to 80°F. The thermostats will also start the standby exhaust fan, during diesel operation, when the room exhaust air temperature exceeds 80°F. 6

<u>The Additional Diesel Generator Building</u>

The Additional Diesel Generator Building Heating and Ventilating Systems are shown on Figures 9.4.5-4 and 9.4.5-5.

Two diesel generator room exhaust fans, one fuel oil transfer room exhaust fan, one transformer and 6.9 kV board room exhaust fan, and one 480-volt auxiliary board room exhaust fan are located in the fan room at elevation 741.7 for the additional diesel generator unit.

The diesel generator room fans are connected to the additional diesel generator engineered safety power supply; one room exhaust fan and the generator will start automatically upon diesel generator start. The room exhaust fan which starts is preselected by placing the fan in the "auto" mode. Approximately 45,000 cfm of fresh air is routed through the diesel generator room when one exhaust fan is operating. ~~Fire dampers, provided in each air supply and exhaust ventilation opening in the engine room ceiling, will automatically close to isolate the room in case of fire. Combustion air will not be shut off to the engine.~~

9.4.6 Condensate Demineralizer Building Environmental Control System

9.4.6.1 Design Basis

The Condensate Demineralizer Building (CDB) Environmental Control System (ECS) is designed to supply an acceptable ventilation air flow to the CDB continuously and to supply increased air flow for heat removal as necessary. All cooling needs within the building are accomplished with ventilation air flow. This ECS is designed to maintain building temperatures below 105°F when the outside temperature is 97°F. 2

Heat is supplied by duct and space electric heaters when required. The duct heaters are interlocked with supply fans to prevent their operation upon fan failure. The heaters are designed to maintain the building at 50°F or higher except in the condensate polisher rooms where freeze protection is the design basis. Heating requirements are based on an outside temperature of 15°F.

Supply and exhaust ductwork is designed in accordance with the SMACNA Low Pressure Duct Standard.

Air flow is from areas of lower radioactivity potential to areas of greater radioactivity potential. There is no requirement for exhaust monitoring or filtration.

~~Fire dampers are used to prevent the spread of fire within the building.~~ (1)

9.4.6.2 System Description

The CDB ECS is shown in Figure 9.4.6-1.

Air is supplied to the building through air intakes located on floor elevation 706. An air intake is located in the north wall and auxiliary air intakes are located in the south and west walls. Air supplied through the air intake in the north wall and the auxiliary air intake in the south wall is ducted to the required release points throughout the building. Air supplied through the auxiliary air intake in the west wall is blown directly into the valve gallery.

Air is exhausted through two roof exhaust fans located on elevation 729 over the valve gallery. An additional roof exhaust, located on elevation 729, is connected by ductwork to tank rooms and the hall on elevation 685, and to the high crud filter room, condensate polishers rooms, and cation and anion tank rooms on elevation 706.

The CDB ECS uses two speed fans only. Main CDB control panel controls set the fans to automatic operation, high or low speed operation, or the off position. In the automatic mode of operation outdoor air temperature controls fan speed. When a fan is started its respective outdoor damper is opened. All air intake and exhaust dampers are spring loaded to fail closed. 2

9.5 OTHER AUXILIARY SYSTEMS

9.5.1 Fire Protection System

9.5.1.1 Design Basis

The Fire Protection System is designed to achieve the following objectives:

a. Provide fire protection in those plant areas where a fire could affect the ability to achieve and maintain safe plant shutdown.

b. Provide fixed water and carbon dioxide suppression systems based on an Analysis of Fire Hazards.

c. Provide hose racks and portable fire extinguishers throughout the plant. The high-pressure fire protection system normally utilizes 100 foot hoses. In a few cases 125 foot hoses are used. These exceptions have been evaluated and determined to be acceptable.

d. Protect safety-related equipment in the auxiliary, control, reactor, and diesel generator buildings and in the ERCW Pumping Station against failure of fire protection system components.

e. Provide curbs around all oil facilities where a potential for an oil pipe rupture exists.

f. Sound predischarge alarms in the areas where automatic initiation of a CO_2 system is required to ensure adequate time for personnel evacuation.

g. Provide an early warning fire detection system to notify personnel of a fire, actuate automatic suppression systems, provide for manual actuation of control valves, and control auxiliary equipment. | 11

h. Provide emergency feedwater to the steam generators under maximum design basis flood conditions as defined in Appendix 2.4A.

