ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Two required offsite circuits inoperable.	E.1 Declare required feature(s) inoperable when the redundant required feature(s) are inoperable. AND E.2 Restore one required offsite circuit to OPERABLE status.	12 hours from discovery of Condition E concurrent with inoperability of redundant required feature(s) 24 hours
----------NOTE---------- Only applicable when more than one 4.16 kV shutdown board is affected. ------------------------ F. One required offsite circuit inoperable. AND One Unit 1 and 2 DG inoperable.	------------NOTE------------ Enter applicable Conditions and Required Actions of LCO 3.8.7, "Distribution Systems — Operating," when Condition F is entered with no AC power source to any 4.16 kV shutdown board. ---------------------------- F.1 Restore required offsite circuit to OPERABLE status. OR F.2 Restore Unit 1 and 2 DG to OPERABLE status.	 12 hours 12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
----------NOTE----------- Applicable when only one 4.16 kV shutdown board is affected. ------------------------- G. One required offsite circuit inoperable. AND One Unit 1 and 2 DG inoperable.	G.1	Declare the affected 4.16 kV shutdown board inoperable.	Immediately
H. Two or more Unit 1 and 2 DGs inoperable.	H.1	Restore all but one Unit 1 and 2 DG to OPERABLE status.	2 hours
I. Required Action and Associated Completion Time of Condition A, B, C, D, E, F, or H not met.	I.1 AND I.2	Be in MODE 3. Be in MODE 4.	12 hours 36 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
J. One or more required offsite circuits and two or more Unit 1 and 2 DGs inoperable. OR Two required offsite circuits and one or more Unit 1 and 2 DGs inoperable. OR Two divisions of 480 V load shed logic inoperable. OR Two divisions of common accident signal logic inoperable.	J.1 Enter LCO 3.0.3.	Immediately
K. One or more required Unit 3 DGs inoperable.	K.1 Declare required feature(s) supported by the inoperable Unit 3 DG inoperable when the redundant required feature(s) are inoperable. AND K.2 Declare affected SGT and CREVs subsystem(s) inoperable.	4 hours from discovery of Condition K concurrent with inoperability of redundant required feature(s) 30 days

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One required offsite circuit inoperable. OR One required DG inoperable.	A.1	Declare affected required feature(s), supported by the inoperable AC source, inoperable.	30 days AND Immediately from discovery of Condition A concurrent with inoperability of redundant required feature(s)

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Two or more required AC sources inoperable.	------------NOTE------------ Enter applicable Condition and Required Actions of LCO 3.8.8, when Condition B is entered with no AC power source to any required 4.16 kV shutdown board. ----------------------------	
	B.1 Declare affected required feature(s) inoperable.	Immediately
	OR	
	B.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	B.2.2 Suspend movement of irradiated fuel assemblies in secondary containment.	Immediately
	AND	
	B.2.3 Initiate action to suspend OPDRVs.	Immediately
	AND	
	B.2.4 Initiate action to restore required DGs to OPERABLE status.	Immediately

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Distribution Systems – Operating

LCO 3.8.7 The following AC and DC electrical power distribution subsystems shall be OPERABLE:

a. Unit 1 and 2 4.16 kV Shutdown Boards;

b. Unit 1 480 V Shutdown Boards;

c. Unit 1 480 V RMOV Boards 1D and 1E;

d. Unit 1 and 2 DG Auxiliary Boards;

e. Unit DC Boards;

f. Unit 1 and 2 Shutdown Board DC Distribution Panels; and

g. Unit 2 and 3 AC and DC Boards needed to support equipment required to be OPERABLE by LCO 3.6.4.3, "Standby Gas Treatment (SGT) System," and LCO 3.7.3, "Control Room Emergency Ventilation (CREV) System."

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One Unit 1 and 2 4.16 kV Shutdown Board inoperable.	------------NOTE------------ Enter applicable conditions and required actions of Condition B, C, D, and G when Condition A results in no power source to a required 480 volt board. ----------------------------	
	A.1 Restore the Unit 1 and 2 4.16 kV Shutdown Board to OPERABLE status.	5 days <u>AND</u> 12 days from discovery of failure to meet LCO
B. One Unit 1 480 V Shutdown Board inoperable.	------------NOTE------------ Enter Condition C when Condition B results in no power source to a required 480 volt RMOV board. ----------------------------	
	B.1 Restore Unit 1 480 V Shutdown Board to OPERABLE status.	8 hours <u>AND</u> 12 days from the discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Unit 1 480 V RMOV Board 1D inoperable. OR Unit 1 480 V RMOV Board 1E inoperable.	C.1 Declare the affected RHR subsystem inoperable.	Immediately
D. One Unit 1 and 2 DG Auxiliary Board inoperable.	D.1 Restore Unit 1 and 2 DG Auxiliary Board to OPERABLE status.	5 days AND 12 days from discovery of failure to meet LCO
E. One Unit DC Board inoperable. OR One Unit 1 and 2 Shutdown Board DC Distribution Panel inoperable.	E.1 Restore required Unit DC Board or Shutdown Board DC Distribution Panel to OPERABLE status.	7 days AND 12 days from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Unit 1 and 2 4.16 kV Shutdown Board A and B inoperable. OR Unit 1 and 2 4.16 kV Shutdown Board C and D inoperable.	-----------NOTE------------- Enter applicable conditions and required actions of Condition B, C, D, and G when Condition F results in no power source to a required 480 volt board. ----------------------------- F.1 Restore one 4.16 kV Shutdown Board to OPERABLE status.	 8 hours AND 12 days from discovery of failure to meet LCO
G. One or more required Unit 2 or 3 AC or DC Boards inoperable.	G.1 Declare the affected SGT or CREV subsystem inoperable.	Immediately
H. Required Action and associated Completion Time of Condition A, B, D, E, or F not met.	H.1 Be in Mode 3. AND H.2 Be in Mode 4.	12 hours 36 hours
I. Two or more electrical power distribution subsystems inoperable that result in a loss of function.	I.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.7.1	Verify indicated power availability to required AC and DC electrical power distribution subsystems.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.8 Distribution Systems — Shutdown

LCO 3.8.8 The necessary portions of the AC and DC electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE.

APPLICABILITY: MODES 4 and 5,
During movement of irradiated fuel assemblies in the secondary containment.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required AC or DC electrical power distribution subsystems inoperable.	A.1 Declare associated supported required feature(s) inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend handling of irradiated fuel assemblies in the secondary containment.	Immediately
	AND	
	A.2.3 Initiate action to suspend operations with a potential for draining the reactor vessel.	Immediately
	AND	
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.4 Initiate actions to restore required AC and DC electrical power distribution subsystems to OPERABLE status.	Immediately
	AND	
	A.2.5 Declare associated required shutdown cooling subsystem(s) inoperable and not in operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.8.1 Verify indicated power availability to required AC and DC electrical power distribution subsystems.	7 days

BROWNS FERRY NUCLEAR PLANT - IMPROVED TECHNICAL SPECIFICATIONS
SECTION 3.8
LIST OF REVISED PAGES

UNIT 2 ITS SECTIONS

Replaced pages 3.8-4 through 3.8-6 *R1 with pages 3.8-4 through 3.8-6 *R2
Replaced pages 3.8-12 *R1 with pages 3.8-12 *R2
Replaced pages 3.8-13 *R1 with pages 3.8-13 *R2
Replaced pages 3.8-28 through 3.8-34 *R1 with pages 3.8-28 through 3.8-34 *R2

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Two required offsite circuits inoperable.	E.1 Declare required feature(s) inoperable when the redundant required feature(s) are inoperable.	12 hours from discovery of Condition E concurrent with inoperability of redundant required feature(s)
	AND	
	E.2 Restore one required offsite circuit to OPERABLE status.	24 hours
----------NOTE----------- Only applicable when more than one 4.16 kV shutdown board is affected. ------------------------	------------NOTE------------- Enter applicable Conditions and Required Actions of LCO 3.8.7, "Distribution Systems — Operating," when Condition F is entered with no AC power source to any 4.16 kV shutdown board. ----------------------------	
F. One required offsite circuit inoperable. AND One Unit 1 and 2 DG inoperable.	F.1 Restore required offsite circuit to OPERABLE status.	12 hours
	OR	
	F.2 Restore Unit 1 and 2 DG to OPERABLE status.	12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
----------NOTE----------- Applicable when only one 4.16 kV shutdown board is affected. ------------------------ G. One required offsite circuit inoperable. <u>AND</u> One Unit 1 and 2 DG inoperable.	G.1 Declare the affected 4.16 kV shutdown board inoperable.	Immediately
H. Two or more Unit 1 and 2 DGs inoperable	H.1 Restore all but one Unit 1 and 2 DG to OPERABLE status	2 hours
I. Required Action and Associated Completion Time of Condition A, B, C, D, E, F, or H not met.	I.1 Be in MODE 3. <u>AND</u> I.2 Be in MODE 4.	12 hours 36 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
J. One or more required offsite circuits and two or more Unit 1 and 2 DGs inoperable. OR Two required offsite circuits and one or more Unit 1 and 2 DGs inoperable. OR Two divisions of 480 V load shed logic inoperable. OR Two divisions of common accident signal logic inoperable.	J.1	Enter LCO 3.0.3.	Immediately
K. One or more required Unit 3 DGs inoperable.	K.1	Declare required feature(s) supported by the inoperable Unit 3 DG inoperable when the redundant required feature(s) are inoperable.	4 hours from discovery of Condition K concurrent with inoperability of redundant required feature(s)
	AND		
	K.2	Declare affected SGT and CREVs subsystem(s) inoperable.	30 days

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required offsite circuit inoperable. OR One required DG inoperable.	A.1 Declare affected required feature(s), supported by the inoperable AC source, inoperable.	30 days AND Immediately from discovery of Condition A concurrent with inoperability of redundant required feature(s)

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Two or more required AC sources inoperable.	------------NOTE------------ Enter applicable Condition and Required Actions of LCO 3.8.8, when Condition B is entered with no AC power source to any required 4.16 kV shutdown board. ----------------------------	
	B.1 Declare affected required feature(s) inoperable.	Immediately
	<u>OR</u>	
	B.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	B.2.2 Suspend movement of irradiated fuel assemblies in secondary containment.	Immediately
	<u>AND</u>	
	B.2.3 Initiate action to suspend OPDRVs.	Immediately
	<u>AND</u>	
	B.2.4 Initiate action to restore required DGs to OPERABLE status.	Immediately

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Distribution Systems — Operating

LCO 3.8.7 The following AC and DC electrical power distribution subsystems shall be OPERABLE:

a. Unit 1 and 2 4.16 kV Shutdown Boards;

b. Unit 2 480 V Shutdown Boards;

c. Unit 2 480 V RMOV Boards 2D and 2E;

d. Unit 1 and 2 DG Auxiliary Boards;

e. Unit DC Boards;

f. Unit 1 and 2 Shutdown Board DC Distribution Panels; and

g. Unit 1 and 3 AC and DC Boards needed to support equipment required to be OPERABLE by LCO 3.6.4.3, "Standby Gas Treatment (SGT) System," and LCO 3.7.3, "Control Room Emergency Ventilation (CREV) System."

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One Unit 1 and 2 4.16 kV Shutdown Board inoperable.	------------NOTE------------ Enter applicable Conditions and Required Actions of Condition B, C, D, and G when Condition A results in no power source to a required 480 volt board. ----------------------------	
	A.1 Restore the Unit 1 and 2 4.16 kV Shutdown Board to OPERABLE status.	5 days AND 12 days from discovery of failure to meet LCO
B. One Unit 2 480 V Shutdown Board inoperable.	------------NOTE------------ Enter Condition C when Condition B results in no power source to a required 480 volt RMOV board. ----------------------------	
	B.1 Restore Unit 2 480 V Shutdown Board to OPERABLE status.	8 hours AND 12 days from the discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Unit 2 480 V RMOV Board 2D inoperable. OR Unit 2 480 V RMOV Board 2E inoperable.	C.1 Declare the affected RHR subsystem inoperable.	Immediately
D. One Unit 1 and 2 DG Auxiliary Board inoperable.	D.1 Restore Unit 1 and 2 DG Auxiliary Board to OPERABLE status.	5 days AND 12 days from discovery of failure to meet LCO
E. One Unit DC Board inoperable. OR One Unit 1 and 2 Shutdown Board DC Distribution Panel inoperable.	E.1 Restore required Unit DC Board or Shutdown Board DC Distribution Panel to OPERABLE status.	7 days AND 12 days from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Unit 1 and 2 4.16 kV Shutdown Board A and B inoperable. OR Unit 1 and 2 4.16 kV Shutdown Board C and D inoperable.	------------NOTE------------ Enter applicable conditions and required actions of Condition B, C, D, and G when Condition F results in no power source to a required 480 volt board. ---------------------------- F.1 Restore one 4.16 kV Shutdown Board to OPERABLE status.	 8 hours AND 12 days from discovery of failure to meet LCO
G. One or more required Unit 1 or 3 AC or DC boards inoperable.	G.1 Declare the affected SGT or CREV subsystem inoperable.	Immediately
H. Required Action and associated Completion Time of Condition A, B, D, E, or F not met.	H.1 Be in MODE 3. AND H.2 Be in MODE 4.	12 hours 36 hours
I. Two or more electrical power distribution subsystems inoperable that result in a loss of function.	I.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.7.1	Verify indicated power availability to required AC and DC electrical power distribution subsystems.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.8 Distribution Systems – Shutdown

LCO 3.8.8 The necessary portions of the AC and DC electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE.

APPLICABILITY: MODES 4 and 5,
During movement of irradiated fuel assemblies in the secondary containment.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required AC or DC electrical power distribution subsystems inoperable.	A.1 Declare associated supported required feature(s) inoperable.	Immediately
	<u>OR</u>	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend handling of irradiated fuel assemblies in the secondary containment.	Immediately
	<u>AND</u>	
	A.2.3 Initiate action to suspend operations with a potential for draining the reactor vessel.	Immediately
	<u>AND</u>	
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.4 Initiate actions to restore required AC and DC electrical power distribution subsystems to OPERABLE status.	Immediately
	<u>AND</u>	
	A.2.5 Declare associated required shutdown cooling subsystem(s) inoperable and not in operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.8.1	Verify indicated power availability to required AC and DC electrical power distribution subsystems.	7 days

BROWNS FERRY NUCLEAR PLANT - IMPROVED TECHNICAL SPECIFICATIONS
SECTION 3.8
LIST OF REVISED PAGES

UNIT 3 ITS SECTIONS

Replaced pages 3.8-4 through 3.8-6 *R1 with pages 3.8-4 through 3.8-6 *R2
Replaced pages 3.8-12 *R1 with pages 3.8-12 *R2
Replaced page 3.8-13 *R1 with page 3.8-13 *R2
Replaced pages 3.8-28 through 3.8-34 *R1 with pages 3.8-28 through 3.8-34 *R2

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Two required offsite circuits inoperable.	E.1 Declare required feature(s) inoperable when the redundant required feature(s) are inoperable.	12 hours from discovery of Condition E concurrent with inoperability of redundant required feature(s)
	AND	
	E.2 Restore one required offsite circuit to OPERABLE status.	24 hours
----------NOTE----------- Only applicable when more than one 4.16 kV shutdown board is affected. --------------------------	------------NOTE------------- Enter applicable Conditions and Required Actions of LCO 3.8.7, "Distribution Systems — Operating," when Condition F is entered with no AC power source to any 4.16 kV shutdown board. ----------------------------	
F. One required offsite circuit inoperable. AND One Unit 3 DG inoperable.	F.1 Restore required offsite circuit to OPERABLE status.	12 hours
	OR	
	F.2 Restore Unit 3 DG to OPERABLE status.	12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
----------NOTE----------- Applicable when only one 4.16 kV shutdown board is affected. ------------------------			
G. One required offsite circuit inoperable. AND One Unit 3 DG inoperable.	G.1	Declare the affected 4.16 kV shutdown board inoperable.	Immediately
H. Two or more Unit 3 DGs inoperable.	H.1	Restore all but one Unit 3 DG to OPERABLE status.	2 hours
I. Required Action and Associated Completion Time of Condition A, B, C, D, E, F, or H not met.	I.1	Be in MODE 3.	12 hours
	AND		
	I.2	Be in MODE 4.	36 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
J. One or more required offsite circuits and two or more Unit 3 DGs inoperable. OR Two required offsite circuits and one or more Unit 3 DGs inoperable. OR Two divisions of 480 V load shed logic inoperable. OR Two divisions of common accident signal logic inoperable.	J.1	Enter LCO 3.0.3.	Immediately
K. One or more required Unit 1 and 2 DGs inoperable.	K.1	Declare required feature(s) supported by the inoperable Unit 1 and 2 DG inoperable when the redundant required feature(s) are inoperable.	4 hours from discovery of Condition K concurrent with inoperability of redundant required feature(s)
	AND		
	K.2	Declare affected SGT and CREVs subsystem(s) inoperable.	30 days

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One required offsite circuit inoperable. **OR** One required DG inoperable.	A.1	Declare affected required feature(s), supported by the inoperable AC source, inoperable.	30 days **AND** Immediately from discovery of Condition A concurrent with inoperability of redundant required feature(s)

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Two or more required AC sources inoperable.	------------NOTE------------- Enter applicable Condition and Required Actions of LCO 3.8.8, when Condition B is entered with no AC power source to any required 4.16 kV shutdown board. ----------------------------	
	B.1 Declare affected required feature(s) inoperable	Immediately
	OR	
	B.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	B.2.2 Suspend movement of irradiated fuel assemblies in secondary containment.	Immediately
	AND	
	B.2.3 Initiate action to suspend OPDRVs.	Immediately
	AND	
	B.2.4 Initiate action to restore required DGs to OPERABLE status.	Immediately

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Distribution Systems — Operating

LCO 3.8.7 The following AC and DC electrical power distribution subsystems shall be OPERABLE:

a. Unit 3 4.16 kV Shutdown Boards;

b. Unit 3 480 V Shutdown Boards;

c. Unit 3 480 V RMOV Boards 3D and 3E;

d. Unit 3 DG Auxiliary Boards;

e. Unit DC Boards;

f. Shutdown Board DC Distribution Panel 3EB; and

g. Unit 1 and 2 AC and DC Boards needed to support equipment required to be OPERABLE by LCO 3.6.4.3, "Standby Gas Treatment (SGT) System," and LCO 3.7.3, "Control Room Emergency Ventilation (CREV) System."

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One Unit 3 4.16 kV Shutdown Board inoperable.	------------NOTE------------ Enter applicable Conditions and Required Actions of Condition B, C, D, and G when Condition A results in no power source to a required 480 volt board. ----------------------------	
	A.1 Restore the Unit 3 4.16 kV Shutdown Board to OPERABLE status.	5 days <u>AND</u> 12 days from discovery of failure to meet LCO
B. One Unit 3 480 V Shutdown Board inoperable.	------------NOTE------------ Enter Condition C when Condition B results in no power source to a required 480 volt RMOV board. ----------------------------	
	B.1 Restore Unit 3 480 V Shutdown Board to OPERABLE status.	8 hours <u>AND</u> 12 days from the discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Unit 3 480 V RMOV Board 3D inoperable. OR Unit 3 480 V RMOV Board 3E inoperable.	C.1 Declare the affected RHR subsystem inoperable.	Immediately
D. One Unit 3 DG Auxiliary Board inoperable.	D.1 Restore Unit 3 DG Auxiliary Board to OPERABLE status.	5 days AND 12 days from discovery of failure to meet LCO
E. One Unit DC Board inoperable. OR Shutdown Board DC Distribution Panel 3EB inoperable.	E.1 Restore required Unit DC Board or Shutdown Board DC Distribution Panel 3EB to OPERABLE status.	7 days AND 12 days from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Unit 3 4.16 kV Shutdown Board 3EA and 3EB inoperable. OR Unit 3 4.16 kV Shutdown Board 3EC and 3ED inoperable.	------------NOTE------------ Enter applicable conditions and required actions of Condition B, C, D, and G when Condition F results in no power source to a required 480 volt board. ---------------------------- F.1 Restore one 4.16 kV Shutdown Board to OPERABLE status.	 8 hours AND 12 days from discovery of failure to meet LCO
G. One or more required Unit 1 or 2 AC or DC Board inoperable.	G.1 Declare the affected SGT or CREV subsystem inoperable.	Immediately
H. Required Action and associated Completion Time of Condition A, B, D, E, or F not met.	H.1 Be in MODE 3. AND H.2 Be in MODE 4.	12 hours 36 hours
I. Two or more electrical power distribution subsystems inoperable that result in a loss of function.	I.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.7.1	Verify indicated power availability to required AC and DC electrical power distribution subsystems.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.8 Distribution Systems — Shutdown

LCO 3.8.8 The necessary portions of the AC and DC electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE.