9.5.1.2 System Description

The high-pressure fire protection system (HPFP) furnishes raw water for fixed water spray systems, preaction sprinkler systems, fire hose racks, and fire hose connections throughout the plant. (The flow diagram for the HPFP system is shown in Figures 9.5.1-1 through 9.5.1-15.) Low-pressure carbon dioxide fire protection systems (CO_2) are also provided for some areas. The carbon dioxide system also furnishes carbon dioxide for turbine-generator purging. (The CO_2 systems are shown in Figures 9.5.1-16 and 9.5.1-17.)

Water for fire fighting is provided from the river by four submersible electric motor-drive pumps located in the intake pumping station. These

Insert

9.5.1.1 Design Basis

The Fire Protection System and fire protection features are described in the Fire Protection Report (FPR). The FPR is a separate document that is revised and updated periodically similar to this FSAR (e.g. 10CFR50.59 process) . The FPR should be referred to for a detail description of the Fire Protection Program.

9.5 OTHER AUXILIARY SYSTEMS

9.5.1 Fire Protection System

9.5.1.1 Design Basis

The Fire Protection System is designed to achieve the following objectives:

a. Provide fire protection in those plant areas where a fire could affect the ability to achieve and maintain safe plant shutdown.

b. Provide fixed water and carbon dioxide suppression systems based on an Analysis of Fire Hazards.

c. Provide hose racks and portable fire extinguishers throughout the plant. The high-pressure fire protection system normally utilizes 100 foot hoses. In a few cases 125 foot hoses are used. These exceptions have been evaluated and determined to be acceptable.

d. Protect safety-related equipment in the auxiliary, control, reactor and diesel generator buildings and in the ERCW Pumping Station against failure of fire protection system components.

e. Provide curbs around all oil facilities where a potential for an oil pipe rupture exists.

f. Sound predischarge alarms in the areas where automatic initiation of a CO_2 system is required to ensure adequate time for personnel evacuation.

g. Provide an early warning fire detection system to notify personnel of a fire, actuate automatic suppression systems, provide for manual actuation of control valves, and control auxiliary equipment. | 11

h. Provide emergency feedwater to the steam generators under maximum design basis flood conditions as defined in Appendix 2.4A.

and fire protection features are described in the Fire Protection Report (FPR). The FPR is a separate document that is similar in status to the FSAR (i.e. 10CFR50.59 process) and periodically updated & resubmitted to the NRC. The FPR should be referred to for all aspects of the fire protection program.

9.5.1.2 System Description

The high-pressure fire protection system (HPFP) furnishes raw water for fixed water spray systems, preaction sprinkler systems, fire hose racks, and fire hose connections throughout the plant. (The flow diagram for the HPFP system is shown in Figures 9.5.1-1 through 9.5.1-15.) Low-pressure carbon dioxide fire protection systems (CO_2) are also provided for some areas. The carbon dioxide system also furnishes carbon dioxide for turbine-generator purging. (The CO_2 systems are shown in Figures 9.5.1-16 and 9.5.1-17.)

Water for fire fighting is provided from the river by four submersible electric motor-drive pumps located in the intake pumping station. These

Air flow is from areas of lower radioactivity potential to areas of greater radioactivity potential. All exhaust air is monitored for excessive radioactivity levels.

~~Fire dampers are used to prevent the spread of fire between the CDWEB and the waste package area of the Auxiliary Building.~~

9.4.9.2 System Description

The CDWEB ECS is shown on Figures 9.4.2-1 and 9.4.9-1.