APPLICABILITY: MODES 4 and 5,
During movement of irradiated fuel assemblies in the secondary containment.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required AC or DC electrical power distribution subsystems inoperable.	A.1 Declare associated supported required feature(s) inoperable.	Immediately
	<u>OR</u>	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend handling of irradiated fuel assemblies in the secondary containment.	Immediately
	<u>AND</u>	
	A.2.3 Initiate action to suspend operations with a potential for draining the reactor vessel.	Immediately
	<u>AND</u>	
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.4 Initiate actions to restore required AC and DC electrical power distribution subsystems to OPERABLE status.	Immediately
	<u>AND</u>	
	A.2.5 Declare associated required shutdown cooling subsystem(s) inoperable and not in operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.8.1	Verify indicated power availability to required AC and DC electrical power distribution subsystems.	7 days

BROWNS FERRY NUCLEAR PLANT - IMPROVED TECHNICAL SPECIFICATIONS
SECTION 3.8
LIST OF REVISED PAGES

UNIT 1 ITS BASES SECTIONS

Replaced pages B 3.8-1 through B 3.8-78 *R1 with pages B 3.8-1 through B 3.8-83 *R2

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources — Operating

BASES

BACKGROUND

The unit Class 1E AC Electrical Power Distribution System AC sources consist of the offsite power sources (preferred power sources, normal and alternates), and the onsite standby power sources (Unit 1 and 2 diesel generators (DGs) A, B, C, and D, and Unit 3 DGs 3A, 3B, 3C, and 3D). As required by 10 CFR 50, Appendix A, GDC 17 (Ref. 1), the design of the AC electrical power system provides independence and redundancy to ensure an available source of power to the Engineered Safety Feature (ESF) systems.

The Class 1E AC distribution system is divided into redundant divisions, so loss of any one division does not prevent the minimum safety functions from being performed. Each of four 4.16 kV shutdown boards has two offsite power supplies available and a single DG. Only offsite power delivered through the normal feeder breakers can be credited since common accident signal (CAS) logic (CAS A/CAS B) will trip the alternate breaker. This prevents an overload condition if all shutdown boards had been aligned to the same shutdown bus, and thus to the same transformer winding.

An offsite circuit consists of all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network to the A and B (Division I) or C and D (Division II) 4.16 kV shutdown boards. Offsite power is supplied to the 161 kV and 500 kV switchyards from the transmission network by seven transmission lines (two 161 kV lines and five 500 kV lines; Trinity I and II 500 kV lines are not included in the 500 kV line totals). Four basic circuits from the transmission network to the safety related Division I (A and B 4.16 kV shutdown boards) and Division II (C and D 4.16 kV shutdown boards), are as follows:

1. From the 500 kV switchyard, through unit station service transformer (USST) 1B to a 4.16 kV unit board. That unit board feeds 4.16 kV shutdown bus 1 or 2,

(continued)

BASES

BACKGROUND (continued)

which then feeds two of the Unit 1 and 2 4.16 kV shutdown boards (A and B or C and D);

2. From the 500 kV switchyard, through USST 2B to a 4.16 kV unit board. That unit board feeds 4.16 kV shutdown bus 1 or 2, which then feeds two of the Unit 1 and 2 4.16 kV shutdown boards (A and B or C and D);

3. From the Trinity 161 kV transmission system, through common station service transformer (CSST) A or B to start bus 1A or 1B, then to a 4.16 kV unit board. That unit board feeds 4.16 kV shutdown bus 1 or 2, which then feeds two of the Unit 1 and 2 4.16 kV shutdown boards (A and B or C and D); and

4. From the Athens 161 kV transmission system, through CSST A or B to start bus 1A or 1B, and then to a 4.16 kV unit board. That unit board feeds 4.16 kV shutdown bus 1 or 2, which then feeds two of the Unit 1 and 2 4.16 kV shutdown boards (A and B or C and D).

Shutdown bus 1 normally feeds 4.16 kV shutdown boards A and B and shutdown bus 2 normally feeds 4.16 kV shutdown boards C and D. The 4.16 kV shutdown boards are normally aligned to power associated divisional 480 V safety equipment (two divisions per unit). This results in one DG powering only one 480 V division of one unit, and some of that same division's 4.16 kV loads for both Units 1 and 2. A detailed description of the offsite power network and circuits to the onsite Class 1E ESF buses is found in the FSAR, Chapter 8 (Ref. 2).

USST 1B and 2B, and the CSSTs are sized to accommodate all required ESF loads on receipt of an accident signal on Unit 1, while also carrying all the required safety loads of Unit 2 operating at full power.

The onsite standby power source for 4.16 kV shutdown boards A, B, C, and D consists of four Unit 1 and 2 DGs,each dedicated to a shutdown board. Each DG starts automatically on a loss of coolant accident (LOCA) signal (i.e., low reactor water level signal or high drywell pressure signal), or on its respective 4.16 kV shutdown board degraded voltage or undervoltage signal. Common Accident Signal Logic (CAS A/CAS B) actuates on high drywell pressure with low reactor

(continued)

BASES

BACKGROUND (continued)

pressure, or low water level. In addition to starting all diesel generators, this logic trips the alternate feeder breakers to 4.16 kV Shutdown Boards A, B, C, D. After the DG has started, it automatically ties to its respective bus after offsite power is tripped as a consequence of 4.16 kV shutdown board undervoltage or degraded voltage, independent of or coincident with a LOCA signal. The DGs also start and operate in the standby mode without tying to the 4.16 kV shutdown board on a LOCA signal alone. Following the trip of offsite power, an under or degraded voltage activated load shed logic strips all loads from the 4.16 kV Shutdown Board except transformer feeds. When the DG is tied to the 4.16 kV shutdown board, large loads are then sequentially connected to its respective 4.16 kV shutdown board by individual pump timers. The individual pump timers control the permissive and starting signals to motor breakers to prevent overloading the DG.

In the event of a loss of offsite power, the ESF electrical loads are automatically connected to the DGs in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a LOCA.

Certain required plant loads are returned to service in a predetermined sequence in order to prevent overloading of the DGs in the process. Within 40 seconds after the initiating signal (DG breaker closure with accident signal) is received, all automatic and permanently connected loads needed to recover the unit or maintain it in a safe condition are returned to service.

Ratings for the DGs satisfy the intent of Safety Guide 9 (Ref. 3). The DGs have the following ratings (Non-derated for intake air temperature ≤ 90°F/Derated for either intake air temperature >90°F or a combination of intake air temperature >90°F and engine cooling water outlet temperature >190°F) (Reference 12):

a. 2600/2550 kW – continuous,

b. 2860/2800 kW – 0 to 2 hours (Short Time Steady State),

(continued)

BASES

BACKGROUND (continued)

c. 2850/2815 kW — 0 to 3 minutes (Cold Engine Instantaneous),

d. 3050/3025 kW — > 3 minutes (Hot Engine Instantaneous).

APPLICABLE SAFETY ANALYSES

The initial conditions of DBA and transient analyses in the FSAR, Chapter 6 (Ref. 4) and Chapter 14 (Ref. 5), assume ESF systems are OPERABLE. The AC electrical power sources are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

The OPERABILITY of the AC electrical power sources is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining the onsite or offsite AC sources OPERABLE during accident conditions in the event of:

a. An assumed loss of all offsite power or all onsite AC power sources; and

b. A postulated worst case single failure.

AC sources satisfy Criterion 3 of the NRC Policy Statement (Ref. 15).

LCO

Two qualified circuits between the offsite transmission network and the onsite Class 1E Distribution System, four separate and independent Unit 1 and 2 DGs (A, B, C, and D), and the Unit 3 DG(s) needed to support required Standby Gas Treatment (SGT) trains and Control Room Emergency Ventilation System (CREVS) trains are required to be OPERABLE. Two divisions of 480 V load shed logic and two divisions of CAS logic are required to be OPERABLE to support Unit 1 and 2 DG OPERABILITY and post-accident loads. In the case of the Unit 3 DG(s), during MODES 1, 2, and 3,

(continued)

BASES

LCO (continued)

Unit 3 Technical Specifications will require the OPERABILITY of all Unit 3 DGs and provide appropriate compensatory actions for inoperable Unit 3 DG(s). However, when Unit 3 is not in MODE 1, 2, or 3, the DG(s) necessary to support the operation of Unit 2 may not be required. Therefore, the Unit 2 LCO for AC Sources requires the necessary DG(s) to support SGT and CREVS only when Unit 3 is not in MODES 1, 2, or 3. These requirements ensure availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an abnormal operational transient or a postulated DBA.

Qualified offsite circuits are those that are described in the FSAR, and are part of the licensing basis for the unit. Each offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the 4.16 kV shutdown boards. An offsite circuit is considered OPERABLE if the offsite source is available to A and B or C and D 4.16 kV shutdown boards.

Each offsite circuit consists of incoming breakers to a 4.16 kV shutdown bus and then to the 4.16 kV shutdown boards (A and B or C and D). Each shutdown bus is independently supplied from separate unit boards, which are fed from transformers (via start buses as appropriate). Specific circuits and limitations for considering the offsite circuit qualified are described below. Qualified circuits are one or more of the following:

1. From the 500 kV switchyard (with no credit for the two 500 kV Trinity lines), through unit station service transformer (USST) 1B to 4.16 kV unit board 1A, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B; and/or, to 4.16 kV unit board 1B, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D. If USST 2B is credited as the second source, a minimum of two 500 kV lines must be available.

2. From the 500 kV switchyard (with no credit for the two 500 kV Trinity lines), through USST 2B to 4.16 kV unit board 2A, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D; and/or, to 4.16 kV unit board 2B, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B. If USST 1B is credited as the second

(continued)

BASES

LCO (continued)

source, a minimum of two 500 kV lines must be available.

3. From the Trinity 161 kV transmission system, through common station service transformer (CSST) A or B to start bus 1A or 1B, to 4.16 kV unit board 1A or 2B, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B; or alternately, to 4.16 kV unit board 1B or 2A, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D.

4. From the Athens 161 kV transmission system, through CSST A or B to start bus 1A or 1B, to 4.16 kV unit board 1A or 2B, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B; or alternately, to 4.16 kV unit board 1B or 2A, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D.

For the Athens 161 kV offsite power to be considered as one of the qualified offsite power supplies, the following restrictions must also be met:

a. The 161 kV capacitor bank must be available for the Athens 161 kV line.

b. Credit for offsite power from the Athens 161 kV line may be taken by only one unit at one time. However, more than one unit may be aligned to the Athens line without invalidating the offsite power supply for the unit claiming it.

For the Trinity 161 kV offsite power to be considered as one of the qualified offsite power supplies, the following restrictions must also be met:

a. For the Trinity 161 kV line to be considered as one of the qualified offsite power supplies by only one unit, either the 161 kV capacitor bank must be available or the Trinity Inter-Tie transformer must be in service with 161 kV line nominal voltage $\geq$ 165 kV.

b. The Trinity 161 kV line may be considered as one of the qualified offsite power supplies by two separate units at any one time, provided that both CSST A and B are available and either the 161 kV capacitor bank is

(continued)

BASES

LCO (continued)

available or the Athens line and Trinity Inter-Tie transformer are in service with 161 kV line nominal voltage ≥ 165 kV.

c. The Trinity 161 kV line may be considered as one of the qualified offsite power supplies by three separate units at any one time, provided that both CSST A and B are available, Unit 3 claims USST 3B as its other offsite power source, and either the 161 kV capacitor bank is available or the Athens line and Trinity Inter-Tie transformer are in service with 161 kV line nominal voltage ≥ 165 kV.

The only requirements for the position of the 161 kV bus 1 and bus 2 cross-tie breakers (924 and 928) are those implied by the restrictions on claiming Athens and Trinity as offsite power supplies.

Each DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective 4.16 kV shutdown board on detection of bus undervoltage. This sequence must be accomplished within 10 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and must continue to operate until offsite power can be restored to the 4.16 kV shutdown board. The Unit 1 and 2 DGs are provided with a common 480 V load shed logic system with two redundant divisions. The common accident signal logic system, with two redundant divisions, is common to the Unit 1, 2, and 3 DGs. These logic systems must be OPERABLE to ensure the DGs will perform and alignments will occur as assumed during a DBA.

Proper sequencing of loads, including tripping of nonessential loads, is a required function for DG OPERABILITY.

The AC sources must be separate and independent (to the extent possible) of other AC sources. For the DGs, the separation and independence are complete. For the offsite AC sources, the separation and independence are to the extent practical. A qualified offsite circuit may be connected to more than one division of 4.16 kV shutdown boards and not violate separation criteria. A circuit that is not connected to the Division I or II 4.16 kV shutdown

(continued)

BASES

LCO (continued)

boards is required to have the capability to be connected to at least one division of 4.16 kV shutdown boards to be considered OPERABLE.

The inability to supply qualified offsite power to an individual 4.16 kV shutdown board from a 4.16 kV shutdown bus constitutes the failure of only one offsite circuit as long as offsite power is available to ther other division's shutdown boards. Thus, if one 4.16 kV shutdown board or complete division of shutdown boards (i.e., A and B or C and D) does not have a qualified offsite circuit available, then only one offsite circuit would be inoperable. If one or more shutdown boards in each division (i.e., A or B and C or D) or all four shutdown boards do not have a qualified offsite circuit available, then both (2) offsite circuits would be inoperable.

APPLICABILITY

The AC sources are required to be OPERABLE with Unit 1 in MODES 1, 2, and 3 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of abnormal operational transients; and

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

The AC power requirements for Unit 2 in MODES 4 and 5 are covered in LCO 3.8.2, "AC Sources — Shutdown."

ACTIONS

A.1

To ensure a highly reliable power source remains with one required offsite circuit inoperable, it is necessary to verify the availability of the remaining required offsite circuit on a more frequent basis. This action ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and

(continued)

BASES

ACTIONS

A.1 (continued)

availability of offsite AC electrical power. If a second required circuit is not available, the second offsite circuit is inoperable, and Condition E, for two offsite circuits inoperable, is entered.

A.2

Required Action A.2, which only applies if one or both 4.16 kV shutdown boards in a division cannot be powered from a qualified offsite source, is intended to provide assurance that an event with a coincident single failure of a DG does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related divisions (i.e., single division systems are not included). Redundant required features failures consist of inoperable features associated with a division redundant to the division that has no offsite power. For example, if no qualified offsite power source was available to 4.16 kV shutdown board A and RHR pump D was inoperable for maintenance, then RHR pump A would have to be declared inoperable.

The Completion Time for Required Action A.2 is intended to allow time for the operator to evaluate and repair any discovered inoperabilities. This Completion Time also allows an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

a. The 4.16 kV shutdown board has no offsite power supplying its loads or no qualified offsite power available; and

b. A required feature on, or supported by, the opposite or other division's 4.16 kV shutdown board is inoperable.

If, at any time during the existence of this Condition (one required offsite circuit inoperable) a required feature in a redundant division subsequently becomes inoperable, this Completion Time would begin to be tracked.

(continued)

BASES

ACTIONS

A.2 (continued)

Discovering no offsite power to one or both 4.16 kV shutdown boards of a division coincident with one or more inoperable required support or supported features, or both, that are associated with another division's 4.16 kV shutdown board that has offsite power, results in starting the Completion Time for the Required Action. Twenty-four hours is acceptable because it minimizes risk while allowing time for restoration before the unit is subjected to transients associated with shutdown.

The remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection may have been lost for the required feature's function; however, function is not lost. The 24 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 24 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

A.3

Based on the diversity of AC electrical power sources, and the remaining redundancy and reliability, operation may continue in Condition A for a period that should not exceed 7 days. With one required offsite circuit inoperable, the reliability of the offsite system is degraded, and the potential for a loss of offsite power is increased, with attendant potential for a challenge to the plant safety systems. In this condition, however, the remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to the onsite Class 1E Distribution System.

The 7 day Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and the low probability of a DBA occurring during this period.

(continued)

BASES

ACTIONS

A.3 (continued)

The second Completion Time for Required Action A.3 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition A is entered while, for instance, a DG is inoperable, and that DG is subsequently returned OPERABLE, the LCO may already have been not met for up to 7 days. This situation could lead to a total of 14 days, since initial failure to meet the LCO, to restore the offsite circuit. At this time, a DG could again become inoperable, the circuit restored OPERABLE, and an additional 7 days (for a total of 21 days) allowed prior to complete restoration of the LCO. The 14 day Completion Time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "AND" connector between the 7 day and 14 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

As in Required Action A.2, the Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This exception results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time that Condition A was entered.

B.1

To ensure a highly reliable power source remains with one Unit 1 and 2 DG inoperable, it is necessary to verify the availability of the required offsite circuits on a more frequent basis. This action ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. However, if an offsite circuit is not available, the offsite circuit is inoperable, and additional Conditions must then be entered.

(continued)

BASES

ACTIONS (continued)

B.2

Required Action B.2 is intended to provide assurance that a loss of offsite power, during the period that a Unit 1 and 2 DG is inoperable, does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related divisions (i.e., single division systems are not included). Redundant required features failures consist of inoperable features associated with a division redundant to the division that has an inoperable Unit 1 and 2 DG. For example, if DG A was inoperable and RHR pump D was inoperable for maintenance, then RHR pump A would have to be declared inoperable.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock."

In this Required Action the Completion Time only begins on discovery that both:

a. An inoperable Unit 1 and 2 DG exists; and

b. A required feature on, or supported by, the opposite or other division's 4.16 kV shutdown board is inoperable.

If, at any time during the existence of this Condition (one Unit 1 and 2 DG inoperable), a required feature in a redundant division subsequently becomes inoperable, this Completion Time begins to be tracked.

Discovering one Unit 1 and 2 DG inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the other division's OPERABLE DG[s] results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

(continued)

BASES

ACTIONS

B.2 (continued)

The remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and low probability of a DBA occurring during this period.

B.3.1 and B.3.2

Required Action B.3.1 provides an allowance to avoid unnecessary testing of OPERABLE DGs. If it can be determined that the cause of the inoperable DG does not exist on the OPERABLE Unit 1 and 2 DGs, SR 3.8.1.1 does not have to be performed. If the cause of inoperability exists on other Unit 1 and 2 DG(s), they are declared inoperable upon discovery, and Condition H of LCO 3.8.1 is entered. Once the failure is repaired, and the common cause failure no longer exists, Required Action B.3.1 is satisfied. If the cause of the initial inoperable DG cannot be confirmed not to exist on the remaining Unit 1 and 2 DG(s), performance of SR 3.8.1.1 suffices to provide assurance of continued OPERABILITY of those DGs.

In the event the inoperable DG is restored to OPERABLE status prior to completing either B.3.1 or B.3.2, the plant corrective action program will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in Condition B.

According to Generic Letter 84-15 (Ref. 7), 24 hours is a reasonable time to confirm that the OPERABLE DGs are not affected by the same problem as the inoperable DG.

(continued)

BASES

ACTIONS (continued)

B.4

Based on the diversity of AC electrical power sources, and the remaining redundancy and reliability, operation may continue in Condition B for a period that should not exceed 7 days. In Condition B, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The 7 day Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and low probability of a DBA occurring during this period.

The second Completion Time for Required Action B.4 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition B is entered while, for instance, an offsite circuit is inoperable and that circuit is subsequently restored OPERABLE, the LCO may already have been not met for up to 7 days. This situation could lead to a total of 14 days, since initial failure to meet the LCO, to restore the DG. At this time, an offsite circuit could again become inoperable, the DG restored OPERABLE, and an additional 7 days (for a total of 21 days) allowed prior to complete restoration of the LCO. The 14 day Completion Time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "AND" connector between the 7 day and 14 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive must be met.

As in Required Action B.2, the Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This exception results in establishing the "time zero" at the time that the LCO was initially not met, instead of the time that Condition B was entered.

(continued)

BASES

ACTIONS (continued)

C.1

With one division of Unit 1 and 2 480 V load shed logic inoperable, the reliability of the DGs is degraded, and the potential for the loss of all four Unit 1 and 2 DGs is increased with attendant potential challenge to plant safety systems. In this condition, however, the remaining division of Unit 1 and 2 480 V load shed logic is capable of performing its intended function of limiting the loads on the Unit 1 and 2 DGs.

The 7 day Completion Time takes into account the capability of the remaining division of Unit 1 and 2 480 V load shed logic, reasonable time for repairs, and the low probability of a DBA occurring during this period.