Air induced by the CDWEB supply fan from e waste package area supply duct is used for building ventilation. ventilation air is supplied to areas of low radioactivity potential and migrates by naturally induced flow paths to progressively higher areas of contamination.

The CDWEB ventilation exhaust fan exhausts air from the area with highest contamination potential and directs it to the Fuel Handling Area Exhaust System where it is passed through a radiation monitoring station prior to its release to the atmosphere.

The CDWEB utilizes one speed ventilation fans. The fans are manually controlled and operate continuously.

Additionally, separate air-conditioning recirculation systems serve the potentially contaminated areas and the moderately contaminated areas.

9.4.9.3 Safety Evaluation

No nuclear safety-related systems or components are located in the Condensate Demineralizer Waste Evaporator Building. Therefore, a single failure within the EC System will not affect nuclear safety. 2

9.4.9.4 Inspection and Testing Requirements

The CDWEB ECS will be tested initially to assure that design criteria have been met. Continued satisfactory operation will demonstrate the system capability.

9.4.10 Postaccident Sampling Ventilation System

9.4.10.1 Design Basis

The postaccident sampling facility environmental control system (PASFECS) provides heating, cooling, and ventilation during normal plant operations and training activities. In addition, heating, ventilation, and control of airborne radiological contamination is provided during postaccident acquisition and testing of samples. This is accomplished through pressurization of the areas by the ventilation system which induces air from areas of lesser to areas of greater contamination potential. The system maintains temperatures within a range of 50°F to 104°F. The PASFECS has redundant isolation capability in all ductwork which interfaces with the Auxiliary Building Gas Treatment System (ABGTS) or penetrates the Auxiliary Building Secondary Containment Enclosure (ABSCE). 6

pumps are each rated at 1500 gal/min at 400 feet head. They satisfy the draft ASME code for pumps and valves for Nuclear Power (1968) and Seismic Category I Requirements. The pumps are powered by Class IE sources that automatically transfer to the emergency diesel generators on loss of offsite power. They are capable of operating during any lake condition from minimum level upon loss of down-stream dam to the maximum design basis flood.

A yard fire main loops the periphery of the plant buildings and provides protection for the switchyard, storage areas, and other areas adjacent to the powerhouse. Sectionalizing valves are provided to permit isolation of potential faults in the loop, and a cross-connection to the Auxiliary Feedwater System is provided to supply feedwater to the steam generators during flood conditions. Hydrants are appropriately located throughout the yard.

The fire protection headers are pressurized through an interconnection with the Raw Service Water System, with the pressure being maintained by two 10,000 gallon raw water tanks on the auxiliary building roof. The storage tanks are filled by three raw service water pumps located in the turbine building. These pumps are each rated at 500 gal/min at 235 feet head. The pumps are normally operated with two pumps in service and one as a spare to pressurize the fire protection headers and supply raw water services. The Raw Service Water System supply is automatically isolated when the fire pumps come on.

The logic and control diagrams for these systems are shown in Figures 9.5.1-18 through 9.5.1-25.

Plant location drawings show the location of the hand-operated fire control equipment. See Figures 1.2.3-1 through 1.2.3-7; Figures 1.2.3-11, 1.2.3-14, 1.2.3-15, 1.2.3-20, 1.2.3-21, 1.2.3-23, 1.2.3-24, and 8.3.1-1. | 10

A fire detection system is provided which consists of initiating devices, local control panels, remote transmitter-receivers providing multiplex (MUX) functions, and computerized multiplex central control equipment. The system's initiating devices consist of detectors, which are identified as to type and location on Figures 9.5.1-26 through 9.5.1-42, and flow pressure switches which are provided for each fixed suppression system.

A central processor unit (CPU) communicates with the local control panels via the remote MUX units over looped circuits. The MUX equipment allows the processor to interrogate each local control panel in turn and to receive data from the panels. When an initiating device changes from normal to a trouble or alarm status, it is detected at the remote MUX transmitter-receiver and when next interogated by the central processor will transmit this status change. The change is evaluated by the processor and visual and audible indications are provided.

An alarm condition results in the following system responses:

a. Sounding of audible devices locally* and in the main control room.

b. Illumination of indicating lamps on the local control panel indicating the location of the alarming device.

c. Actuation (via local control panel circuits) of automatic suppression systems, fire pumps, fire dampers, fire doors, and ventilation equipment.

d. Identification of the location and time of receipt of the alarm condition on a cathode ray tube (CRT) display and a printer which are both located in the main control room and on a redundant printer in the Unit 2 Auxiliary Instrument Room.

* Note: Supervisory signal type modules are not required to sound an audible local alarm.

The logic diagrams for the detection system are shown in Figures 9.5.1-43 through 9.5.1-47.

9.5.1.3 Design Evaluation

~~The Fire Protection System provides a reliable source of water or other firefighting agent to all fire suppression systems throughout the plant.~~

Four fire pumps are provided and are designed to start in sequence to maintain adequate pressure in the fire mains. The water and carbon dioxide fire protection systems are Seismic Category I for those portions of the systems supplying the auxiliary building, reactor buildings, control bay, and diesel generator building. The remainder of the Fire Protection System which includes the yard, turbine building, service building, and office building, is not seismically qualified.

~~Portable fire extinguishers are provided in various portions of the plant for fighting smaller fires and are of a size and type that are compatible with the specific types of combustibles on which they are used.~~

An automatic fire detection system is installed in various areas of the plant to give rapid notification of a fire to the main control room and to initiate automatic responses where such a need exists.

Sequoyah Nuclear Plant's fire protection system design is based on the results of a fire hazards analysis covering those areas where an unmitigated fire could affect a unit's ability to reach and maintain a safe cold shutdown. The analysis involved a detailed review of the plant design and an evaluation of the effects of postulated fires. The results of the analysis are provided in the Sequoyah Nuclear Plant Fire Protection Program Reevaluation forwarded to the NRC by a letter from J. E. Gilleland to R. S. Boyd dated January 24, 1977, and TVA's responses to subsequent NRC questions forwarded by letter from J.E. Gilleland to S. A. Varga dated November 9, 1978; January 19, 1979; March 8, 1979; and a letter from L. M. Mills to L. S. Rubenstein dated October 23, 1979. For documentation of the As-Configured Fire Detection and Suppression System in the Control Building 669.0 - C11 Corridor, see SAR 9.5.1 Safety Assessment/Safety Evaluation (RIMS # B38 940808 800). See the Fire Hazards Analysis ~~[illegible]~~ FHA 11

Additional information describing revisions to the fire protection program can be found in the following documents: RIMS No. S62 060294 842. 11

~~CFM ABB~~ ~~AMPFHA~~

9.5.1.4 Tests and Inspections

All sections of the High-Pressure Fire Protection System, including yard piping, were initially hydrostatically tested. The system is flushed and tested at regular intervals to ensure that it is free of silt or obstructions.

Fixed water suppression systems are tested in accordance with surveillance instructions which are based on the applicable NFPA code requirements. Hose systems and fixed suppression systems will be visually inspected at regular intervals to ensure that all equipment protecting Appendix R areas and safety-related systems is in place and in good operating condition. 10

The Low-Pressure Carbon Dioxide System is inspected at regular intervals to verify that there is sufficient carbon dioxide in the storage tanks and that all equipment is in good operating condition. The system is tested in accordance with surveillance instructions which are based on the applicable NFPA code requirements.

The detection and annunciation circuits are tested in accordance with surveillance instructions which are based on the applicable NFPA code requirements.

Portable fire extinguishers are inspected at regular intervals to verify that they are fully charged and in good physical condition. Extinguishers are maintained in accordance with surveillance instructions which are based on the applicable NFPA code requirements.