D.1

With one division of common accident signal logic inoperable, the plant electrical system response is degraded, and the potential for inappropriate electrical system alignment is increased with attendant potential challenge to plant safety systems. In this condition, however, the remaining division of common accident signal logic is capable of performing its intended function of providing a start signal to the Unit 1 and 2 DGs during a DBA.

The 7 day Completion Time takes into account the capability of the remaining division of common accident signal logic, reasonable time for repairs, and the low probability of a DBA occurring during this period.

(continued)

BASES

ACTIONS (continued)

E.1 and E.2

Required Action E.1 addresses actions to be taken in the event of inoperability of redundant required features concurrent with inoperability of two required offsite circuits. Required Action E.1 reduces the vulnerability to a loss of function. The Completion Time for taking these actions is reduced to 12 hours from that allowed with one or both 4.16 kV shutdown boards in a division without offsite power (Required Action A.2). The rationale for the reduction to 12 hours is that Regulatory Guide 1.93 (Ref. 6) allows a Completion Time of 24 hours for two required offsite circuits inoperable, based upon the assumption that two complete safety divisions are OPERABLE. When a concurrent redundant required feature failure exists, this assumption is not the case, and a shorter Completion Time of 12 hours is appropriate. These features are designed with redundant safety related divisions, (i.e., single division systems are not included in the list). Redundant required features failures consist of any of these features that are inoperable because any inoperability is on a division redundant to a division with inoperable offsite circuits.

The Completion Time for Required Action E.1 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. All required offsite circuits are inoperable; and

b. A required feature is inoperable.

If, at any time during the existence of this Condition (two offsite circuits inoperable), a required feature subsequently becomes inoperable, this Completion Time begins to be tracked.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition E for a period that should not exceed 24 hours. This level of degradation means that the offsite electrical power system does not have the capability to effect a safe shutdown and to mitigate the effects of an

(continued)

BASES

ACTIONS

E.1 and E.2 (continued)

accident; however, the onsite AC sources have not been degraded. This level of degradation generally corresponds to a total loss of accessible offsite power sources.

Because of the normally high availability of the offsite sources, this level of degradation may appear to be more severe than other combinations of two AC sources inoperable that involve one or more DGs inoperable. However, two factors tend to decrease the severity of this degradation level:

a. The configuration of the redundant AC electrical power system that remains available is not susceptible to a single bus or switching failure; and

b. The time required to detect and restore an unavailable offsite power source is generally much less than that required to detect and restore an unavailable onsite AC source.

With both of the required offsite circuits inoperable, sufficient onsite AC sources are available to maintain the unit in a safe shutdown condition in the event of a DBA or transient. In fact, a simultaneous loss of offsite AC sources, a LOCA, and a worst case single failure were postulated as a part of the design basis in the safety analysis. Thus, the 24 hour Completion Time provides a period of time to effect restoration of one of the offsite circuits commensurate with the importance of maintaining an AC electrical power system capable of meeting its design criteria.

According to Regulatory Guide 1.93 (Ref. 6), with the available offsite AC sources two less than required by the LCO, operation may continue for 24 hours. If two offsite sources are restored within 24 hours, unrestricted operation may continue. If only one offsite source is restored within 24 hours, power operation continues in accordance with Condition A.

(continued)

BASES

ACTIONS (continued)

F.1 and F.2

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it were inoperable, resulting in de-energization. Therefore, the Required Actions of Condition F are modified by a Note to indicate that when Condition F is entered with no AC source to any 4.16 kV shutdown board, ACTIONS for LCO 3.8.7, "Distribution Systems — Operating," must be immediately entered. This allows Condition F to provide requirements for the loss of the offsite circuit and one DG without regard to whether a 4.16 kV shutdown board is de-energized. LCO 3.8.7 provides the appropriate restrictions for a de-energized 4.16 kV shutdown board.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition F for a period that should not exceed 12 hours. In Condition F, individual redundancy is lost in both the offsite electrical power system and the onsite AC electrical power system. Since power system redundancy is provided by two diverse sources of power, however, the reliability of the power systems in this Condition may appear higher than that in Condition E (loss of both required offsite circuits). This difference in reliability is offset by the susceptibility of this power system configuration to a single bus or switching failure. The 12 hour Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and the low probability of a DBA occurring during this period.

A Note has been added to Condition F to clarify that the Condition is only applicable when more than one shutdown board is affected. The situation where only one shutdown board is affected is covered by Condition G.

G.1

Condition G addresses the situation where both one required offsite circuit and one DG are inoperable and affect only one 4.16 kV shutdown board. The Note clarifies the applicability. The Required Action is to declare the affected 4.16 kV shutdown board inoperable immediately. This requires entry into the applicable Conditions and

(continued)

BASES

ACTIONS

G.1 (continued)

Required Actions of LCO 3.8.7, "Distribution Systems - Operating," which provides the appropriate restrictions for the affected 4.16 kV shutdown board. LCO 3.8.1 Conditions and Required Actions continue to apply until the required offsite circuit and DG are made OPERABLE.

H.1

With two or more DGs inoperable, an assumed loss of offsite electrical power may result in insufficient standby AC sources available to power the minimum required ESF functions. Since the offsite electrical power system may be the only source of AC power for the majority of ESF equipment at this level of degradation, the risk associated with continued operation for a very short time could be less than that associated with an immediate controlled shutdown. (The immediate shutdown could cause grid instability, which could result in a total loss of AC power.) Since any inadvertent unit generator trip could also result in a total loss of offsite AC power, however, the time allowed for continued operation is severely restricted. The intent here is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

According to Regulatory Guide 1.93 (Ref. 6), with all DGs inoperable, operation may continue for a period that should not exceed 2 hours.

I.1 and I.2

If the inoperable AC electrical power sources cannot be restored to OPERABLE status within the associated Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

(continued)

BASES

ACTIONS (continued)

J.1

Condition J corresponds to a level of degradation in which all redundancy in the AC electrical power supplies has been lost. At this severely degraded level, any further losses in the AC electrical power system will cause a loss of function. Therefore, no additional time is justified for continued operation. The unit is required by LCO 3.0.3 to commence a controlled shutdown.

K.1

Required Action K.1 where Unit 3 is not in MODE 1, 2, or 3, is intended to provide assurance that a loss of offsite power, during the period that a required Unit 3 DG is inoperable, does not result in a complete loss of safety function of critical systems (i.e., SGT or CREVS). These features consist of SGT or CREVS trains redundant to trains supported by the inoperable Unit 3 DG.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

a. An inoperable required Unit 3 DG exists; and

b. An SGT or CREVS train supported by another DG, is inoperable.

If, at any time during the existence of this Condition (a required Unit 3 DG inoperable), a required SGT or CREVS train subsequently becomes inoperable, this Completion Time begins to be tracked.

Discovering a required Unit 3 DG inoperable coincident with an inoperable SGT or CREVS train, or both, that are associated with the OPERABLE DGs results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for

(continued)

BASES

ACTIONS

K.1 (continued)

restoration before subjecting the unit to transients associated with shutdown.

The remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and low probability of a DBA occurring during this period.

K.2

In Condition K, where Unit 3 is in MODES 4, 5, or defueled, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System to support operation of Unit 1. The 30 day Completion Time is commensurate with the importance of the affected system considering the low probability of a DBA in these conditions and the availability of the remaining power sources. If the inoperable Unit 3 DG cannot be restored to OPERABLE status within the associated Completion Time, the associated SGT or CREVS subsystem must be declared inoperable, and the ACTIONS in the appropriate system Specification taken.

SURVEILLANCE REQUIREMENTS

The AC sources are designed to permit inspection and testing of all important areas and features, especially those that have a standby function. Periodic component tests are supplemented by extensive functional tests (under simulated accident conditions). The SRs for demonstrating the OPERABILITY of the DGs meet the intent of Safety Guide 9 (Ref. 3), as addressed by References 13 and 14.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

Where the SRs discussed herein specify voltage and frequency tolerances, the following summary is applicable. The minimum steady state output voltage of 3740 V is 90% of the nominal 4160 V output voltage. This value, which is specified in ANSI C84.1 (Ref. 9), allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage is specified as 90% or 3600 V. It also allows for voltage drops to motors and other equipment down through the 120 V level where minimum operating voltage is also usually specified as 90% of name plate rating. The specified maximum steady state output voltage of 4580 V is equal to the maximum operating voltage specified for 4000 V motors. It ensures that for a lightly loaded distribution system, the voltage at the terminals of 4000 V motors is no more than the maximum rated operating voltages. The specified minimum and maximum frequencies of the DG are 58.8 Hz and 61.2 Hz, respectively. These values are equal to ± 2% of the 60 Hz nominal frequency and are derived from the recommendations found in Safety Guide 9 (Ref. 3).

SR 3.8.1.1 and SR 3.8.1.4

These SRs help to ensure the availability of the standby electrical power supply to mitigate DBAs and transients and maintain the unit in a safe shutdown condition.

For the purposes of this testing, the DGs are started from standby conditions. Standby conditions for a DG mean that the diesel engine coolant and oil are being continuously circulated and temperature is being maintained consistent with manufacturer recommendations.

In order to reduce stress and wear on diesel engines, a modified start may be utilized for SR 3.8.1.1 in which the starting speed of DGs is limited, engine warmup is allowed at this lower speed, and the DGs are gradually accelerated to synchronous speed prior to loading. These start procedures are the intent of the Note.

SR 3.8.1.4 requires that, at a 184 day Frequency, the DG starts from standby conditions and achieves required voltage and frequency within 10 seconds. The 10 second start requirement supports the assumptions in the design basis LOCA analysis of FSAR, Section 14.6.3 (Ref. 10). The

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.1 and SR 3.8.1.4 (continued)

10 second start requirement is not applicable to SR 3.8.1.1 (see the Note for SR 3.8.1.1), when a modified start procedure as described above is used. If a modified start is not used, the 10 second start requirement of SR 3.8.1.4 applies.

Since SR 3.8.1.4 does require a 10 second start, it is more restrictive than SR 3.8.1.1, and it may be performed in lieu of SR 3.8.1.1. This procedure is the intent of the Note for SR 3.8.1.1.

The 31 day Frequency for SR 3.8.1.1 is consistent with Safety Guide 9 (Ref. 3). The 184 day Frequency for SR 3.8.1.4 is a reduction in cold testing consistent with Generic Letter 84-15 (Ref. 7). These Frequencies provide adequate assurance of DG OPERABILITY, while minimizing degradation resulting from testing.

SR 3.8.1.2

This Surveillance verifies that the DGs are capable of synchronizing and accepting greater than or equal to the continuous rating. A minimum run time of 60 minutes is required to stabilize engine temperatures, while minimizing the time that the DG is connected to the offsite source.

Although no power factor requirements are established by this SR, the DG is normally operated at a power factor between 0.8 lagging and 1.0.

The 31 day Frequency for this Surveillance is consistent with Safety Guide 9 (Ref. 3).

Note 1 modifies this Surveillance to indicate that diesel engine runs for this Surveillance may include gradual loading, as recommended by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized.

Note 2 modifies this Surveillance by stating that momentary transients because of changing bus loads do not invalidate

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.2 (continued)

this test. Similarly, momentary power factor transients above the limit do not invalidate the test.

Note 3 indicates that this Surveillance should be conducted on only one DG at a time in order to avoid common cause failures that might result from offsite circuit or grid perturbations.

Note 4 stipulates a prerequisite requirement for performance of this SR. A successful DG start must precede this test to credit satisfactory performance. Additionally, prior to loading, an engine-idle warmup period is allowed.

SR 3.8.1.3

This Surveillance demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated 7-day storage tank to its associated engine fuel oil tank. It is required to support continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oils piping system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer systems are OPERABLE.

The design of fuel transfer systems is such that pumps that transfer the fuel oil operate automatically in order to maintain an adequate volume of fuel oil in the engine tank during or following DG operation. A 31 day Frequency is appropriate, since proper operation of fuel transfer systems is an inherent part of DG OPERABILITY.

SR 3.8.1.4

See SR 3.8.1.1.

SR 3.8.1.5

Each DG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.5 (continued)

the loss of a large load could cause diesel engine overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. The largest single load for each DG is a residual heat removal pump (2000 hp). This Surveillance may be accomplished by:

a. Tripping the DG output breaker with the DG carrying greater than or equal to its associated single largest post-accident load while paralleled to offsite power, or while solely supplying the board; or

b. Tripping its associated single largest post-accident load with the DG solely supplying the board.

As required by IEEE-308 (Ref. 11), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint, or 15% above synchronous speed, whichever is lower. This represents 66.75 Hz, equivalent to 75% of the difference between nominal speed and the overspeed trip setpoint.

The voltage and frequency tolerances specified in this SR are derived from Safety Guide 9 (Ref. 3) recommendations for response during load sequence intervals. The voltage and frequency specified are consistent with the design range of the equipment powered by the DG. SR 3.8.1.5.a corresponds to the maximum frequency excursion, while SR 3.8.1.5.b is a steady state voltage value to which the system must recover following load rejection. The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 8).

This SR is modified by a Note. In order to ensure that the DG is tested under load conditions that are as close to design basis conditions as possible, the Note requires that, if synchronized to offsite power, testing must be performed using a power factor ≤ 0.9. This power factor is chosen to

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.5 (continued)

be representative of the actual design basis inductive loading that the DG would experience.

SR 3.8.1.6

This Surveillance demonstrates that the DG automatically starts from the design basis actuation signal (LOCA signal). This test will also verify the start of the Unit 3 DGs aligned to the SGT and CREV Systems on an accident signal from Unit 1. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

SR 3.8.1.7

Demonstration once per 18 months that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours—22 hours of which is at a load equivalent to the continuous rating of the DG, and 2 hours of which is at a load equivalent to the two-hour rating, which is greater than the maximum expected post-accident loading on the DG, confirms the DG capability for long term operation. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for gradual loading, discussed in SR 3.8.1.2, are applicable to this SR.

In order to ensure that the DG is tested under load conditions that are as close to design conditions as possible, testing must be performed using a power factor ≤ 0.9. This power factor is chosen to be representative of the actual design basis inductive loading that the DG could experience. A load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 8), paragraph 2.a.(3).

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.7 (continued)

This Surveillance has been modified by a Note that states that momentary transients due to changing bus loads do not invalidate this test. Similarly, momentary power factor transients above the limit do not invalidate the test.

SR 3.8.1.8

Under accident conditions (and loss of offsite power) loads are sequentially connected to the shutdown boards by automatic individual pump timers. The individual pump timers control the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. This SR is demonstrated by performance of SR 3.3.5.1.5 for the Core Spray and LPCI pump timers, SR 3.7.2.3 for the EECW pump timers, and SR 3.8.1.9.b for the 480 V load shed logic timers. These calibration tolerances ensure that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Reference 2 provides a summary of the automatic loading of ESF shutdown boards.

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 8), paragraph 2.a.(2).

SR 3.8.1.9

In the event of a DBA coincident with a loss of offsite power, the DGs are required to supply the necessary power to ESF systems so that the fuel, RCS, and containment design limits are not exceeded.

This Surveillance demonstrates the as designed operation of the standby power sources during a loss of offsite power actuation test signal in conjunction with an ECCS initiation signal. This test verifies all actions encountered from the loss of offsite power in conjunction with an ECCS initiation signal, including shedding of the nonessential loads and energization of the 4.16 kV shutdown boards and respective loads from the DG. It further demonstrates the capability

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.9 (continued)

of the DG to automatically achieve the required voltage and frequency within the specified time.

The requirement to verify the connection and power supply of permanent and auto-connected loads is intended to satisfactorily show the relationship of these loads to the DG loading logic. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, Emergency Core Cooling Systems (ECCS) injection valves are not desired to be stroked open, some systems are not capable of being operated at full flow, and RHR systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of the connection and loading of these loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of 18 months takes into consideration plant conditions required to perform the Surveillance and is intended to be consistent with an expected fuel cycle length of 18 months.

SR 3.8.1.10

This Surveillance is provided to direct that the appropriate Surveillances for the required Unit 3 DGs are governed by the Unit 3 Technical Specifications. Performance of the applicable Unit 3 Surveillances will satisfy any Unit 3 requirements, as well as this Unit 1 and 2 Surveillance requirement. The Frequency required by the applicable Unit 3 SR also governs performance of that SR for both Units.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.

2. FSAR, Chapter 8.

(continued)

BASES

REFERENCES (continued)

3. Safety Guide 9.

4. FSAR, Chapter 6.

5. FSAR, Chapter 14.

6. Regulatory Guide 1.93.

7. Generic Letter 84-15.

8. Regulatory Guide 1.108.

9. ANSI C84.1, 1982.

10. FSAR, Section 14.6.3.

11. IEEE Standard 308.

12. FSAR, Section 8.5, Table 8.5-6.

13. FSAR, Section 8.5.2.

14. TVA Design Criteria BFN-50-7082.

15. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.2 AC Sources — Shutdown

BASES

BACKGROUND

A description of the AC sources is provided in the Bases for LCO 3.8.1, "AC Sources — Operating."

APPLICABLE SAFETY ANALYSES

The OPERABILITY of the minimum AC sources during MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment ensures that:

a. The facility can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate AC electrical power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

In general, when the unit is shut down the Technical Specifications requirements ensure that the unit has the capability to mitigate the consequences of postulated accidents. However, assuming a single failure and concurrent loss of all offsite or loss of all onsite power is not required. The rationale for this is based on the fact that many Design Basis Accidents (DBAs) that are analyzed in MODES 1, 2, and 3 have no specific analyses in MODES 4 and 5. Worst case bounding events are deemed not credible in MODES 4 and 5 because the energy contained within the reactor pressure boundary, reactor coolant temperature and pressure, and corresponding stresses result in the probabilities of occurrences significantly reduced or eliminated, and minimal consequences. These deviations from DBA analysis assumptions and design requirements during shutdown conditions are allowed by the LCO for required systems.

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BASES

APPLICABLE SAFETY ANALYSES (continued)

During MODES 1, 2, and 3, various deviations from the analysis assumptions and design requirements are allowed within the ACTIONS. This allowance is in recognition that certain testing and maintenance activities must be conducted, provided an acceptable level of risk is not exceeded. During MODES 4 and 5, performance of a significant number of required testing and maintenance activities is also required. In MODES 4 and 5, the activities are generally planned and administratively controlled. Relaxations from typical MODES 1, 2, and 3 LCO requirements are acceptable during shutdown MODES, based on:

a. The fact that time in an outage is limited. This is a risk prudent goal as well as a utility economic consideration.

b. Requiring appropriate compensatory measures for certain conditions. These may include administrative controls, reliance on systems that do not necessarily meet typical design requirements applied to systems credited in operation MODE analyses, or both.

c. Prudent utility consideration of the risk associated with multiple activities that could affect multiple systems.

d. Maintaining, to the extent practical, the ability to perform required functions (even if not meeting MODES 1, 2, and 3 OPERABILITY requirements) with systems assumed to function during an event.

In the event of an accident during shutdown, this LCO ensures the capability of supporting systems necessary for avoiding immediate difficulty, assuming either a loss of all offsite power or a loss of all onsite (diesel generator (DG)) power.

The AC sources satisfy Criterion 3 of the NRC Policy Statement (Ref. 1).

LCO

One offsite circuit capable of supplying the onsite Class 1E power distribution subsystem(s) of LCO 3.8.8, "Distribution Systems – Shutdown," ensures that all required loads are

(continued)

BASES

LCO (continued)

powered from offsite power. Two Unit 1 and 2 DGs, and when Unit 3 is not in MODE 1, 2, or 3 with SGT and CREV Systems required OPERABLE, Unit 3 DGs OPERABLE, each associated with a Distribution System Engineered Safety Feature (ESF) 4.16 kV shutdown board required OPERABLE by LCO 3.8.8, ensures that a diverse LCO power source is available for providing electrical power support assuming a loss of the offsite circuit. Together, OPERABILITY of the required offsite circuit and DGs ensures the availability of sufficient AC sources to operate the plant in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents and reactor vessel draindown).

The qualified offsite circuit(s) must be capable of maintaining rated frequency and voltage while connected to their respective 4.16 kV shutdown boards, and of accepting required loads during an accident. Qualified offsite circuits are those that are described in the FSAR and are part of the licensing basis for the unit. An offsite circuit is considered OPERABLE if the offsite source is available to one or more required 4.16 kV shutdown boards, through its normal supply breaker.

The offsite circuit consists of incoming breakers to a 4.16 kV shutdown bus and then to the 4.16 kV shutdown boards required by LCO 3.8.8. Each shutdown bus is independently supplied from separate unit boards, which are fed from transformers (via start buses as appropriate). Specific circuits and limitations for considering the offsite circuit qualified are described below.

1. From the 500 kV switchyard (with no credit for the two 500 kV Trinity lines), through unit station service transformer (USST) 1B to 4.16 kV unit board 1A, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B; and/or, to 4.16 kV unit board 1B, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D.

2. From the 500 kV switchyard (with no credit for the two 500 kV Trinity lines), through USST 2B to 4.16 kV unit board 2A, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D; and/or, to 4.16 kV unit

(continued)

BASES

LCO (continued)

board 2B, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B.

3. From the Trinity 161 kV transmission system, through common station service transformer (CSST) A or B to start bus 1A or 1B, to 4.16 kV unit board 1A or 2B, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B; or alternately, to 4.16 kV unit board 1B or 2A, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D.

4. From the Athens 161 kV transmission system, through CSST A or B to start bus 1A or 1B, to 4.16 kV unit board 1A or 2B, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B; or alternately, to 4.16 kV unit board 1B or 2A, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D.

For the Athens 161 kV offsite power to be considered as one of the qualified offsite power supplies, the following restrictions must also be met:

a. The 161 kV capacitor bank must be available for the Athens 161 kV line.

b. Credit for offsite power from the Athens 161 kV line may be taken by only one unit at one time. However, more than one unit may be aligned to the Athens line without invalidating the offsite power supply for the unit claiming it.

For the Trinity 161 kV offsite power to be considered as one of the qualified offsite power supplies, the following restrictions must also be met:

a. For the Trinity 161 kV line to be considered as one of the qualified offsite power supplies by only one unit, either the 161 kV capacitor bank must be available or the Trinity Inter-Tie transformer must be in service with 161 kV line nominal voltage $\geq$ 165 kV.

b. The Trinity 161 kV line may be considered as one of the qualified offsite power supplies by two separate units at any one time, provided that both CSST A and B are available and either the 161 kV capacitor bank is

(continued)

BASES

LCO (continued)

available or the Athens line and Trinity Inter-Tie transformer are in service with 161 kV line nominal voltage ≥ 165 kV.

c. The Trinity 161 kV line may be considered as one of the qualified offsite power supplies by three separate units at any one time, provided that both CSST A and B are available, Unit 3 claims USST 3B as its other offsite power source, and either the 161 kV capacitor bank is available or the Athens line and Trinity Inter-Tie transformer are in service with 161 kV line nominal voltage ≥ 165 kV.

The only requirements for the position of the 161 kV bus 1 and bus 2 cross-tie breakers (924 and 928) are those implied by the restrictions on claiming Athens and Trinity as offsite power supplies.

The required DGs must be capable of starting, accelerating to rated speed and voltage, connecting to respective 4.16 kV shutdown boards on detection of bus undervoltage, and accepting required loads. This sequence must be accomplished within 10 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and must continue to operate until offsite power can be restored to the 4.16 kV shutdown boards.

Proper sequencing of loads, including tripping of nonessential loads, is a required function for DG OPERABILITY.

APPLICABILITY

The AC sources are required to be OPERABLE in MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment to provide assurance that:

a. Systems providing adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core in case of an inadvertent draindown of the reactor vessel;

b. Systems needed to mitigate a fuel handling accident are available;

(continued)

BASES

APPLICABILITY (continued)

c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

AC power requirements for MODES 1, 2, and 3 are covered in LCO 3.8.1.

ACTIONS

A.1

With the required offsite circuit inoperable, or one required DG inoperable, the remaining AC sources available may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, and operations with a potential for draining the reactor vessel. By declaring required features inoperable that are supported by the inoperable AC source, appropriate restrictions can be implemented in accordance with the affected required feature(s) LCOs' ACTIONS.

The 30 day Completion Time takes into account the OPERABILITY of the redundant required features, and their offsite and DG power availability. Additionally, the 30 day Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and low probability of an event occurring during this period. If the redundant required feature(s) is (are) not OPERABLE, the second Completion Time requires immediately declaring the required feature(s), supported by the inoperable AC source, inoperable. This results in taking the appropriate ACTIONS in the supported system Specification for the inoperable function.

B.1, B.2.1, B.2.2, B.2.3, and B.2.4

With two or more required AC sources inoperable, the option still exists to declare all required features inoperable. However, since this option may involve undesired administrative efforts, the allowance for sufficiently

(continued)

BASES

ACTIONS

B.1, B.2.1, B.2.2, B.2.3, and B.2.4 (continued)

conservative actions is made. With two or more required AC sources inoperable, the minimum required diversity of AC power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies in the secondary containment, and activities that could result in inadvertent draining of the reactor vessel.

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC sources and to continue this action until restoration is accomplished in order to provide the necessary AC power to the plant safety systems.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required AC electrical power sources should be completed as quickly as possible in order to minimize the time during which the plant safety systems may be without sufficient power.

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition B have been modified by a Note to indicate that when Condition B is entered with no AC power to any required 4.16 kV shutdown board, ACTIONS for LCO 3.8.8 must be immediately entered. This Note allows Condition B to provide requirements for the loss of the offsite circuit whether or not a division is de-energized. LCO 3.8.8 provides the appropriate restrictions for the situation involving a de-energized 4.16 kV shutdown board.

SURVEILLANCE REQUIREMENTS

SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the Unit 1 and 2

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.2.1 (continued)

AC sources in other than MODES 1, 2, and 3. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR.

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DG(s) from being paralleled with the offsite power network or otherwise rendered inoperable during the performance of SRs, and to preclude deenergizing a required 4.16 kV shutdown board or disconnecting a required offsite circuit during performance of SRs. With limited AC sources available, a single event could compromise both the required circuit and the DG. It is the intent that these SRs must still be capable of being met, but actual performance is not required during periods when the DG and offsite circuit is required to be OPERABLE.

SR 3.8.2.2

This Surveillance is provided to direct that the appropriate Surveillances for the required Unit 3 DGs are governed by the Unit 3 Technical Specifications. Performance of the applicable Unit 3 Surveillances will satisfy any Unit 3 requirements, as well as satisfying this Unit 2 Surveillance requirement. The Frequency required by the applicable SR Unit 3 SR also governs performance of that SR for both Units.

REFERENCES

1. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.3 Diesel Fuel Oil, Lube Oil, and Starting Air

BASES

BACKGROUND

Each diesel generator (DG) is provided with three interconnected storage tanks having a minimum usable fuel oil volume (35,280 gallons) sufficient to operate that DG for a period of 7 days while the DG is supplying maximum post loss of coolant accident (LOCA) load demand discussed in FSAR, Section 8.5.3.4 (Ref. 1). A transfer pump is located at the fuel oil storage tanks which can supply fuel oil from two 71,000-gallon fuel oil storage tanks to the 7-day storage tanks. In addition, it is possible to transfer fuel from one 7-day storage tank to any other by using transfer pumps. This onsite fuel oil capacity is sufficient to operate the DGs for longer than the time to replenish the onsite supply from outside sources.

Fuel oil is transferred from the 7-day storage tank to the day tank by either of two transfer pumps associated with each diesel generator. This is accomplished automatically by level switches on the day tank. Redundancy of pumps and piping precludes the failure of one pump, or the rupture of any pipe, valve, or tank to result in the loss of more than one DG. All 7-day tanks are embedded in the substructure of the Standby Diesel Generator Building.

For proper operation of the standby DGs, it is necessary to ensure the proper quality of the stored fuel oil. The fuel oil property monitored is the total particulate concentration. Periodic testing of the stored fuel oil total particulate concentration is a method to monitor the potential degradation related to long term storage and the potential impact to fuel filter plugging as a result of high particulate levels.

The DG lubrication system is designed to provide sufficient lubrication to permit proper operation of its associated DG under all loading conditions. The system is required to circulate the lube oil to the diesel engine working surfaces and to remove excess heat generated by friction during operation. Each engine oil sump contains an inventory capable of supporting a minimum of 7 days of operation.

(continued)

BASES

BACKGROUND (continued)

The 175-gallon and 150-gallon capacities listed in Condition B are based upon the DG seven-day consumption and six-day consumption of lube oil, respectively. The total lube oil system capacity is 465 gallons, of which, 235 gallons are useable (i.e., 230 gallons are not useable). If the seven-day and six-day capacities are added to the non-useable capacity, a minimum value of lube oil capacity can be established for purposes of this LCO. Therefore, 405 gallons are required to ensure the seven-day requirement (i.e., 230 + 175); while, 380 gallons (i.e., 230 + 150) are required to ensure the six-day requirement. Note: actual lube oil consumption is 0.98 gal/hr or 23.52 gal/day - 25 gal/day was conservatively chosen to establish the seven-day and six-day requirements.

This supply is sufficient to allow the operator to replenish lube oil from outside sources.

Each DG has two fully redundant air start systems, either of which is capable of starting the engine, with adequate capacity for at least one start attempt on the DG without recharging the air start receiver(s).

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in FSAR, Chapter 6 (Ref. 3), and Chapter 14 (Ref. 4), assume Engineered Safety Feature (ESF) systems are OPERABLE. The DGs are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that fuel, Reactor Coolant System, and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.5, Emergency Core Cooling System (ECCS) and Reactor Core Isolation Cooling (RCIC) System; and Section 3.6, Containment Systems.

Since diesel fuel oil, lube oil, and starting air subsystems support the operation of the standby AC power sources, they satisfy Criterion 3 of the NRC Policy Statement (Ref. 5).

(continued)

BASES (continued)

LCO

Stored diesel fuel oil is required to have sufficient supply for 7 days of full load operation. It is also required to meet specific standards for quality. Additionally, sufficient lube oil supply must be available to ensure the capability to operate at full load for 7 days. This requirement, in conjunction with an ability to obtain replacement supplies within 7 days, supports the availability of DGs required to shut down the reactor and to maintain it in a safe condition for an abnormal operational transient or a postulated DBA with loss of offsite power. DG day tank fuel oil requirements, as well as transfer capability from the 7-day storage tank to the day tank, are addressed in LCO 3.8.1, "AC Sources—Operating," and LCO 3.8.2, "AC Sources—Shutdown."

One of the two redundant starting air systems is required to have a minimum capacity for one DG start attempt without recharging the air start receiver.

APPLICABILITY

The AC sources (LCO 3.8.1 and LCO 3.8.2) are required to ensure the availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an abnormal operational transient or a postulated DBA. Because stored diesel fuel oil, lube oil, and starting air subsystem support LCO 3.8.1 and LCO 3.8.2, stored diesel fuel oil, lube oil, and starting air are required to be within limits when the associated DG is required to be OPERABLE.

(continued)

BASES (continued)

ACTIONS

The ACTIONS Table is modified by a Note indicating that separate Condition entry is allowed for each DG. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable DG subsystem. Complying with the Required Actions for one inoperable DG subsystem may allow for continued operation, and subsequent inoperable DG subsystem(s) governed by separate Condition entry and application of associated Required Actions.

A.1

In this condition, the 7 day fuel oil supply for a DG is not available. However, the Condition is restricted to fuel oil level reductions that maintain at least a 6 day supply. These circumstances may be caused by events such as:

a. Full load operation required for an inadvertent start while at minimum required level; or

b. Feed and bleed operations that may be necessitated by increasing particulate levels or any number of other oil quality degradations.

This restriction allows sufficient time for obtaining the requisite replacement volume and performing the analyses required prior to addition of the fuel oil to the tank. A period of 48 hours is considered sufficient to complete restoration of the required level prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> 6 days), the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

B.1

With lube oil inventory < 175 gal, sufficient lube oil to support 7 days of continuous DG operation at full load conditions may not be available. However, the Condition is restricted to lube oil volume reductions that maintain at least a 6 day supply. This restriction allows sufficient time for obtaining the requisite replacement volume. A period of 48 hours is considered sufficient to complete

(continued)

BASES

ACTIONS

B.1 (continued)

restoration of the required volume prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> 6 days), the low rate of usage, the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

C.1

This Condition is entered as a result of a failure to meet the acceptance criterion for particulates. Normally, trending of particulate levels allows sufficient time to correct high particulate levels prior to reaching the limit of acceptability. Poor sample procedures (bottom sampling), contaminated sampling equipment, and errors in laboratory analysis can produce failures that do not follow a trend. Since the presence of particulates does not mean failure of the fuel oil to burn properly in the diesel engine, since particulate concentration is unlikely to change significantly between Surveillance Frequency intervals, and since proper engine performance has been recently demonstrated (within 31 days), it is prudent to allow a brief period prior to declaring the associated DG inoperable. The 7 day Completion Time allows for further evaluation, re-sampling, and re-analysis of the DG fuel oil.

D.1

With the starting air receiver pressure < 165 psig in the required starting air system, sufficient capacity to start the associated DG may not exist. The associated DG may be incapable of performing its intended function and must be immediately declared inoperable. This declaration also requires entry into applicable Conditions and Required Actions for an inoperable DG, LCO 3.8.1, "AC Sources—Operating."

(continued)

BASES

ACTIONS (continued)

E.1

With a Required Action and associated Completion Time not met, or the stored diesel fuel oil, lube oil, or starting air subsystem not within limits for reasons other than addressed by Conditions A through D, the associated DG may be incapable of performing its intended function and must be immediately declared inoperable.

SURVEILLANCE REQUIREMENTS

SR 3.8.3.1

This SR provides verification that there is an adequate inventory of fuel oil in the storage tanks to support each DG's operation for 7 days at full load. The 7 day period is sufficient time to place the unit in a safe shutdown condition and to bring in replenishment fuel from an offsite location.

The 31 day Frequency is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and unit operators would be aware of any large uses of fuel oil during this period.

SR 3.8.3.2

This Surveillance ensures that sufficient lubricating oil inventory is available to support at least 7 days of full load operation for each DG. The 175 gal requirement is based on the DG manufacturer's consumption values for the run time of the DG. Implicit in this SR is the requirement to verify the capability to transfer the lube oil from its storage location to the DG, when the DG lube oil sump does not hold adequate inventory for 7 days of full load operation without the level reaching the manufacturer's recommended minimum level.

A 31 day Frequency is adequate to ensure that a sufficient lube oil supply is onsite, since DG starts and run time are closely monitored by the plant staff.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.3.3

This SR verifies that the required fuel oil testing is performed in accordance with the Diesel Fuel Oil Testing Program. Tests are a means of monitoring the potential degradation related to long term storage and the potential impact to fuel filter plugging as a result of high particulate levels. Specific sampling requirements, frequencies, and additional information are discussed in detail in the Diesel Fuel Oil Testing Program.

SR 3.8.3.4

This Surveillance ensures that, without the aid of the refill compressor, sufficient air start capacity for each DG is available. The system design requirements provide for at least one start cycle from one of two redundant air start systems without recharging. A start cycle is defined by the DG vendor, but usually is measured in terms of time (seconds of cranking) or engine cranking speed. The pressure specified in this SR is the lowest pressure at which at least one start attempt can be accomplished using one of two redundant air start systems.

The 31 day Frequency takes into account the capacity, capability, redundancy, and diversity of the AC sources and other indications available in the control room, including alarms, to alert the operator to below normal air start pressure.

REFERENCES

1. FSAR, Section 8.5.3.4.
2. Regulatory Guide 1.137.
3. FSAR, Chapter 6.
4. FSAR, Chapter 14.
5. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.4 DC Sources—Operating

BASES

BACKGROUND

The DC electrical power system provides the AC emergency power system with control power. It also provides both motive and control power to selected safety related equipment. As required by 10 CFR 50, Appendix A, GDC 17 (Ref. 1), the DC electrical power system is designed to have sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure. The DC electrical power system also conforms to the recommendations of Regulatory Guide 1.6 (Ref. 2) and meets the intent of IEEE-279 (Ref. 3).

Three separate DC Source Systems consist of:

1. Three 250 VDC Unit DC subsystems, together with the associated charger, circuitry, switches, indicators, and alarms. Each Unit DC battery board can be supplied from its own battery charger or from the spare charger. The three Unit batteries have engineered safety feature loads for the three units distributed among them so that redundant subsystems on each unit have separate normal and alternate power supplies. The Unit DC battery boards also supply control power for the bus-tie board, the cooling tower switchgear, three Unit 3 shutdown boards, and the alternate feeder to Unit 1 and 2 shutdown boards and one Unit 3 shutdown board. The battery boards, motor-operated valve boards, and distribution panels supply nominal 250 VDC power to their loads without interruption unless the supply battery is discharged and power to the charger is lost. All transfers from normal to alternate sources are done manually.

2. Four 250 VDC shutdown board subsystems supply control power for 4.16 kV shutdown boards A, B, C, and D, respectively, and 480 V shutdown boards 1A, 1B, 2A and 2B. Each DC shutdown board subsystem consists of a battery together with the associated charger, circuitry, switches, indicators, and alarms. Each shutdown board DC subsystem can receive power from its

(continued)

BASES

BACKGROUND (continued)

own battery, battery charger, or from the spare charger. Normal 250 VDC control power for 4.16 kV shutdown boards A, B, C, and D is supplied by one of the shutdown board DC subsystems with an alternate supply from one of the Unit DC battery boards through a manual transfer switch; and control power for 480 V shutdown boards 1A, 1B, 2A, and 2B is supplied by one of the shutdown board DC subsystems with an alternate supply from one of the Unit DC battery boards through a manual transfer switch. Alternate supplies have been provided through manual transfer switches. Separation between redundant control power circuits is maintained external to and within the switchgear.

3. The diesel generator (DG) DC subsystems provide control and instrumentation power for their respective DG. Each DG DC subsystem is energized by one 125 V battery and one of two 125 V battery chargers per 125 V subsystem.

During normal operation, the DC loads are powered from the battery chargers with the batteries floating on the system. In case of loss of normal power to the battery charger, the DC loads are automatically powered from the batteries.

The DC power distribution system is described in more detail in Bases for LCO 3.8.7, "Distribution System — Operating," and LCO 3.8.8, "Distribution System — Shutdown."

Each Unit and Shutdown Board battery has adequate storage capacity to carry the required load continuously for approximately 30 minutes (Ref. 4).

Each diesel battery has adequate storage capacity to carry required loads. These include control and logic power, governor booster pumps, generator relay protection, generator field flashing, and the motor-driven fuel pumps. The governor booster pumps and generator field flashing require power for only a relatively short time during a diesel start. Approximately 5.5 seconds after start, the diesel battery load is about 4.2 amps.

Each Unit and Shutdown Board DC battery subsystem is separately housed in a ventilated room apart from its charger and distribution centers. Each subsystem is located

(continued)

BASES

BACKGROUND (continued)

in an area separated physically and electrically from the other subsystems to ensure that a single failure in one subsystem does not cause a failure in a redundant subsystem. Each diesel battery is located in the room with the diesel generator it serves. One of its chargers is also in the room; the other is immediately outside the door in the Diesel Generator Building hallway.

The batteries for Unit DC, Shutdown Board DC, and DG DC electrical power subsystems are sized to produce required capacity at 80% of nameplate rating, corresponding to warranted capacity at end of life cycles and the 100% design demand. The minimum design voltage limit for the Unit DC and Shutdown Board DC subsystems is 210 V. The minimum design voltage limit for the DG DC subsystems is 105 V.

Each battery charger for a DC electrical power subsystem has ample power output capacity for the steady state operation of connected loads required during normal operation, while at the same time maintaining its battery bank fully charged. Each battery charger has sufficient capacity to restore the battery from the design minimum charge to its fully charged state within 12 hours while supplying normal steady state loads (Ref. 4).

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the FSAR, Chapter 6 (Ref. 5) and Chapter 14 (Ref. 5), assume that Engineered Safety Feature (ESF) systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the DGs, emergency auxiliaries, and control and switching during all MODES of operation. The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining DC sources OPERABLE during accident conditions in the event of:

a. An assumed loss of all offsite AC power or all onsite AC power sources; and

b. A postulated worst case single failure.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)	The DC sources satisfy Criterion 3 of the NRC Policy Statement (Ref. 11).
LCO	The DC Electrical Power System — with: 1) three Unit DC subsystems, each consisting of one 250 V battery, one battery charger, and the corresponding control equipment and interconnecting cabling supplying power to the associated Unit battery board; 2) four shutdown board DC subsystems (and the Unit 3 shutdown board DC subsystem needed to support OPERABILITY of the CREV System), each consisting of one 250 V battery, its associated charger, and the corresponding control equipment and interconnecting cabling supplying power to the associated DC shutdown board; and 3) four Unit 2 and two Unit 3 DG DC subsystems each consisting of one battery bank, one battery charger, and the corresponding control equipment and interconnecting cabling, is required to be OPERABLE to ensure the availability of the required power to shut down the reactor and maintain it in a safe condition after an abnormal operational transient or a postulated DBA. Loss of any DC electrical power subsystem does not prevent the minimum safety function from being performed (Ref. 4).
APPLICABILITY	The DC electrical power sources are required to be OPERABLE in MODES 1, 2, and 3 to ensure safe unit operation and to ensure that: a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of abnormal operational transients; and b. Adequate core cooling is provided, and containment integrity and other vital functions are maintained in the event of a postulated DBA. The DC electrical power requirements for MODES 4 and 5 are addressed in the Bases for LCO 3.8.5, "DC Sources — Shutdown."