9.5.2 Plant Communications System

9.5.2.1 Design Bases

Interplant and/or Offsite Systems

The design basis for interplant and/or offsite communications is to provide dependable systems to ensure reliable service during normal plant operation and emergency conditions.

The primary interplant communications systems are microwave radio, carrier telephone, commercial telephone service, radios, emergency notification system, and health physics network.

See Section 9.5.2.3 for a general description of each system and Figure 9.5.2-2 for simplified diagrams of the systems provided.

Intraplant Communications

The design basis for the intraplant communications is to provide sufficient equipment of various types such that the plant has adequate communications to start up, continue safe operation, or safely shutdown.

6. Power failure to the timers and to the remote control unit actuating relays is annunciated.

Refer to Figure 9.5.2-3 for availability of intraplant communications during various postulated conditions.

9.5.2.5 Inspection and Tests

Two communications systems were covered by preoperational test (TVA-11):

1. The sound-powered telephone systems provided for the backup control center, health physics office, and diesel building shielded room.

2. The evacuation alarm system.

All systems are carefully installed and checked for proper operation initially by construction forces. Routine maintenance is performed by operating personnel on a regular basis and includes such items as checking for proper switch operation, checking for proper operating levels, visual inspection, etc.

The most comprehensive testing, however, results from the heavy daily usage of the equipment and the subsequent reports of any of the users. Individual power failures in the equipment are annunciated.

9.5.3 Lighting Systems

9.5.3.1 Design Bases

There are three basic lighting systems in the plant designated as follows: normal, standby, and emergency. These systems are designed in accordance with the recommendations of the Illuminating Engineering Society, National Electrical Code, TVA Electrical Design Memorandums, and good engineering practice to provide the required illumination necessary for safe conduct of plant operations and under normal conditions to make the plant personnel as comfortable as possible.

The normal system is designed to economically provide the amount and quality of illumination to meet normal plant operations and maintenance requirements.

The standby system, on loss of the normal lighting system, provides the minimum illumination level necessary for the safe shutdown of the reactor and the evacuation of personnel from the plant if the need should occur. It forms an integral part of the normal lighting requirements but is fed from an entirely independent source.

The emergency lighting system, fed from independent dc voltage sources, provides immediately the minimum illumination level in areas vital to the safe shutdown of the reactor when the other lighting systems are unavailable.

9.5.3.2 Description of the Plant Lighting Systems

All plant lighting systems have the following features in common: adequate capacity and rating for the operation of all loads connected to the systems, independent wiring and power supply, overcurrent protection for conductor and equipment using nonadjustable circuit breakers, copper conductor with 600 Volt insulation run in metal raceways.

The insulated cable used inside the primary containment area is resistant to nuclear radiation and chemical environmental conditions in this area.

The plant lighting system consists of three basic schemes, the first of which is the normal lighting. This system is for general lighting of the plant; the major power supply is through normal and alternate feeders from the 6.9 kV common boards A and B to 3-phase, 120/208 Volt AC transformers feeding lighting boards distributed throughout the main plant. Other lighting boards in the service building, office building, gatehouse, etc., are fed from various 480 Volt boards through 3-phase 120/208 Volt AC transformer. These lighting boards feed the normal lighting cabinets, designated by the prefix LC__, located near load centers. In the power boards and control rooms, alternate rows of fixtures or alternate fixtures are fed from different lighting boards to prevent total blackout in a particular area in case of failure of one of the other lighting boards or cabinets.

The second system is the standby lighting which forms a part of the normal lighting requirements and is energized at all times. This system is fed from 480 Volt shutdown boards 1A2-A, 2A2-A, 1B1-B, and 2B1-B to 3-phase 120/208 Volt AC transformers to each standby lighting cabinet, designated by the prefix LS__. The shutdown boards have a normal and alternate ac power supply and in event of their failure are fed from the diesel generators. The cable feeders to the standby cabinets located in the Category I structure are routed in redundant raceways and the fixtures are dispersed among the normal lighting fixtures.