(continued)

BASES (continued)

ACTIONS

A.1

Condition A represents one Unit or Shutdown Board DC subsystem with a loss of ability to completely respond to an event, and a potential loss of ability to remain energized during normal operation. It is therefore imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for complete loss of DC power to the affected division. The 7 day limit is consistent with the allowed time for an inoperable Unit DC Board or Shutdown Board Distribution Panel.

If one Unit or Shutdown Board DC electrical power subsystem is inoperable (e.g., inoperable battery, inoperable battery charger(s), or inoperable battery charger and associated inoperable battery), the remaining Unit or Shutdown Board DC electrical power subsystems have the capacity to support a safe shutdown and cooldown of all three units in the event of a loss of offsite power and a DBA on one Unit. Since a subsequent worst case single failure could, however, result in the loss of minimum necessary DC electrical subsystems to mitigate a worst case accident, continued power operation should not exceed 7 days. The loss of one shutdown board electrical power subsystem affects normal control power supply for the 480 V and 4.16 kV shutdown board(s) which it supplies. Loss of uninterrupted control power to these shutdown boards may result in loss of those engineered safety features supplied by these boards. Therefore, 7 days is considered a reasonable time to effect repairs and perform required testing of the unit or shutdown board DC electrical power subsystem, recognizes the ability to connect alternate sources to support continued operation or accident mitigation, and, if the unit or shutdown board DC electrical power subsystem is not restored to OPERABLE status, to prepare to effect an orderly and safe unit shutdown.

B.1 and B.2

If the Unit or Shutdown Board DC electrical power subsystem cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit

(continued)

BASES

ACTIONS

B.1 and B.2 (continued)

must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems. The Completion Time to bring the unit to MODE 4 is consistent with the time required in Regulatory Guide 1.93 (Ref. 6).

C.1

If a DG DC electrical power subsystem is inoperable, the associated DG may be incapable of performing its intended function and must be immediately declared inoperable. This declaration also requires entry into applicable Conditions and Required Actions for an inoperable DG, LCO 3.8.1, "AC Sources — Operating."

D.1

Required Action D.1 is intended to provide assurance that a loss of Unit 3 Shutdown Board DC electrical power subsystem 3EB does not result in a complete loss of safety function of critical systems (i.e., CREVS). With Unit 3 Shutdown Board DC electrical power subsystem 3EB inoperable, the CREVS train supported by that shutdown board is inoperable. Therefore, the associated CREVS subsystem must be declared inoperable immediately, and the ACTIONS in the appropriate system Specification taken.

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1

Verifying battery terminal voltage while on float charge for the batteries helps to ensure the effectiveness of the charging system and the ability of the batteries to perform their intended function. Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery (or battery cell) and maintain the battery (or a battery cell) in a fully charged state. The voltage requirements are

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1 (continued)

based on the nominal design voltage of the battery and are consistent with the initial voltages assumed in the battery sizing calculations. The 7 day Frequency is consistent with manufacturer recommendations and IEEE-450 (Ref. 7).

SR 3.8.4.2 and SR 3.8.4.5

Battery charger capability requirements are based on the design capacity of the chargers (Ref. 4). According to Regulatory Guide 1.32 (Ref. 8), the battery charger supply is required to be based on the largest combined demands of the various steady state loads and the charging capacity to restore the battery from the design minimum charge state to the fully charged state, irrespective of the status of the unit during these demand occurrences. The minimum required amperes and verification of the charger's ability to recharge the battery ensures that these requirements can be satisfied.

SR 3.8.4.2 verifies that the chargers are capable of charging the batteries after their designed duty cycle testing and ensures that the chargers will perform their design function. This SR is modified by a Note that allows the performance of SR 3.8.4.5 in lieu of this surveillance requirement. SR 3.8.4.5 verifies that the chargers are capable of charging the batteries after each discharge test and ensures that the chargers are capable of performing at maximum output. SR 3.8.4.2 is performed at the same frequency as the 18 month service test (SR 3.8.4.3), while SR 3.8.4.5 is performed following the 60 month battery discharge test (SR 3.8.4.4).

SR 3.8.4.3

A battery service test is a special test of the battery's capability, as found, to satisfy the design requirements (battery duty cycle) of the DC electrical power system. The discharge rate and test length corresponds to the design duty cycle requirements as specified in Reference 4.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.3 (continued)

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.32 (Ref. 8) and Regulatory Guide 1.129 (Ref. 9), which state, in part, that the battery service test should be performed with intervals between tests not to exceed 18 months.

This SR is modified by a Note that allows the performance of a modified performance discharge test in lieu of a service test once per 60 months. The modified performance discharge test is a simulated duty cycle consisting of just two rates; the one minute rate published for the battery or the largest current load of the duty cycle, followed by the test rate employed for the performance test, both of which envelope the duty cycle of the service test. Since the ampere-hours removed by a rated one minute discharge represents a very small portion of the battery capacity, the test rate can be changed to that for the performance test without compromising the results of the performance discharge test. The battery terminal voltage for the modified performance discharge test should remain above the minimum battery terminal voltage specified in the battery service test for the duration of time equal to that of the service test.

A modified discharge test is a test of the battery capacity and its ability to provide a high rate, short duration load (usually the highest rate of the duty cycle). This will often confirm the battery's ability to meet the critical period of the load duty cycle, in addition to determining its percentage of rated capacity. Initial conditions for the modified performance discharge test should be identical to those specified for a service test.

SR 3.8.4.4

A battery performance discharge test is a test of constant current capacity of a battery, normally done in the as found condition, after having been in service, to detect any change in the capacity determined by the acceptance test. The test is intended to determine overall battery degradation due to age and usage.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.4 (continued)

A battery modified performance discharge test is described in the Bases for SR 3.8.4.3. Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.4.4; however, only the modified performance discharge test may be used to satisfy SR 3.8.4.4 while satisfying the requirements of SR 3.8.4.3 at the same time.

The acceptance criteria for this Surveillance is consistent with IEEE-279 (Ref. 3) and IEEE-485 (Ref. 10). These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements.

The Frequency for this test is normally 60 months. If the battery shows degradation, or if the battery has reached 85% of its expected life and capacity is < 100% of the manufacturer's rating, the Surveillance Frequency is reduced to 12 months. However, if the battery shows no degradation but has reached 85% of its expected life, the Surveillance Frequency is only reduced to 24 months for batteries that retain capacity ≥ 100% of the manufacturer's rating. Degradation is indicated, according to IEEE-279 (Ref. 3), when the battery capacity drops by more than 10% relative to its capacity on the previous performance test or when it is 10% below the manufacturer's rating. All these Frequencies are consistent with the recommendations in IEEE-279 (Ref. 3).

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.
2. Regulatory Guide 1.6.
3. IEEE Standard 279.
4. FSAR, Sections 8.5 and 8.6.
5. FSAR, Chapters 6 and 14.

(continued)

BASES

REFERENCES (continued)

6. Regulatory Guide 1.93.

7. IEEE Standard 450.

8. Regulatory Guide 1.32, February 1977.

9. Regulatory Guide 1.129, December 1974.

10. IEEE Standard 485, 1983.

11. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.5 DC Sources — Shutdown

BASES

BACKGROUND

A description of the DC sources is provided in the Bases for LCO 3.8.4, "DC Sources — Operating."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident and transient analyses in the FSAR, Chapter 6 (Ref. 1) and Chapter 14 (Ref. 2), assume that Engineered Safety Feature systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the diesel generators (DGs), emergency auxiliaries, and control and switching during all MODES of operation.

The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and the requirements for the supported systems' OPERABILITY.

The OPERABILITY of the minimum DC electrical power sources during MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment ensures that:

a. The facility can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate DC electrical power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

The DC sources satisfy Criterion 3 of the NRC Policy Statement (Ref. 3).

(continued)

BASES (continued)

LCO

The DC Electrical Power Systems — with: 1) each Unit DC subsystem, supporting Unit battery boards required OPERABLE by LCO 3.8.8, consisting of one 250 V battery, one battery charger, and the corresponding control equipment and interconnecting cabling supplying power to the associated Unit battery board; 2) each shutdown board DC subsystem, supporting DC shutdown boards required OPERABLE by LCO 3.8.8, consisting of one 250 V battery, its associated charger, and the corresponding control equipment and interconnecting cabling supplying power to the associated DC shutdown board; and 3) each DG DC subsystem supporting DGs required OPERABLE for 4.16 kV shutdown boards required OPERABLE by LCO 3.8.8, consisting of one 125 V battery, one battery charger, and the corresponding control equipment and interconnecting cabling. This requirement ensures the availability of sufficient DC electrical power sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents and inadvertent reactor vessel draindown).

APPLICABILITY

The DC electrical power sources required to be OPERABLE in MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment provide assurance that:

a. Required features to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core in case of an inadvertent draindown of the reactor vessel;

b. Required features needed to mitigate a fuel handling accident are available;

c. Required features necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.5.1

SR 3.8.5.1 requires performance of all Surveillances required by SR 3.8.4.1 through SR 3.8.4.5. Therefore, see the corresponding Bases for LCO 3.8.4 for a discussion of each SR.

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DC sources from being discharged below their capability to provide the required power supply or otherwise rendered inoperable during the performance of SRs. It is the intent that these SRs must still be capable of being met, but actual performance is not required.

REFERENCES

1. FSAR, Chapter 6.
2. FSAR, Chapter 14.
3. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.6 Battery Cell Parameters

BASES

BACKGROUND

This LCO delineates the limits on electrolyte temperature, level, float voltage, and specific gravity for the DC electrical power subsystems batteries. At BFN, these batteries were designed to IEEE-279 Standards (Ref. 4). However, the batteries have been analyzed and meet IEEE-450 Standards (Ref. 3). A discussion of these batteries and their OPERABILITY requirements is provided in the Bases for LCO 3.8.4, "DC Sources - Operating," and LCO 3.8.5, "DC Sources - Shutdown."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in FSAR, Chapter 6 (Ref. 1) and Chapter 14 (Ref. 2), assume Engineered Safety Feature systems are OPERABLE. The DC electrical power subsystems provide normal and emergency DC electrical power for the diesel generators (DGs), emergency auxiliaries, and control and switching during all MODES of operation.

The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining at least one division of DC sources OPERABLE during accident conditions, in the event of:

a. An assumed loss of all offsite AC or all onsite AC power sources; and

b. A postulated worst case single failure.

Since battery cell parameters support the operation of the DC electrical power subsystems, they satisfy Criterion 3 of the NRC Policy Statement (Ref. 5).

LCO

Battery cell parameters must remain within acceptable limits to ensure availability of the required DC power to shut down the reactor and maintain it in a safe condition after an

(continued)

BASES

LCO (continued)

anticipated operational occurrence or a postulated DBA. Electrolyte limits are conservatively established, allowing continued DC electrical system function even with Category A and B limits not met.

APPLICABILITY

The battery cell parameters are required solely for the support of the associated DC electrical power subsystem. Therefore, battery electrolyte is only required when the DC power source is required to be OPERABLE. Refer to the Applicability discussions in Bases for LCO 3.8.4 and LCO 3.8.5.

ACTIONS

A Note has been added providing that, for this LCO, separate Condition entry is allowed for each battery. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable battery. Complying with the Required Actions for battery cell parameters allows for restoration and continued operation, and subsequent out of limit battery cell parameters may be governed by separate Condition entry and application of associated Required Action.

A.1, A.2, and A.3

With parameters of one or more cells in one or more batteries not within limits (i.e., Category A limits not met or Category B limits not met, or Category A and B limits not met) but within the Category C limits specified in Table 3.8.6-1, the battery is degraded but there is still sufficient capacity to perform the intended function. Therefore, the affected battery is not required to be considered inoperable solely as a result of Category A or B limits not met, and continued operation is permitted for a limited period.

The pilot cell electrolyte level and float voltage are required to be verified to meet the Category C limits within 1 hour (Required Action A.1). This check provides a quick indication of the status of the remainder of the battery

(continued)

BASES

ACTIONS

A.1, A.2, and A.3 (continued)

cells. One hour provides time to inspect the electrolyte level and to confirm the float voltage of the pilot cells. One hour is considered a reasonable amount of time to perform the required verification.

Verification that the Category C limits are met (Required Action A.2) provides assurance that during the time needed to restore the parameters to the Category A and B limits, the battery is still capable of performing its intended function. A period of 24 hours is allowed to complete the initial verification because specific gravity measurements must be obtained for each connected cell. Taking into consideration both the time required to perform the required verification and the assurance that the battery cell parameters are not severely degraded, this time is considered reasonable. The verification is repeated at 7 day intervals until the parameters are restored to Category A and B limits. This periodic verification is consistent with the normal Frequency of pilot cell Surveillances.

Continued operation is only permitted for 31 days before battery cell parameters must be restored to within Category A and B limits. Taking into consideration that, while battery capacity is degraded, sufficient capacity exists to perform the intended function and to allow time to fully restore the battery cell parameters to normal limits, this time is acceptable for operation prior to declaring the associated DC battery inoperable.

B.1

When any battery parameter is outside the Category C limit for any connected cell, sufficient capacity to supply the maximum expected load requirement is not ensured and the corresponding DC electrical power subsystem must be declared inoperable. Additionally, other potentially extreme conditions, such as not completing the Required Actions of Condition A within the required Completion Time or average electrolyte temperature of representative cells falling below 60°F for each Unit and Shutdown Board battery (except Shutdown Board battery 3EB) and 40°F for Shutdown Board battery 3EB and each DG battery, also are cause for

(continued)

BASES

ACTIONS

B.1 (continued)

immediately declaring the associated DC electrical power subsystem inoperable.

SURVEILLANCE REQUIREMENTS

This SR verifies that Category A battery cell parameters are consistent with IEEE-450 (Ref. 3), which recommends regular battery inspections (at least one per month) including voltage, specific gravity, and electrolyte temperature of pilot cells.

SR 3.8.6.2

The 92 day inspection of specific gravity and voltage is consistent with IEEE-450 (Ref. 3).

SR 3.8.6.3

This Surveillance verification that the average temperature of representative cells is within limits is consistent with a recommendation of IEEE-450 (Ref. 3) that states that the temperature of electrolytes in representative (10 percent of) cells should be determined on a quarterly basis.

Lower than normal temperatures act to inhibit or reduce battery capacity. This SR ensures that the operating temperatures remain within an acceptable operating range. This limit is based on manufacturer's recommendations.

Table 3.8.6-1

This table delineates the limits on electrolyte level, float voltage, and specific gravity for three different categories. The meaning of each category is discussed below.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

Category A defines the normal parameter limit for each designed pilot cell in each battery. The cells selected as pilot cells are those whose temperature, voltage, and electrolyte specific gravity approximate the state of charge of the entire battery.The Category A limits specified for electrolyte level are based on manufacturer's recommendations and are consistent with the guidance in IEEE-450 (Ref. 3), with the extra ¼ inch allowance above the high water level indication for operating margin to account for temperature and charge effects. In addition to this allowance, footnote a to Table 3.8.6-1 permits the electrolyte level to be above the specified maximum level during equalizing charge, provided it is not overflowing. These limits ensure that the plates suffer no physical damage, and that adequate electron transfer capability is maintained in the event of transient conditions. IEEE-450 (Ref. 3) recommends that electrolyte level readings should be made only after the battery has been at float charge for at least 72 hours.

The Category A limit specified for float voltage is ≥ 2.13 V per cell. This value is based on the recommendation of IEEE-450 (Ref. 3), which states that prolonged operation of cells below 2.13 V can reduce the life expectancy of cells. The Category A limit specified for specific gravity for each pilot cell is ≥ 1.200 (0.015 below the manufacturer's fully charged nominal specific gravity or a battery charging current that had stabilized at a low value). This value is characteristic of a charged cell with adequate capacity. According to IEEE-450 (Ref. 3), the specific gravity readings are based on a temperature of 77°F (25°C).

The specific gravity readings are corrected for actual electrolyte temperature. For each 3°F (1.67°C) above 77°F (25°C), 1 point (0.001) is added to the reading; 1 point is subtracted for each 3°F below 77°F. The specific gravity of the electrolyte in a cell increases with a loss of water due to electrolysis or evaporation.

Category B defines the normal parameter limits for each connected cell. The term "connected cell" excludes any battery cell that may be jumpered out.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

The Category B limits specified for electrolyte level and float voltage are the same as those specified for Category A and have been discussed above. The Category B limit specified for specific gravity for each connected cell is ≥ 1.195 (0.020 below the manufacturer's fully charged, nominal specific gravity) with the average of all connected cells 1.205 (0.010 below the manufacturer's fully charged, nominal specific gravity). These values are based on manufacturer's recommendations. The minimum specific gravity value required for each cell ensures that the effects of a highly charged or newly installed cell do not mask overall degradation of the battery.

Category C defines the limits for each connected cell. These values, although reduced, provide assurance that sufficient capacity exists to perform the intended function and maintain a margin of safety. When any battery parameter is outside the Category C limits, the assurance of sufficient capacity described above no longer exists, and the battery must be declared inoperable.

The Category C limit specified for electrolyte level (above the top of the plates and not overflowing) ensures that the plates suffer no physical damage and maintain adequate electron transfer capability. The Category C Allowable Value for voltage is based on IEEE-450 (Ref. 3), which states that a cell voltage of 2.07 V or below, under float conditions and not caused by elevated temperature of the cell, indicates internal cell problems and may require cell replacement.

The Category C limit on average specific gravity ≥ 1.195, is based on manufacturer's recommendations (0.020 below the manufacturer's recommended fully charged, nominal specific gravity). In addition to that limit, it is required that the specific gravity for each connected cell must be no less than 0.020 below the average of all connected cells. This limit ensures that the effect of a highly charged or new cell does not mask overall degradation of the battery.

The footnotes to Table 3.8.6-1 that apply to specific gravity are applicable to Category A, B, and C specific

(continued)

BASES

SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

gravity. Footnote (b) of Table 3.8.6-1 requires the above mentioned correction for electrolyte temperature.

Because of specific gravity gradients that are produced during the recharging process, delays of several days may occur while waiting for the specific gravity to stabilize. A stabilized charger current is an acceptable alternative to specific gravity measurement for determining the state of charge of the designated pilot cell. This phenomenon is discussed in IEEE-450 (Ref. 3). Footnote (c) to Table 3.8.6-1 allows the float charge current to be used as an alternate to specific gravity for up to 7 days following a battery recharge. Within 7 days, each connected cell's specific gravity must be measured to confirm the state of charge. Following a minor battery recharge (such as equalizing charge that does not follow a deep discharge) specific gravity gradients are not significant, and confirming measurements may be made in less than 7 days. Footnote (d) to Table 3.8.6-1 allows alternate values recommended by the manufacturer to be used for specific gravity as appropriate (Ref. 6). For the DG and Shutdown batteries, up to 10 cells for each DG battery and up to 20 cells for each Shutdown battery can have specific gravities of 1.180 to 1.200 provided the demonstrated battery capacity at the last discharge test is ≥ 81.2 percent. For the Unit batteries, up to 12 cells for each battery can have specific gravities of 1.180 to 1.200 provided the demonstrated battery capacity at the last discharge test is ≥ 80.7 percent.

REFERENCES

1. FSAR, Chapter 6.
2. FSAR, Chapter 14.
3. IEEE Standard 450, 1987.
4. IEEE Standard 279.
5. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.
6. TVA Internal Memorandum from H.B. Bounds to G.G. Campbell dated January 27, 1989 (RIMS B22 890127002).

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.7 Distribution Systems — Operating

BASES

BACKGROUND

The onsite Class 1E AC and DC electrical power distribution system is divided into redundant and independent AC and DC electrical power distribution subsystems.

The primary AC distribution system consists of four Unit 1 and 2 4.16 kV shutdown boards each having an offsite source of power as well as a dedicated onsite diesel generator (DG) source. Each 4.16 kV shutdown board is normally connected to a unit station service transformer (USST) (1B or 2B) via a 4.16 kV unit board and a shutdown bus (1 or 2). If no offsite source is available, the onsite emergency DGs supply power to the 4.16 kV shutdown boards. A shutdown board must be fed through its normal feeder to have a qualified offsite source. The alternate feeder trips on CAS A/CAS B logic initiation.