The third lighting system is referred to as the emergency system. The feeder to this system is electrically held in the off position until a power failure occurs on the AC systems. Then the emergency lighting cabinets, designated by the prefix LD__, are automatically energized from the 125 Volt DC vital battery boards. This system is an essential supporting auxiliary system for the ESF, and the cable feeders to the LD cabinets are routed on the redundant ESF cable tray system or in conduit. The fixtures are incandescent type and are dispersed among the normal and standby fixtures with alternate emergency fixtures being fed from redundant power trained LD cabinets.

In addition, 8-hour battery powered emergency lighting system is provided ~~in accordance with Branch Technical Position 9.5-1, Appendix A, except within primary containment~~. as described in the Fire Protection Report (see 9.5.1).

info only

9.5.3.3 Diesel Generator Building Lighting System

The diesel generator building lighting cabinets are fed through 480-208/120 Volt 3-phase local lighting transformers, which in turn are fed from the diesel 480 Volt auxiliary boards respectively. Each of these auxiliary boards has dual feeders from the 480 Volt shutdown boards, the diesel should start within the prescribed time to provide the 480 Volt AC power requirements for the safe shutdown of the plant through the standby feeds to the 480 Volt shutdown boards, thus supplying power again to the diesel generator building transformers. Each diesel generator unit has a lighting cabinet which supplies approximately one-half of the lighting for that unit, with the remaining half being supplied from the lighting cabinet of the adjacent like-trained unit.

9.5.3.4 Safety-Related Functions of the Lighting System

The normal lighting is safe for the operation and evacuation of the plant to the extent of the design criteria for seismic mounting of conduits, boxes, and fixtures and the reliability of the power source feeding it, along with the quality of the materials and field installation.

The standby system provides low level lighting in the vital areas, less critical areas, and exit points for the safe shutdown of the reactor and evacuation of personnel.

The emergency lighting in the vital areas is adequate for the safe shutdown of the reactor and the evacuation of personnel.

9.5.3.5 Inspection and Testing Requirements

Following the complete installation of a lighting system, it shall be tested and inspected. The operation of the lighting system shall be observed during the initial and periodic testing of the normal and alternate feeder systems and during the emergency power tests to the various boards from which these emergency lighting systems are fed. Maintenance and relamping of the normal and standby lighting systems shall be according to routine plant operating procedures.

The 125 Volt emergency lighting system shall be tested periodically by tripping the holding coil circuit fed from the LS standby cabinet, thus closing the feeder circuit to the LD emergency cabinet. All emergency lamps of this system shall be inspected and replacements made where necessary. A written record of dates and results of these tests shall be maintained by plant personnel responsible for these tests.

9.5.4 Diesel Generator Fuel Oil System

9.5.4.1 Design Bases

That portion of the Diesel Generator Fuel Oil System within the Diesel Generator Building is designed to Class I seismic requirements, and is designed to be impervious to the effects of tornadoes, hurricanes, floods, rain, snow, or ice as defined in Chapter 3 of this document.

In response to licensing question concerning IE Information Notice 79-22 on environmental qualification of control systems, TVA performed a systematic (matrix) evaluation of the environmental effects resulting from high-energy pipe breaks inside and outside containment upon nonsafety-related systems. Specifically, safety features required to mitigate the consequences of high-energy pipe break and those required to obtain and maintain a safe shutdown following such an event were evaluated to determine if a single inappropriate actuation of an interfacing nonsafety-related system could unacceptably affect the required safety feature. TVA's conclusion is that although there is a possibility for disruptive signals to be generated, these are in every case acceptable because the operator will always have sufficient indication and time to take corrective action. Consequently, a safe shutdown can be achieved at SQN even if a postulated accident is compounded by environmentally induced inappropriate. operating instructions have been modified as an additional precaution to preclude the event or to alert the operator to the possibility of the event.