The secondary plant distribution system includes 480 VAC shutdown boards and associated load centers, and transformers.

There are three Unit DC and five Shutdown Board 250 V DC electrical power distribution subsystems and one 125 V DC DG electrical power distribution subsystem for each DG that support the necessary power for Unit 1 and 2 ESF functions.

The list of all distribution boards is presented in Table B 3.8.7-1.

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the FSAR, Chapter 6 (Ref. 1) and Chapter 14 (Ref. 2), assume ESF systems are OPERABLE. The AC and DC electrical power distribution systems are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.5, Emergency Core

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Cooling System (ECCS) and Reactor Core Isolation Cooling (RCIC) System; and Section 3.6 Containment Systems.

The OPERABILITY of the AC and DC electrical power distribution subsystems is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining distribution systems OPERABLE during accident conditions in the event of:

a. An assumed loss of all offsite power or all onsite AC electrical power sources; and

b. A postulated worst case single failure.

The AC and DC electrical power distribution system satisfies Criterion 3 of the NRC Policy Statement (Ref. 4).

LCO

The required electrical power distribution subsystems listed in Table B 3.8.7-1 ensure the availability of AC and DC electrical power for the systems required to shut down the reactor and maintain it in a safe condition after an abnormal operational transient or a postulated DBA. The AC and DC electrical power distribution subsystems are required to be OPERABLE.

Maintaining the AC and DC electrical power distribution subsystems OPERABLE ensures that the redundancy incorporated into the design of ESF is not defeated. Therefore, a single failure within any system or within the electrical power distribution subsystems will not prevent safe shutdown of the reactor.

The AC electrical power distribution subsystems require the associated buses and electrical circuits to be energized to their proper voltages. In addition, for the D or E RMOV Boards to be OPERABLE, they must be able to auto-transfer on loss of voltage. This feature ensures that the failure of one Diesel Generator will not result in the loss of an RHR subsystem. OPERABLE DC electrical power distribution subsystems require the associated buses to be energized to their proper voltage from either the associated battery or charger.

(continued)

BASES

LCO (continued)

The Unit 1 480 V RMOV boards 1A, 1B, and 1C are not specifically listed in Table B 3.8.7-1. Should one of these boards become inoperable due to a failure not affecting the operability of a board listed in Table B 3.8.7-1, the individual loads on the board would be considered inoperable and the appropriate conditions and required actions of the LCOs governing the individual loads would be entered. If however, one or more of the 1A, 1B, or 1C RMOV boards are inoperable due to a failure also affecting the operability of 1A or 1B 480 V shutdown board; the conditions and required actions are not required to be entered since LCO 3.0.6 allows this exception, and the required actions for the inoperable 480 V shutdown board are sufficient. In addition, the alternate supply breakers to 480 V RMOV boards 1A, 1B, and 1C must be open. This prevents a single malfunction causing a failure of a redundant subsystem and a loss of safety function. If any alternate breakers for the 1A, 1B, or 1C 480 V RMOV boards are closed, the affected systems/components which are not powered from its normal source are inoperable.

The 480 V shutdown boards and diesel auxiliary boards can be placed on their alternate feeder breakers and considered OPERABLE as long as the restrictions on the associated drawings are met. In addition, tie breakers between redundant safety related DC power distribution subsystems must be open. This prevents any electrical malfunction in any DC power distribution subsystem from propagating to the redundant subsystem, which could cause the failure of a redundant DC subsystem and a loss of essential safety function(s). If any DC tie breakers are closed, the affected redundant DC electrical power distribution subsystems are considered inoperable. This applies to the onsite, safety related, redundant DC electrical power distribution subsystems.

The Unit DC Boards are sized to accommodate alternate loads normally supplied by the Shutdown DC Distribution Panels with no effect on OPERABILITY.

APPLICABILITY

The electrical power distribution subsystems are required to be OPERABLE in MODES 1, 2, and 3 to ensure that:

(continued)

BASES

APPLICABILITY (continued)

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of abnormal operational transients; and

b. Adequate core cooling is provided, and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

Electrical power distribution subsystem requirements for MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment are covered in the Bases for LCO 3.8.8, "Distribution Systems — Shutdown."

ACTIONS

<u>A.1</u>

With one Unit 1 and 2 4.16 kV shutdown board inoperable, the remaining Unit 1 and 2 4.16 kV shutdown boards are capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming a single failure. The overall liability is reduced, however, because another single failure in the remaining three 4.16 kV shutdown boards could result in the minimum required ESF functions not being supported. Therefore, the 4.16 kV shutdown board must be restored to OPERABLE status within 5 days.

The Condition A postulated worst scenario is one 4.16 kV shutdown board without AC power (i.e., no offsite power to the 4.16 kV shutdown board and the associated DG inoperable). In this condition, ESF capabilities are not at their maximum, however, they remain adequate. The four 4.16 kV shutdown boards have ESF loads for Units 1 and 2 distributed among them so that an additional single failure will not result in a loss of safety function (e.g., one RHR pump for Unit 1 and one for Unit 2 on each board). Therefore, loss of two shutdown boards still leaves two RHR pumps per Unit. The 5 day time limit before requiring a unit shutdown in this Condition is acceptable because:

a. The remaining 4.16 kV shutdown boards have AC power available.

(continued)

BASES

ACTIONS

A.1 (continued)

b. The potential for an event in conjunction with a single failure of a redundant component in the 4.16 kV shutdown board with AC power. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

The second Completion Time for Required Action A.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition A is entered while, for instance, a Unit DC board is inoperable and subsequently returned OPERABLE, this LCO may already have been not met for up to 7 days. This situation could lead to a total duration of 12 days, since initial failure of the LCO, to restore the 4.16 kV shutdown board. At this time a Unit DC board could again become inoperable, and the 4.16 kV shutdown board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This results in establishing the "time zero" at the time this LCO was initially not met, instead of at the time Condition A was entered. The 12 day Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely.

Pursuant to LCO 3.0.6, the Distribution System Actions B, C, D, or G would not be entered even if the 4.16 kV shutdown board was inoperable, resulting in de-energization of a 480 V board. Therefore, the Required Actions of Condition A are modified by a Note to indicate that when Condition A is entered with no power source to a required 480 V board, Actions B, C, D, or G must be immediately entered. This allows Condition A to provide requirements for the loss of the 4.16 kV shutdown board without regard to whether a 480 V shutdown board is de-energized. Actions B, C, D, or G provide the appropriate restrictions for a de-energized 480 V board.

(continued)

BASES

ACTIONS (continued)

B.1

With one Unit 1 480 V shutdown board inoperable, the remaining 480 V shutdown board is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 480 V shutdown board could result in the minimum required ESF functions not being supported. Therefore, the inoperable 480 V shutdown board must be restored to OPERABLE status within 8 hours.

The Condition B postulated worst case scenario is one division (480 V shutdown board) without AC power (i.e., no offsite power to the division and the associated DG inoperable). In this condition, the unit is more vulnerable to a complete loss of AC power. It is, therefore, imperative that the unit operators' attention be focused on minimizing the potential for loss of power to the remaining division by stabilizing the unit, and on restoring power to the affected division. The 8 hour time period before requiring a unit shutdown is acceptable because:

a. There is a potential for decreased safety if the unit operator's attention is diverted from the evaluations and actions necessary to restore power to the affected division to the actions associated with taking the unit to shutdown within this time limits.

b. The potential for an event in conjunction with a single failure of a redundant component in the division with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

The second Completion Time (12 days) for Required Action B.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO. If Condition B is entered while, for instance, a 4.16 kV shutdown board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 5 days and 8 hours, since initial

(continued)

BASES

ACTIONS

B.1 (continued)

failure of the LCO, to restore the 480 V shutdown board. At this time, a 4.16 kV shutdown board could again become inoperable, and the 480 V shutdown board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition B was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

Pursuant to LCO 3.0.6, the Distribution System Action C would not be entered even if the 480 V shutdown board was inoperable, resulting in de-energization of a 480 V RMOV board. Therefore, the Required Actions of Condition B are modified by a Note to indicate that when Condition B is entered with no power source to a required 480 V RMOV board, Action C must be immediately entered. This allows Condition B to provide requirements for the loss of the 480 V shutdown board without regard to whether a 480 V RMOV board is de-energized. Action C provides the appropriate restrictions for a de-energized 480 V RMOV board.

C.1

With 480 V RMOV Board D or E inoperable, the respective RHR subsystem supported by each affected board is inoperable for LPCI. The overall reliability is reduced because of the loss of one LPCI/RHR subsystem. In this condition, the remaining OPERABLE ECCS subsystems provide adequate core cooling during a LOCA. However, overall ECCS reliability is reduced, because a single failure in one of the remaining OPERABLE subsystems, concurrent with a LOCA, may result in the ECCS not being able to perform its intended safety function. Therefore, the associated RHR subsystem must be declared inoperable immediately, and the actions in the appropriate system specification taken.

(continued)

BASES

ACTIONS (continued)

D.1

With one Units 1 and 2 480 V diesel auxiliary board inoperable, the remaining 480 V diesel auxiliary board is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 480 V diesel auxiliary board could result in the minimum required ESF functions not being supported. Therefore, the 480 V diesel auxiliary board must be restored to OPERABLE status within 5 days.

The Condition D postulated worst scenario is one 480 V diesel auxiliary board without AC power (i.e., no offsite power to the diesel auxiliary board). In this Condition, the Unit 1 and 2 DGs and SGT trains A and B are more vulnerable to a complete loss of AC power. These boards are normally fed from Shutdown Boards A and D. However, both of these boards have an alternate source of power coming from 4.16 kV shutdown board B. Thus, each auxiliary board has access to two DGs. Therefore, the 5 day time limit before requiring a unit shutdown in this Condition is acceptable because:

a. The remaining diesel auxiliary board has an alternate source of AC power in addition to the normal source and their dedicated DG.

b. The potential for an event in conjunction with a single failure of a redundant component in the 480 V diesel auxiliary board with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).").

The second Completion Time (12 days) for Required Action D.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO. If Condition D is entered while, for instance, a 4.16 kV shutdown board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration

(continued)

BASES

ACTIONS

D.1 (continued)

of 10 days, since initial failure of the LCO, to restore the 480 V DG auxiliary board. At this time, a 4.16 kV shutdown board could again become inoperable, and the 480 V DG auxiliary board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition D was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

E.1

With one Unit DC board or one Unit 1 and 2 Shutdown Board DC Distribution Panel inoperable, the remaining boards are capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. The overall reliability is reduced, however, because a single failure in the remaining boards could result in the minimum required ESF functions not being supported. Therefore, the required Unit DC board or Unit 1 and 2 Shutdown Board DC Distribution Panel must be restored to OPERABLE status within 7 days by powering it from the associated battery or charger.

Condition E represents one Unit DC board or one Unit 1 and 2 Shutdown Board DC Distribution Panel without adequate DC power, potentially with both the battery significantly degraded and the associated charger nonfunctioning. In this situation the plant is significantly more vulnerable to a partial loss of DC power. However, the three Unit DC boards have ESF loads for the three BFN units distributed among them so that redundant subsystems on each unit have separate normal and alternate power supplies. The 7 day Completion Time is partially based on this and reflects a reasonable time to assess unit status as a function of the inoperable Unit DC board or Unit 1 and 2 Shutdown Board DC Distribution Panel and, if not restored to OPERABLE status, to prepare to effect an orderly and safe shutdown.

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BASES

ACTIONS

E.1 (continued)

The second Completion Time for Required Action E.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition E is entered while, for instance, a 4.16 kV shutdown board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 12 days, since initial failure of the LCO, to restore the Unit DC board or the Shutdown Board DC Distribution Panel. At this time, a 4.16 kV shutdown board could again become inoperable, and the Unit DC board or the Shutdown Board DC Distribution Panel could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition E was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

F.1

With one division of 4.16 kV shutdown boards inoperable, the remaining division of shutdown boards is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 4.16 kV shutdown boards could result in the minimum required ESF functions not being supported. Therefore, one of the inoperable 4.16 kV shutdown board must be restored to OPERABLE status within 8 hours.

The Condition F postulated worst case scenario is one division of 4.16 kV shutdown board without AC power (i.e., no offsite power to the division and the associated DGs inoperable). In this condition, the unit is more vulnerable to a complete loss of AC power. It is, therefore, imperative that the unit operators' attention be focused on

(continued)

BASES

ACTIONS

F.1 (continued)

minimizing the potential for loss of power to the remaining division by stabilizing the unit, and on restoring power to the affected division. The 8 hour time period before requiring a unit shutdown is acceptable because:

a. There is a potential for decreased safety if the unit operator's attention is diverted from the evaluations and actions necessary to restore power to the affected division to the actions associated with taking the unit to shutdown within this time limit.

b. The potential for an event in conjunction with a single failure of a redundant component in the division with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

The second Completion Time (12 days) for Required Action F.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO. If Condition F is entered while, for instance, a 480 V DG auxiliary board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 5 days and 8 hours, since initial failure of the LCO, to restore the 480 V shutdown board. At this time, a 480 V DG auxiliary board could again become inoperable, and a 4.16 kV shutdown board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition F was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

Pursuant to LCO 3.0.6, the Distribution System Actions B, C, D, or G would not be entered even if the 4.16 kV shutdown boards were inoperable, resulting in de-energization of a

(continued)

BASES

ACTIONS

F.1 (continued)

480 V board. Therefore, the Required Actions of Condition F are modified by a Note to indicate that when Condition F is entered with no AC source to the 4.16 kV shutdown boards, Actions B, C, D, or G must be immediately entered. This allows Condition F to provide requirement for the loss of the 4.16 kV shutdown boards without regard to whether 480 V board is de-energized. Actions B, C, D, or G provide the appropriate restrictions for a de-energized 480 V board.

G.1

Required Action G.1 is intended to provide assurance that a loss of one or more required Unit 2 or 3 AC or DC boards does not result in a complete loss of safety function of critical systems (i.e., SGT or CREVS). With one or more of the required boards inoperable, the SGT or CREVS train supported by each affected board is inoperable. Therefore, the associated SGT or CREVS subsystem must be declared inoperable immediately, and the ACTIONS in the appropriate system Specification taken.

H.1 and H.2

If the inoperable distribution subsystem cannot be restored to OPERABLE status within the associated Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

I.1

Condition I corresponds to a level of degradation in the electrical distribution system that causes a required safety function to be lost. When more than one AC or DC electrical power distribution subsystem is lost, and this results in

(continued)

BASES

| ACTIONS

I.1 (continued)

the loss of a required function, the plant is in a condition outside the accident analysis. Therefore, no additional time is justified for continued operation. LCO 3.0.3 must be entered immediately to commence a controlled shutdown.

SURVEILLANCE REQUIREMENTS

SR 3.8.7.1

This Surveillance verifies that the AC and DC electrical power distribution subsystem is functioning properly, with the buses energized. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the redundant capability of the electrical power distribution subsystems, as well as other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. FSAR, Chapter 6.
2. FSAR, Chapter 14.
3. Regulatory Guide 1.93, December 1974.
4. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

Table B 3.8.7-1 (page 1 of 1)
AC and DC Electrical Power Distribution Systems

TYPE	VOLTAGE	ELECTRICAL POWER DISTRIBUTION SUBSYSTEMS
AC safety boards	4160 V	Shutdown Board A Shutdown Board B Shutdown Board C Shutdown Board D Shutdown Board 3EB or 3EC Shutdown Board 3ED
	480 V	Shutdown Board 1A Shutdown Board 1B Shutdown Board 3B RMOV Board 1D RMOV Board 1E SGT Board Diesel Auxiliary Board A Diesel Auxiliary Board B
DC boards	250 V	Unit DC Board 1 Unit DC Board 2 Unit DC Board 3 Shutdown Board DC Distribution Panel A Shutdown Board DC Distribution Panel B Shutdown Board DC Distribution Panel C Shutdown Board DC Distribution Panel D Shutdown Board DC Distribution Panel 3EB

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.8 Distribution Systems — Shutdown

BASES

BACKGROUND

A description of the AC and DC electrical power distribution system is provided in the Bases for LCO 3.8.7, "Distribution Systems — Operating."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident and transient analyses in the FSAR, Chapter 6 (Ref. 1) and Chapter 14 (Ref. 2), assume Engineered Safety Feature (ESF) systems are OPERABLE. The AC and DC electrical power distribution systems are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded.

The OPERABILITY of the AC and DC electrical power distribution system is consistent with the initial assumptions of the accident analyses and the requirements for the supported systems' OPERABILITY.

The OPERABILITY of the minimum AC and DC electrical power sources and associated power distribution subsystems during MODES 4 and 5, and during movement of irradiated fuel assemblies in the secondary containment ensures that:

a. The facility can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

The AC and DC electrical power distribution systems satisfy Criterion 3 of the NRC Policy Statement (Ref. 3).

(continued)

BASES (continued)

LCO

Various combinations of subsystems, equipment, and components are required OPERABLE by other LCOs, depending on the specific plant condition. Implicit in those requirements is the required OPERABILITY of necessary support required features. This LCO explicitly requires energization of the portions of the electrical distribution system necessary to support OPERABILITY of Technical Specifications required systems, equipment, and components — both specifically addressed by their own LCO, and implicitly required by the definition of OPERABILITY.

In addition, some components that may be required by Unit 1 receive power through the Unit 3 electrical power distribution subsystems (e.g., Standby Gas Treatment (SGT) System, and Control Room Emergency Ventilation System (CREVS)). Therefore, the Unit 3 AC and DC electrical power distribution subsystems needed to support the required equipment must also be OPERABLE.

For a unit in MODE 4 or 5, the AC and DC boards can be placed on their alternate feeder breakers and considered OPERABLE as long as the restrictions on the associated drawings are met.

Maintaining these portions of the distribution system energized ensures the availability of sufficient power to operate the plant in a safe manner to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents and inadvertent reactor vessel draindown).

APPLICABILITY

The AC and DC electrical power distribution subsystems required to be OPERABLE in MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel in the core in case of an inadvertent draindown of the reactor vessel;

b. Systems needed to mitigate a fuel handling accident are available;

(continued)

BASES

APPLICABILITY (continued)

c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

The AC and DC electrical power distribution subsystem requirements for MODES 1, 2, and 3 are covered in LCO 3.8.7.

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.5

Although redundant required features may require redundant divisions of electrical power distribution subsystems to be OPERABLE, one OPERABLE distribution subsystem division may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, and operations with a potential for draining the reactor vessel. By allowing the option to declare required features associated with an inoperable distribution subsystem inoperable, appropriate restrictions are implemented in accordance with the affected distribution subsystem LCO's Required Actions. In many instances this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made, (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies in the secondary containment, and any activities that could result in inadvertent draining of the reactor vessel).

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC and DC electrical power distribution subsystems and to continue this action until restoration is accomplished in order to provide the necessary power to the plant safety systems.

(continued)

BASES

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.5 (continued)

Notwithstanding performance of the above conservative Required Actions, a required residual heat removal-shutdown cooling (RHR-SDC) subsystem may be inoperable. In this case, Required Actions A.2.1 through A.2.4 do not adequately address the concerns relating to coolant circulation and heat removal. Pursuant to LCO 3.0.6, the RHR-SDC ACTIONS would not be entered. Therefore, Required Action A.2.5 is provided to direct declaring RHR-SDC inoperable, which results in taking the appropriate RHR-SDC ACTIONS.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required distribution subsystems should be completed as quickly as possible in order to minimize the time the plant safety systems may be without power.

SURVEILLANCE REQUIREMENTS

SR 3.8.8.1

This Surveillance verifies that the AC and DC electrical power distribution subsystem is functioning properly, with the buses energized. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the redundant capability of the electrical power distribution subsystems, as well as other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. FSAR, Chapter 6.
2. FSAR, Chapter 14.
3. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

BROWNS FERRY NUCLEAR PLANT - IMPROVED TECHNICAL SPECIFICATIONS
SECTION 3.8
LIST OF REVISED PAGES

UNIT 2 ITS BASES SECTIONS

Replaced pages B 3.8-1 through B 3.8-78 *R1 with pages B 3.8-1 through B 3.8-83 *R2

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources – Operating

BASES

BACKGROUND

The unit Class 1E AC Electrical Power Distribution System AC sources consist of the offsite power sources (preferred power sources, normal and alternates), and the onsite standby power sources (Unit 1 and 2 diesel generators (DGs) A, B, C, and D, and Unit 3 DGs 3A, 3B, 3C, and 3D). As required by 10 CFR 50, Appendix A, GDC 17 (Ref. 1), the design of the AC electrical power system provides independence and redundancy to ensure an available source of power to the Engineered Safety Feature (ESF) systems.

The Class 1E AC distribution system is divided into redundant divisions, so loss of any one division does not prevent the minimum safety functions from being performed. Each of four 4.16 kV shutdown boards has two offsite power supplies available and a single DG. Only offsite power delivered through the normal feeder breakers can be credited since common accident signal (CAS) logic (CAS A/CAS B) will trip the alternate breaker. This prevents an overload condition if all shutdown boards had been aligned to the same shutdown bus, and thus to the same transformer winding.

An offsite circuit consists of all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network to the A and B (Division I) or C and D (Division II) 4.16 kV shutdown boards. Offsite power is supplied to the 161 kV and 500 kV switchyards from the transmission network by seven transmission lines (two 161 kV lines and five 500 kV lines; Trinity I and II 500 kV lines are not included in the 500 kV line totals). Four basic circuits from the transmission network to the safety related Division I (A and B 4.16 kV shutdown boards) and Division II (C and D 4.16 kv shutdown boards), are as follows:

1. From the 500 kV switchyard, through unit station service transformer (USST) 1B to a 4.16 kV unit board. That unit board feeds 4.16 kV shutdown bus 1 or 2,

(continued)

BASES

BACKGROUND (continued)

which then feeds two of the Unit 1 and 2 4.16 kV shutdown boards (A and B or C and D);

2. From the 500 kV switchyard, through USST 2B to a 4.16 kV unit board. That unit board feeds 4.16 kV shutdown bus 1 or 2, which then feeds two of the Unit 1 and 2 4.16 kV shutdown boards (A and B or C and D);

3. From the Trinity 161 kV transmission system, through common station service transformer (CSST) A or B to start bus 1A or 1B, then to a 4.16 kV unit board. That unit board feeds 4.16 kV shutdown bus 1 or 2, which then feeds two of the Unit 1 and 2 4.16 kV shutdown boards (A and B or C and D); and

4. From the Athens 161 kV transmission system, through CSST A or B to start bus 1A or 1B, and then to a 4.16 kV unit board. That unit board feeds 4.16 kV shutdown bus 1 or 2, which then feeds two of the Unit 1 and 2 4.16 kV shutdown boards (A and B or C and D).

Shutdown bus 1 normally feeds 4.16 kV shutdown boards A and B and shutdown bus 2 normally feeds 4.16 kV shutdown boards C and D. The 4.16 kV shutdown boards are normally aligned to power associated divisional 480 V safety equipment (two divisions per unit). This results in one DG powering only one 480 V division of one unit, and some of that same division's 4.16 kV loads for both Units 1 and 2. A detailed description of the offsite power network and circuits to the onsite Class 1E ESF buses is found in the FSAR, Chapter 8 (Ref. 2).

USST 1B and 2B, and the CSSTs are sized to accommodate all required ESF loads on receipt of an accident signal on Unit 2, while also carrying all the required safety loads of Unit 1 operating at full power.

The onsite standby power source for 4.16 kV shutdown boards A, B, C, and D consists of four Unit 1 and 2 DGs, each dedicated to a shutdown board. Each DG starts automatically on a loss of coolant accident (LOCA) signal (i.e., low reactor water level signal or high drywell pressure signal), or on its respective 4.16 kV shutdown board degraded voltage or undervoltage signal. Common Accident Signal Logic (CAS A/CAS B) actuates on high drywell pressure with low reactor

(continued)

BASES

BACKGROUND (continued)

pressure, or low water level. In addition to starting all diesel generators, this logic trips the alternate feeder breakers to 4.16 kV Shutdown Boards A, B, C, D. After the DG has started, it automatically ties to its respective bus after offsite power is tripped as a consequence of 4.16 kV shutdown board undervoltage or degraded voltage, independent of or coincident with a LOCA signal. The DGs also start and operate in the standby mode without tying to the 4.16 kV shutdown board on a LOCA signal alone. Following the trip of offsite power, an under or degraded voltage activated load shed logic strips all loads from the 4.16 kV Shutdown Board except transformer feeds. When the DG is tied to the 4.16 kV shutdown board, large loads are then sequentially connected to its respective 4.16 kV shutdown board by individual pump timers. The individual pump timers control the permissive and starting signals to motor breakers to prevent overloading the DG.

In the event of a loss of offsite power, the ESF electrical loads are automatically connected to the DGs in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a LOCA.

Certain required plant loads are returned to service in a predetermined sequence in order to prevent overloading of the DGs in the process. Within 40 seconds after the initiating signal (DG breaker closure with accident signal) is received, all automatic and permanently connected loads needed to recover the unit or maintain it in a safe condition are returned to service.

Ratings for the DGs satisfy the intent of Safety Guide 9 (Ref. 3). The DGs have the following ratings (Non-derated for intake air temperature ≤ 90°F/Derated for either intake air temperature >90°F or a combination of intake air temperature >90°F and engine cooling water outlet temperature >190°F) (Reference 12):

a. 2600/2550 kW – continuous,

b. 2860/2800 kW – 0 to 2 hours (Short Time Steady State),

(continued)

BASES

BACKGROUND (continued)

c. 2850/2815 kW — 0 to 3 minutes (Cold Engine Instantaneous),

d. 3050/3025 kW — > 3 minutes (Hot Engine Instantaneous).

APPLICABLE SAFETY ANALYSES

The initial conditions of DBA and transient analyses in the FSAR, Chapter 6 (Ref. 4) and Chapter 14 (Ref. 5), assume ESF systems are OPERABLE. The AC electrical power sources are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

The OPERABILITY of the AC electrical power sources is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining the onsite or offsite AC sources OPERABLE during accident conditions in the event of:

a. An assumed loss of all offsite power or all onsite AC power sources; and

b. A postulated worst case single failure.

AC sources satisfy Criterion 3 of the NRC Policy Statement (Ref. 15).

LCO

Two qualified circuits between the offsite transmission network and the onsite Class 1E Distribution System, four separate and independent Unit 1 and 2 DGs (A, B, C, and D), and the Unit 3 DG(s) needed to support required Standby Gas Treatment (SGT) trains and Control Room Emergency Ventilation System (CREVS) trains are required to be OPERABLE. Two divisions of 480 V load shed logic and two divisions of CAS logic are required to be OPERABLE to support Unit 1 and 2 DG OPERABILITY and post-accident loads. In the case of the Unit 3 DG(s), during MODES 1, 2, and 3,

(continued)

BASES

LCO (continued)

Unit 3 Technical Specifications will require the OPERABILITY of all Unit 3 DGs and provide appropriate compensatory actions for inoperable Unit 3 DGs. However, when Unit 3 is not in MODE 1, 2, or 3, the DG(s) necessary to support the operation of Unit 2 may not be required. Therefore, the Unit 2 LCO for AC Sources requires the necessary DG(s) to support SGT and CREVS only when Unit 3 is not in MODES 1, 2, or 3. These requirements ensure availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an abnormal operational transient or a postulated DBA.

Qualified offsite circuits are those that are described in the FSAR, and are part of the licensing basis for the unit. Each offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the 4.16 kV shutdown boards. An offsite circuit is considered OPERABLE if the offsite source is available to A and B or C and D 4.16 kV shutdown boards.

Each offsite circuit consists of incoming breakers to a 4.16 kV shutdown bus and then to the 4.16 kV shutdown boards (A and B or C and D). Each shutdown bus is independently supplied from separate unit boards, which are fed from transformers (via start buses as appropriate). Specific circuits and limitations for considering the offsite circuit qualified are described below. Qualified circuits are one or more of the following:

1. From the 500 kV switchyard (with no credit for the two 500 kV Trinity lines), through unit station service transformer (USST) 1B to 4.16 kV unit board 1A, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B; and/or, to 4.16 kV unit board 1B, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D. If USST 2B is credited as the second source, a minimum of two 500 kV lines must be available.

2. From the 500 kV switchyard (with no credit for the two 500 kV Trinity lines), through USST 2B to 4.16 kV unit board 2A, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D; and/or, to 4.16 kV unit board 2B, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B. If USST 1B is credited as the second

(continued)

BASES

LCO (continued)

source, a minimum of two 500 kV lines must be available.

3. From the Trinity 161 kV transmission system, through common station service transformer (CSST) A or B to start bus 1A or 1B, to 4.16 kV unit board 1A or 2B, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B; or alternately, to 4.16 kV unit board 1B or 2A, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D.

4. From the Athens 161 kV transmission system, through CSST A or B to start bus 1A or 1B, to 4.16 kV unit board 1A or 2B, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B; or alternately, to 4.16 kV unit board 1B or 2A, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D.

For the Athens 161 kV offsite power to be considered as one of the qualified offsite power supplies, the following restrictions must also be met:

a. The 161 kV capacitor bank must be available for the Athens 161 kV line.

b. Credit for offsite power from the Athens 161 kV line may be taken by only one unit at one time. However, more than one unit may be aligned to the Athens line without invalidating the offsite power supply for the unit claiming it.

For the Trinity 161 kV offsite power to be considered as one of the qualified offsite power supplies, the following restrictions must also be met:

a. For the Trinity 161 kV line to be considered as one of the qualified offsite power supplies by only one unit, either the 161 kV capacitor bank must be available or the Trinity Inter-Tie transformer must be in service with 161 kV line nominal voltage $\geq$ 165 kV.

b. The Trinity 161 kV line may be considered as one of the qualified offsite power supplies by two separate units at any one time, provided that both CSST A and B are available and either the 161 kV capacitor bank is

(continued)

BASES

LCO (continued)

available or the Athens line and Trinity Inter-Tie transformer are in service with 161 kV line nominal voltage ≥ 165 kV.

c. The Trinity 161 kV line may be considered as one of the qualified offsite power supplies by three separate units at any one time, provided that both CSST A and B are available, Unit 3 claims USST 3B as its other offsite power source, and either the 161 kV capacitor bank is available or the Athens line and Trinity Inter-Tie transformer are in service with 161 kV line nominal voltage ≥ 165 kV.

The only requirements for the position of the 161 kV bus 1 and bus 2 cross-tie breakers (924 and 928) are those implied by the restrictions on claiming Athens and Trinity as offsite power supplies.

Each DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective 4.16 kV shutdown board on detection of bus undervoltage. This sequence must be accomplished within 10 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and must continue to operate until offsite power can be restored to the 4.16 kV shutdown board. The Unit 1 and 2 DGs are provided with a common 480 V load shed logic system with two redundant divisions. The common accident signal logic system, with two redundant divisions, is common to the Unit 1, 2, and 3 DGs. These logic systems must be OPERABLE to ensure the DGs will perform and alignments will occur as assumed during a DBA.

Proper sequencing of loads, including tripping of nonessential loads, is a required function for DG OPERABILITY.

The AC sources must be separate and independent (to the extent possible) of other AC sources. For the DGs, the separation and independence are complete. For the offsite AC sources, the separation and independence are to the extent practical. A qualified offsite circuit may be connected to more than one division of 4.16 kV shutdown boards and not violate separation criteria. A circuit that is not connected to the Division I or II 4.16 kV shutdown

(continued)

BASES

LCO (continued)

boards is required to have the capability to be connected to at least one division of 4.16 kV shutdown boards to be considered OPERABLE.

The inability to supply qualified offsite power to an individual 4.16 kV shutdown board from a 4.16 kV shutdown bus constitutes the failure of only one offsite circuit as long as offsite power is available to ther other division's shutdown boards. Thus, if one 4.16 kV shutdown board or complete division of shutdown boards (i.e., A and B or C and D) does not have a qualified offsite circuit available, then only one offsite circuit would be inoperable. If one or more shutdown boards in each division (i.e., A or B and C or D) or all four shutdown boards do not have a qualified offsite circuit available, then both (2) offsite circuits would be inoperable.

APPLICABILITY

The AC sources are required to be OPERABLE with Unit 2 in MODES 1, 2, and 3 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of abnormal operational transients; and

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

The AC power requirements for Unit 2 in MODES 4 and 5 are covered in LCO 3.8.2, "AC Sources — Shutdown."

ACTIONS

A.1

To ensure a highly reliable power source remains with one required offsite circuit inoperable, it is necessary to verify the availability of the remaining required offsite circuit on a more frequent basis. This action ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and

(continued)

BASES

ACTIONS

A.1 (continued)

availability of offsite AC electrical power. If a second required circuit is not available, the second offsite circuit is inoperable, and Condition E, for two offsite circuits inoperable, is entered.

A.2

Required Action A.2, which only applies if one or both 4.16 kV shutdown boards in a division cannot be powered from a qualified offsite source, is intended to provide assurance that an event with a coincident single failure of a DG does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related divisions (i.e., single division systems are not included). Redundant required features failures consist of inoperable features associated with a division redundant to the division that has no offsite power. For example, if no qualified offsite power source was available to 4.16 kV shutdown board A and RHR pump D was inoperable for maintenance, then RHR pump A would have to be declared inoperable.

The Completion Time for Required Action A.2 is intended to allow time for the operator to evaluate and repair any discovered inoperabilities. This Completion Time also allows an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

a. The 4.16 kV shutdown board has no offsite power supplying its loads or no qualified offsite power available; and

b. A required feature on, or supported by, the opposite or other division's 4.16 kV shutdown board is inoperable.

If, at any time during the existence of this Condition (one required offsite circuit inoperable) a required feature in a redundant division subsequently becomes inoperable, this Completion Time would begin to be tracked.

(continued)

BASES

ACTIONS

A.2 (continued)

Discovering no offsite power to one or both 4.16 kV shutdown boards of a division coincident with one or more inoperable required support or supported features, or both, that are associated with another division's 4.16 kV shutdown board that has offsite power, results in starting the Completion Time for the Required Action. Twenty-four hours is acceptable because it minimizes risk while allowing time for restoration before the unit is subjected to transients associated with shutdown.

The remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection may have been lost for the required feature's function; however, function is not lost. The 24 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 24 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

A.3

Based on the diversity of AC electrical power sources, and the remaining redundancy and reliability, operation may continue in Condition A for a period that should not exceed 7 days. With one required offsite circuit inoperable, the reliability of the offsite system is degraded, and the potential for a loss of offsite power is increased, with attendant potential for a challenge to the plant safety systems. In this condition, however, the remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to the onsite Class 1E Distribution System.

The 7 day Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and the low probability of a DBA occurring during this period.

(continued)

BASES

ACTIONS

A.3 (continued)

The second Completion Time for Required Action A.3 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition A is entered while, for instance, a DG is inoperable, and that DG is subsequently returned OPERABLE, the LCO may already have been not met for up to 7 days. This situation could lead to a total of 14 days, since initial failure to meet the LCO, to restore the offsite circuit. At this time, a DG could again become inoperable, the circuit restored OPERABLE, and an additional 7 days (for a total of 21 days) allowed prior to complete restoration of the LCO. The 14 day Completion Time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "AND" connector between the 7 day and 14 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

As in Required Action A.2, the Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This exception results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time that Condition A was entered.

B.1

To ensure a highly reliable power source remains with one Unit 1 and 2 DG inoperable, it is necessary to verify the availability of the required offsite circuits on a more frequent basis. This action ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. However, if an offsite circuit is not available, the offsite circuit is inoperable, and additional Conditions must then be entered.

(continued)

BASES

ACTIONS (continued)

B.2

Required Action B.2 is intended to provide assurance that a loss of offsite power, during the period that a Unit 1 and 2 DG is inoperable, does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related divisions (i.e., single division systems are not included). Redundant required features failures consist of inoperable features associated with a division redundant to the division that has an inoperable Unit 1 and 2 DG. For example, if DG A was inoperable and RHR pump D was inoperable for maintenance, then RHR pump A would have to be declared inoperable.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock."

In this Required Action the Completion Time only begins on discovery that both:

a. An inoperable Unit 1 and 2 DG exists; and

b. A required feature on, or supported by, the opposite or other division's 4.16 kV shutdown board is inoperable.

If, at any time during the existence of this Condition (one Unit 1 and 2 DG inoperable), a required feature in a redundant division subsequently becomes inoperable, this Completion Time begins to be tracked.

Discovering one Unit 1 and 2 DG inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the other division's OPERABLE DG[s] results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

(continued)

BASES

ACTIONS

B. 2 (continued)

The remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and low probability of a DBA occurring during this period.

B.3.1 and B.3.2

Required Action B.3.1 provides an allowance to avoid unnecessary testing of OPERABLE DGs. If it can be determined that the cause of the inoperable DG does not exist on the OPERABLE Unit 1 and 2 DGs, SR 3.8.1.1 does not have to be performed. If the cause of inoperability exists on other Unit 1 and 2 DG(s), they are declared inoperable upon discovery, and Condition H of LCO 3.8.1 is entered. Once the failure is repaired, and the common cause failure no longer exists, Required Action B.3.1 is satisfied. If the cause of the initial inoperable DG cannot be confirmed not to exist on the remaining Unit 1 and 2 DG(s), performance of SR 3.8.1.1 suffices to provide assurance of continued OPERABILITY of those DGs.

In the event the inoperable DG is restored to OPERABLE status prior to completing either B.3.1 or B.3.2, the plant corrective action program will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in Condition B.

According to Generic Letter 84-15 (Ref. 7), 24 hours is a reasonable time to confirm that the OPERABLE DGs are not affected by the same problem as the inoperable DG.

(continued)

BASES

ACTIONS (continued)

B.4

Based on the diversity of AC electrical power sources, and the remaining redundancy and reliability, operation may continue in Condition B for a period that should not exceed 7 days. In Condition B, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The 7 day Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and low probability of a DBA occurring during this period.

The second Completion Time for Required Action B.4 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition B is entered while, for instance, an offsite circuit is inoperable and that circuit is subsequently restored OPERABLE, the LCO may already have been not met for up to 7 days. This situation could lead to a total of 14 days, since initial failure to meet the LCO, to restore the DG. At this time, an offsite circuit could again become inoperable, the DG restored OPERABLE, and an additional 7 days (for a total of 21 days) allowed prior to complete restoration of the LCO. The 14 day Completion Time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "AND" connector between the 7 day and 14 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive must be met.

As in Required Action B.2, the Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This exception results in establishing the "time zero" at the time that the LCO was initially not met, instead of the time that Condition B was entered.

(continued)

BASES

ACTIONS (continued)

C.1

With one division of Unit 1 and 2 480 V load shed logic inoperable, the reliability of the DGs is degraded, and the potential for the loss of all four Unit 1 and 2 DGs is increased with attendant potential challenge to plant safety systems. In this condition, however, the remaining division of Unit 1 and 2 480 V load shed logic is capable of performing its intended function of limiting the loads on the Unit 1 and 2 DGs.

The 7 day Completion Time takes into account the capability of the remaining division of Unit 1 and 2 480 V load shed logic, reasonable time for repairs, and the low probability of a DBA occurring during this period.

D.1

With one division of common accident signal logic inoperable, the plant electrical system response is degraded, and the potential for inappropriate electrical system alignment is increased with attendant potential challenge to plant safety systems. In this condition, however, the remaining division of common accident signal logic is capable of performing its intended function of providing a start signal to the Unit 1 and 2 DGs during a DBA.

The 7 day Completion Time takes into account the capability of the remaining division of common accident signal logic, reasonable time for repairs, and the low probability of a DBA occurring during this period.

(continued)

BASES

ACTIONS (continued)

E.1 and E.2

Required Action E.1 addresses actions to be taken in the event of inoperability of redundant required features concurrent with inoperability of two required offsite circuits. Required Action E.1 reduces the vulnerability to a loss of function. The Completion Time for taking these actions is reduced to 12 hours from that allowed with one or both 4.16 kV shutdown boards in a division without offsite power (Required Action A.2). The rationale for the reduction to 12 hours is that Regulatory Guide 1.93 (Ref. 6) allows a Completion Time of 24 hours for two required offsite circuits inoperable, based upon the assumption that two complete safety divisions are OPERABLE. When a concurrent redundant required feature failure exists, this assumption is not the case, and a shorter Completion Time of 12 hours is appropriate. These features are designed with redundant safety related divisions, (i.e., single division systems are not included in the list). Redundant required features failures consist of any of these features that are inoperable because any inoperability is on a division redundant to a division with inoperable offsite circuits.

The Completion Time for Required Action E.1 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. All required offsite circuits are inoperable; and

b. A required feature is inoperable.

If, at any time during the existence of this Condition (two offsite circuits inoperable), a required feature subsequently becomes inoperable, this Completion Time begins to be tracked.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition E for a period that should not exceed 24 hours. This level of degradation means that the offsite electrical power system does not have the capability to effect a safe shutdown and to mitigate the effects of an

(continued)

BASES

ACTIONS

E.1 and E.2 (continued)

accident; however, the onsite AC sources have not been degraded. This level of degradation generally corresponds to a total loss of accessible offsite power sources.