The evaluation concerning the environmental effects on the atmospheric relief and main steam isolation bypass valve controls is as follows. The control system for the atmospheric relief valves could be affected by high-energy pipe breaks in the main steam valve room. This inappropriate opening is considered to be acceptable because (1) adequate annunciations provided to alert the operator to the event, (2) adequate time is available for operator action (3) the control system design assures that the operator can override the inappropriate open signal.

An inappropriate opening of a main steam isolation bypass valve would defeat steam generator isolation. Administrative controls require the referenced valves to be closed and their control switches to be placed in the "close" position after the main steam isolation valves are open. This guards against the valve actuation due to environmental effects in the steam valve vaults following a steam line break or flood. ~~During a fire in the Control Building the fuses are pulled to de-energize the valve control circuits. This will eliminate any spurious valve operation due to a fire in the Control Building.~~

10.3.7. References

1.0 Deleted. | 10

2.0 Westinghouse Report NSD-MWR-0215, The Morpholine/Boric Acid Application Document For Tennessee Valley Authority Sequoyah Units 1 and 2 Nuclear Power Plants.

3.0 EPRI Report TR-102134, PWR Secondary Water Chemistry Guidelines - Rev. 3. | 10

core. Pump runout protection is provided for all pumps. Each electric motor-driven pump is equipped with a cavitating venturi, which has a small throat area designed to limit flow by choking. The venturi pressure recovery cone allows the pressure loss across the venturi to be minimized. Electric motor-driven pump runout is designed to be limited to 650 gpm to the steam generators, which is less than that which would result in pump cavitation. The turbine-driven pump utilizes the turbine speed control which uses a flow signal to limit the flow to the steam generators to 880 gal/min.

The preferred sources of water for all auxiliary feedwater pumps are the two 385,000 gallon non-seismic condensate storage tanks. A minimum of 190,000 gallons in each tank is reserved for the AFW Systems by means of an administrative limit based upon indicated level. As an unlimited 11
backup (seismic Category I) water supply, a separate trained ERCW System header feeds each electric pump. The turbine pump can receive backup (seismic Category I) water from either train A or B ERCW header. The ERCW supply is automatically (or remote-manually) initiated on a two-out-of-three low-pressure signal in the condensate suction line. Consequently, even assuming the worst single active failure, auxiliary feedwater can be supplied indefinitely from the ERCW System. However, since the ERCW System supplies poor quality water, it is not used except in emergencies when the condensate supply is unavailable. The ERCW System is described in subsection 9.2.2. In addition, the Fire Protection (FP) System may be connected downstream of each electric pump by a spool piece to supply unlimited raw water directly to the steam generators in the unlikely event of a flood above plant grade as discussed in Appendix 2.4A. ~~The FP System is described in subsection 9.5.1.~~

The AFW System is designed to deliver 40°F to 120°F water for pressures ranging from the RHR System cut-in point (equivalent to 110 lb/in^{2}g in the steam generator) to the steam generator safety valve set pressure (accumulation pressure equivalent to that required to relieve 11 percent nominal steam flow). Criteria for the AFW System design basis conditions are shown in Table 10.4.7-5. Significant pump design parameters are given in Table 10.4.7-6. Pump characteristics and power requirement curves are given in Figures 10.4.7.-13 and 10.4.7-14.

System piping is designed for pressures up to approximately 1650 lb/in^{2}g where necessary.

Separate 1E power subsystems and fully qualified control air subsystems serve each electric-driven AFW pump and its associated valves. The valves associated with the turbine-driven pump are served by both 1E electric and fully qualified control air subsystems, with appropriate measures precluding any interaction between the two subsystems. The turbine-driven pump receives control power from a third direct current electric channel that is distinct from the channels serving the electric pumps and is not dependent on alternating current power for a period of 4 hours during 11
SBO. The essential components of the AFW System and subsystems necessary for safe shutdown can function as required in the event of a loss of offsite power.

compartment is provided with internal liquid drainage and collection capability routed to an external point for sampling and collection. The external collection point is surrounded by a covered concrete sump connected to the module. 5

The sump in each module will be used as a passive sump by design to collect any liquid (e.g., fire suppression water) and sampled periodically to detect the presence of water and/or radioactive releases in the module. The interior surfaces of each module (excluding the concrete cap) are coated sealed with a decontaminable coating. 6

No permanently installed fire detection or fire suppression system is provided inside the OSF structures. A yard fire main, hydrants, and hydrant houses are provided to afford manual firefighting capability for the entire OSF. Fires in the LLRW storage facilities will be fought by the SQNP fire brigade. The OSF structures are designed to contain (within each module) all fire suppression water from a design basis fire in a way that will not preclude processing of the water (if determined to be radioactive) using the existing SQNP liquid radioactive waste treatment system.

The entire OSF is enclosed within a 10-foot high barbed wire security fence. The security fence for the OSF is provided with an intrusion detection device with tamper indication which alarms in the OSF gatehouse. The OSF is provided with closed circuit television monitoring capabilities and is continuously lighted at night. Access to the OSF is controlled through the OSF gatehouse. These security measures may be changed depending on future needs and requirements. 5

II.5.7 Shipment

Waste is shipped to a commercial disposal site according to federal regulations and disposal site criteria. Waste may also be shipped to a broker/processor for processing to meet federal regulations and disposal site criteria. 8

Drums and boxes containing radwaste are transported from the Sequoyah Nuclear Plant to the disposal facility in a sole-use flatbed or van-type truck trailers. Dewatered resins, solidified resins, evaporator concentrates, and chemical sludges are packaged in liners or high integrity containers and transported either by sole-use van type trailer of in a transportation cask (dependent upon dose rates). 5

All radioactive waste is packaged and transported in accordance with the TVA Radioactive Material Shipment Manual.

Table 13.5.1-1 (Sheet 1)

PLANT SYSTEM OPERATING INSTRUCTIONS

General Operating Instructions

- Plant Startup from Cold Shutdown to Hot Standby
- Plant Startup from Hot Standby to Minimum Load
- Plant Shutdown from Minimum Load to Cold Shutdown
- Normal Power Operation
- Apparatus Operations
- 6900 V and 480 V Shutdown Board Ground Location and Isolation Procedure | 10
- FIRE INTERACTION MANUAL

System Operating Instructions

- Main Steam Supply
- Steam Dump System
- Condensate and Feedwater System
- Condenser Vacuum System
- Auxiliary Feedwater System
- Extraction Steam and Heater Drains and Vents System
- Auxiliary Boiler System
- Fire Detection System
- Condensate Demineralizer Polisher Operation
- Condensate Demineralizer Regeneration and Resin Transfer
- Condensate Demineralizer Waste Disposal
- Containment Space Heaters
- Containment Pressure Control | 10
- Condensate Demineralizer Acid and Caustic Unloading
- Steam Generator Blowdown
- Fuel Oil System
- Lubricating Oil System
- Raw Cooling Water System
- Raw Service Water System
- High Pressure Fire Protection System
- ~~Fire Interactions Manual~~
- RCS Boration During a Fire Related Loss of CVCS Letdown and Boric Acid Makeup
- Condenser Circulating Water System
- Amertap System
- CCW Cooling Tower System | 10
- Condenser Water Box Tube Shooting
- Water Treatment System
- Vendor Water Treatment System
- Control Building and Control Room Heating, Ventilating, and Air Conditioning System
- Containment Purge System
- Containment Upper and Lower Compartment Heating, Cooling, and Ventilation System
- Incore Instrument Room Ventilation System
- Auxiliary Building Gas Treatment System
- Onsite Electrical Power System Board Rooms Heating, Venting and Cooling
- Containment Air Return Fans
- Control Air System
- Auxiliary Compressed Air System
- Service Air System
- Generator Hydrogen Cooling System