Because of the normally high availability of the offsite sources, this level of degradation may appear to be more severe than other combinations of two AC sources inoperable that involve one or more DGs inoperable. However, two factors tend to decrease the severity of this degradation level:

a. The configuration of the redundant AC electrical power system that remains available is not susceptible to a single bus or switching failure; and

b. The time required to detect and restore an unavailable offsite power source is generally much less than that required to detect and restore an unavailable onsite AC source.

With both of the required offsite circuits inoperable, sufficient onsite AC sources are available to maintain the unit in a safe shutdown condition in the event of a DBA or transient. In fact, a simultaneous loss of offsite AC sources, a LOCA, and a worst case single failure were postulated as a part of the design basis in the safety analysis. Thus, the 24 hour Completion Time provides a period of time to effect restoration of one of the offsite circuits commensurate with the importance of maintaining an AC electrical power system capable of meeting its design criteria.

According to Regulatory Guide 1.93 (Ref. 6), with the available offsite AC sources two less than required by the LCO, operation may continue for 24 hours. If two offsite sources are restored within 24 hours, unrestricted operation may continue. If only one offsite source is restored within 24 hours, power operation continues in accordance with Condition A.

(continued)

BASES

ACTIONS (continued)

F.1 and F.2

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it were inoperable, resulting in de-energization. Therefore, the Required Actions of Condition F are modified by a Note to indicate that when Condition F is entered with no AC source to any 4.16 kV shutdown board, ACTIONS for LCO 3.8.7, "Distribution Systems — Operating," must be immediately entered. This allows Condition F to provide requirements for the loss of the offsite circuit and one DG without regard to whether a 4.16 kV shutdown board is de-energized. LCO 3.8.7 provides the appropriate restrictions for a de-energized 4.16 kV shutdown board.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition F for a period that should not exceed 12 hours. In Condition F, individual redundancy is lost in both the offsite electrical power system and the onsite AC electrical power system. Since power system redundancy is provided by two diverse sources of power, however, the reliability of the power systems in this Condition may appear higher than that in Condition E (loss of both required offsite circuits). This difference in reliability is offset by the susceptibility of this power system configuration to a single bus or switching failure. The 12 hour Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and the low probability of a DBA occurring during this period.

A Note has been added to Condition F to clarify that the Condition is only applicable when more than one shutdown board is affected. The situation where only one shutdown board is affected is covered by Condition G.

G.1

Condition G addresses the situation where both one required offsite circuit and one DG are inoperable and affect only one 4.16 kV shutdown board. The Note clarifies the applicability. The Required Action is to declare the affected 4.16 kV shutdown board inoperable immediately. This requires entry into the applicable Conditions and

(continued)

BASES

ACTIONS

G.1 (continued)

Required Actions of LCO 3.8.7, "Distribution Systems - Operating," which provides the appropriate restrictions for the affected 4.16 kV shutdown board. LCO 3.8.1 Conditions and Required Actions continue to apply until the required offsite circuit and DG are made OPERABLE.

H.1

With two or more DGs inoperable, an assumed loss of offsite electrical power may result in insufficient standby AC sources available to power the minimum required ESF functions. Since the offsite electrical power system may be the only source of AC power for the majority of ESF equipment at this level of degradation, the risk associated with continued operation for a very short time could be less than that associated with an immediate controlled shutdown. (The immediate shutdown could cause grid instability, which could result in a total loss of AC power.) Since any inadvertent unit generator trip could also result in a total loss of offsite AC power, however, the time allowed for continued operation is severely restricted. The intent here is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

According to Regulatory Guide 1.93 (Ref. 6), with all DGs inoperable, operation may continue for a period that should not exceed 2 hours.

I.1 and I.2

If the inoperable AC electrical power sources cannot be restored to OPERABLE status within the associated Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

(continued)

BASES

ACTIONS (continued)

J.1

Condition J corresponds to a level of degradation in which all redundancy in the AC electrical power supplies has been lost. At this severely degraded level, any further losses in the AC electrical power system will cause a loss of function. Therefore, no additional time is justified for continued operation. The unit is required by LCO 3.0.3 to commence a controlled shutdown.

K.1

Required Action K.1, where Unit 3 is not in MODE 1, 2, or 3, is intended to provide assurance that a loss of offsite power, during the period that a required Unit 3 DG is inoperable, does not result in a complete loss of safety function of critical systems (i.e., SGT or CREVS). These features consist of SGT or CREVS trains redundant to trains supported by the inoperable Unit 3 DG.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

a. An inoperable required Unit 3 DG exists; and

b. An SGT or CREVS train supported by another DG, is inoperable.

If, at any time during the existence of this Condition (a required Unit 3 DG inoperable), a required SGT or CREVS train subsequently becomes inoperable, this Completion Time begins to be tracked.

Discovering a required Unit 3 DG inoperable coincident with an inoperable SGT or CREVS train, or both, that are associated with the OPERABLE DGs results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for

(continued)

BASES

ACTIONS

K.1 (continued)

restoration before subjecting the unit to transients associated with shutdown.

The remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and low probability of a DBA occurring during this period.

K.2

In Condition K, where Unit 3 is in MODES 4, 5, or defueled, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System to support operation of Unit 2. The 30 day Completion Time is commensurate with the importance of the affected system considering the low probability of a DBA in these conditions and the availability of the remaining power sources. If the inoperable Unit 3 DG cannot be restored to OPERABLE status within the associated Completion Time, the associated SGT or CREVS subsystem must be declared inoperable, and the ACTIONS in the appropriate system Specification taken.

SURVEILLANCE REQUIREMENTS

The AC sources are designed to permit inspection and testing of all important areas and features, especially those that have a standby function. Periodic component tests are supplemented by extensive functional tests (under simulated accident conditions). The SRs for demonstrating the OPERABILITY of the DGs meet the intent of Safety Guide 9 (Ref. 3), as addressed by References 13 and 14.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

Where the SRs discussed herein specify voltage and frequency tolerances, the following summary is applicable. The minimum steady state output voltage of 3740 V is 90% of the nominal 4160 V output voltage. This value, which is specified in ANSI C84.1 (Ref. 9), allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage is specified as 90% or 3600 V. It also allows for voltage drops to motors and other equipment down through the 120 V level where minimum operating voltage is also usually specified as 90% of name plate rating. The specified maximum steady state output voltage of 4580 V is equal to the maximum operating voltage specified for 4000 V motors. It ensures that for a lightly loaded distribution system, the voltage at the terminals of 4000 V motors is no more than the maximum rated operating voltages. The specified minimum and maximum frequencies of the DG are 58.8 Hz and 61.2 Hz, respectively. These values are equal to ± 2% of the 60 Hz nominal frequency and are derived from the recommendations found in Safety Guide 9 (Ref. 3).

<u>SR 3.8.1.1 and SR 3.8.1.4</u>

These SRs help to ensure the availability of the standby electrical power supply to mitigate DBAs and transients and maintain the unit in a safe shutdown condition.

For the purposes of this testing, the DGs are started from standby conditions. Standby conditions for a DG mean that the diesel engine coolant and oil are being continuously circulated and temperature is being maintained consistent with manufacturer recommendations.

In order to reduce stress and wear on diesel engines, a modified start may be utilized for SR 3.8.1.1 in which the starting speed of DGs is limited, engine warmup is allowed at this lower speed, and the DGs are gradually accelerated to synchronous speed prior to loading. These start procedures are the intent of the Note.

SR 3.8.1.4 requires that, at a 184 day Frequency, the DG starts from standby conditions and achieves required voltage and frequency within 10 seconds. The 10 second start requirement supports the assumptions in the design basis LOCA analysis of FSAR, Section 14.6.3 (Ref. 10). The

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.1 and SR 3.8.1.4 (continued)

10 second start requirement is not applicable to SR 3.8.1.1 (see the Note for SR 3.8.1.1), when a modified start procedure as described above is used. If a modified start is not used, the 10 second start requirement of SR 3.8.1.4 applies.

Since SR 3.8.1.4 does require a 10 second start, it is more restrictive than SR 3.8.1.1, and it may be performed in lieu of SR 3.8.1.1. This procedure is the intent of the Note for SR 3.8.1.1.

The 31 day Frequency for SR 3.8.1.1 is consistent with Safety Guide 9 (Ref. 3). The 184 day Frequency for SR 3.8.1.4 is a reduction in cold testing consistent with Generic Letter 84-15 (Ref. 7). These Frequencies provide adequate assurance of DG OPERABILITY, while minimizing degradation resulting from testing.

SR 3.8.1.2

This Surveillance verifies that the DGs are capable of synchronizing and accepting greater than or equal to the continuous rating. A minimum run time of 60 minutes is required to stabilize engine temperatures, while minimizing the time that the DG is connected to the offsite source.

Although no power factor requirements are established by this SR, the DG is normally operated at a power factor between 0.8 lagging and 1.0.

The 31 day Frequency for this Surveillance is consistent with Safety Guide 9 (Ref. 3).

Note 1 modifies this Surveillance to indicate that diesel engine runs for this Surveillance may include gradual loading, as recommended by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized.

Note 2 modifies this Surveillance by stating that momentary transients because of changing bus loads do not invalidate

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.2 (continued)

this test. Similarly, momentary power factor transients above the limit do not invalidate the test.

Note 3 indicates that this Surveillance should be conducted on only one DG at a time in order to avoid common cause failures that might result from offsite circuit or grid perturbations.

Note 4 stipulates a prerequisite requirement for performance of this SR. A successful DG start must precede this test to credit satisfactory performance. Additionally, prior to loading, an engine-idle warmup period is allowed.

SR 3.8.1.3

This Surveillance demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated 7-day storage tank to its associated engine fuel oil tank. It is required to support continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oil piping system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer systems are OPERABLE.

The design of fuel transfer systems is such that pumps that transfer the fuel oil operate automatically in order to maintain an adequate volume of fuel oil in the engine tank during or following DG operation. A 31 day Frequency is appropriate, since proper operation of fuel transfer systems is an inherent part of DG OPERABILITY.

SR 3.8.1.4

See SR 3.8.1.1.

SR 3.8.1.5

Each DG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.5 (continued)

the loss of a large load could cause diesel engine overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. The largest single load for each DG is a residual heat removal pump (2000 hp). This Surveillance may be accomplished by:

a. Tripping the DG output breaker with the DG carrying greater than or equal to its associated single largest post-accident load while paralleled to offsite power, or while solely supplying the board; or

b. Tripping its associated single largest post-accident load with the DG solely supplying the board.

As required by IEEE-308 (Ref. 11), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint, or 15% above synchronous speed, whichever is lower. This represents 66.75 Hz, equivalent to 75% of the difference between nominal speed and the overspeed trip setpoint.

The voltage and frequency tolerances specified in this SR are derived from Safety Guide 9 (Ref. 3) recommendations for response during load sequence intervals. The voltage and frequency specified are consistent with the design range of the equipment powered by the DG. SR 3.8.1.5.a corresponds to the maximum frequency excursion, while SR 3.8.1.5.b is a steady state voltage value to which the system must recover following load rejection. The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 8).

This SR is modified by a Note. In order to ensure that the DG is tested under load conditions that are as close to design basis conditions as possible, the Note requires that, if synchronized to offsite power, testing must be performed using a power factor ≤ 0.9. This power factor is chosen to

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.5 (continued)

be representative of the actual design basis inductive loading that the DG would experience.

SR 3.8.1.6

This Surveillance demonstrates that the DG automatically starts from the design basis actuation signal (LOCA signal). This test will also verify the start of the Unit 3 DGs aligned to the SGT and CREV Systems on an accident signal from Unit 2. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

SR 3.8.1.7

Demonstration once per 18 months that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours — 22 hours of which is at a load equivalent to the continuous rating of the DG, and 2 hours of which is at a load equivalent to the two-hour rating, which is greater than the maximum expected post-accident loading on the DG, confirms the DG capability for long term operation. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for gradual loading, discussed in SR 3.8.1.2, are applicable to this SR.

In order to ensure that the DG is tested under load conditions that are as close to design conditions as possible, testing must be performed using a power factor ≤ 0.9. This power factor is chosen to be representative of the actual design basis inductive loading that the DG could experience. A load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 8), paragraph 2.a.(3).

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.7 (continued)

This Surveillance has been modified by a Note that states that momentary transients due to changing bus loads do not invalidate this test. Similarly, momentary power factor transients above the limit do not invalidate the test.

SR 3.8.1.8

Under accident conditions (and loss of offsite power) loads are sequentially connected to the shutdown boards by automatic individual pump timers. The individual pump timers control the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. This SR is demonstrated by performance of SR 3.3.5.1.5 for the Core Spray and LPCI pump timers, SR 3.7.2.3 for the EECW pump timers, and SR 3.8.1.9.b for the 480 V load shed logic timers. These calibration tolerances ensure that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Reference 2 provides a summary of the automatic loading of ESF shutdown boards.

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 8), paragraph 2.a.(2).

SR 3.8.1.9

In the event of a DBA coincident with a loss of offsite power, the DGs are required to supply the necessary power to ESF systems so that the fuel, RCS, and containment design limits are not exceeded.

This Surveillance demonstrates the as designed operation of the standby power sources during a loss of offsite power actuation test signal in conjunction with an ECCS initiation signal. This test verifies all actions encountered from the loss of offsite power in conjunction with an ECCS initiation signal, including shedding of the nonessential loads and energization of the 4.16 kV shutdown boards and respective loads from the DG. It further demonstrates the capability

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.9 (continued)

of the DG to automatically achieve the required voltage and frequency within the specified time.

The requirement to verify the connection and power supply of permanent and auto-connected loads is intended to satisfactorily show the relationship of these loads to the DG loading logic. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, Emergency Core Cooling Systems (ECCS) injection valves are not desired to be stroked open, some systems are not capable of being operated at full flow, and RHR systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of the connection and loading of these loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of 18 months takes into consideration plant conditions required to perform the Surveillance and is intended to be consistent with an expected fuel cycle length of 18 months.

SR 3.8.1.10

This Surveillance is provided to direct that the appropriate Surveillances for the required Unit 3 DGs are governed by the Unit 3 Technical Specifications. Performance of the applicable Unit 3 Surveillances will satisfy any Unit 3 requirements, as well as this Unit 1 and 2 Surveillance requirement. The Frequency required by the applicable Unit 3 SR also governs performance of that SR for both Units.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.

2. FSAR, Chapter 8.

(continued)

BASES

REFERENCES (continued)

3. Safety Guide 9.
4. FSAR, Chapter 6.
5. FSAR, Chapter 14.
6. Regulatory Guide 1.93.
7. Generic Letter 84-15.
8. Regulatory Guide 1.108.
9. ANSI C84.1, 1982.
10. FSAR, Section 14.6.3.
11. IEEE Standard 308.
12. FSAR, Section 8.5, Table 8.5-6.
13. FSAR, Section 8.5.2.
14. TVA Design Criteria BFN-50-7082.
15. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.2 AC Sources — Shutdown

BASES

BACKGROUND

A description of the AC sources is provided in the Bases for LCO 3.8.1, "AC Sources — Operating."

APPLICABLE SAFETY ANALYSES

The OPERABILITY of the minimum AC sources during MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment ensures that:

a. The facility can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate AC electrical power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

In general, when the unit is shut down the Technical Specifications requirements ensure that the unit has the capability to mitigate the consequences of postulated accidents. However, assuming a single failure and concurrent loss of all offsite or loss of all onsite power is not required. The rationale for this is based on the fact that many Design Basis Accidents (DBAs) that are analyzed in MODES 1, 2, and 3 have no specific analyses in MODES 4 and 5. Worst case bounding events are deemed not credible in MODES 4 and 5 because the energy contained within the reactor pressure boundary, reactor coolant temperature and pressure, and corresponding stresses result in the probabilities of occurrences significantly reduced or eliminated, and minimal consequences. These deviations from DBA analysis assumptions and design requirements during shutdown conditions are allowed by the LCO for required systems.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

During MODES 1, 2, and 3, various deviations from the analysis assumptions and design requirements are allowed within the ACTIONS. This allowance is in recognition that certain testing and maintenance activities must be conducted, provided an acceptable level of risk is not exceeded. During MODES 4 and 5, performance of a significant number of required testing and maintenance activities is also required. In MODES 4 and 5, the activities are generally planned and administratively controlled. Relaxations from typical MODES 1, 2, and 3 LCO requirements are acceptable during shutdown MODES, based on:

a. The fact that time in an outage is limited. This is a risk prudent goal as well as a utility economic consideration.

b. Requiring appropriate compensatory measures for certain conditions. These may include administrative controls, reliance on systems that do not necessarily meet typical design requirements applied to systems credited in operation MODE analyses, or both.

c. Prudent utility consideration of the risk associated with multiple activities that could affect multiple systems.

d. Maintaining, to the extent practical, the ability to perform required functions (even if not meeting MODES 1, 2, and 3 OPERABILITY requirements) with systems assumed to function during an event.

In the event of an accident during shutdown, this LCO ensures the capability of supporting systems necessary for avoiding immediate difficulty, assuming either a loss of all offsite power or a loss of all onsite (diesel generator (DG)) power.

The AC sources satisfy Criterion 3 of the NRC Policy Statement (Ref. 1).

LCO

One offsite circuit capable of supplying the onsite Class 1E power distribution subsystem(s) of LCO 3.8.8, "Distribution Systems — Shutdown," ensures that all required loads are

(continued)

BASES

LCO (continued)

powered from offsite power. Two Unit 1 and 2 DGs, and when Unit 3 is not in MODE 1, 2, or 3 with SGT and CREV Systems required OPERABLE, Unit 3 DGs OPERABLE, each associated with a Distribution System Engineered Safety Feature (ESF) 4.16 kV shutdown board required OPERABLE by LCO 3.8.8, ensures that a diverse LCO power source is available for providing electrical power support assuming a loss of the offsite circuit. Together, OPERABILITY of the required offsite circuit and DGs ensures the availability of sufficient AC sources to operate the plant in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents and reactor vessel draindown).

The qualified offsite circuit(s) must be capable of maintaining rated frequency and voltage while connected to their respective 4.16 kV shutdown boards, and of accepting required loads during an accident. Qualified offsite circuits are those that are described in the FSAR and are part of the licensing basis for the unit. An offsite circuit is considered OPERABLE if the offsite source is available to one or more required 4.16 kV shutdown boards, through its normal supply breaker.

The offsite circuit consists of incoming breakers to a 4.16 kV shutdown bus and then to the 4.16 kV shutdown boards required by LCO 3.8.8. Each shutdown bus is independently supplied from separate unit boards, which are fed from transformers (via start buses as appropriate). Specific circuits and limitations for considering the offsite circuit qualified are described below.

1. From the 500 kV switchyard (with no credit for the two 500 kV Trinity lines), through unit station service transformer (USST) 1B to 4.16 kV unit board 1A, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B; and/or, to 4.16 kV unit board 1B, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D.

2. From the 500 kV switchyard (with no credit for the two 500 kV Trinity lines), through USST 2B to 4.16 kV unit board 2A, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D; and/or, to 4.16 kV unit

(continued)

BASES

LCO (continued)

board 2B, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B.

3. From the Trinity 161 kV transmission system, through common station service transformer (CSST) A or B to start bus 1A or 1B, to 4.16 kV unit board 1A or 2B, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B; or alternately, to 4.16 kV unit board 1B or 2A, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D.

4. From the Athens 161 kV transmission system, through CSST A or B to start bus 1A or 1B, to 4.16 kV unit board 1A or 2B, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B; or alternately, to 4.16 kV unit board 1B or 2A, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D.

For the Athens 161 kV offsite power to be considered as one of the qualified offsite power supplies, the following restrictions must also be met:

a. The 161 kV capacitor bank must be available for the Athens 161 kV line.

b. Credit for offsite power from the Athens 161 kV line may be taken by only one unit at one time. However, more than one unit may be aligned to the Athens line without invalidating the offsite power supply for the unit claiming it.

For the Trinity 161 kV offsite power to be considered as one of the qualified offsite power supplies, the following restrictions must also be met:

a. For the Trinity 161 kV line to be considered as one of the qualified offsite power supplies by only one unit, either the 161 kV capacitor bank must be available or the Trinity Inter-Tie transformer must be in service with 161 kV line nominal voltage $\geq$ 165 kV.

b. The Trinity 161 kV line may be considered as one of the qualified offsite power supplies by two separate units at any one time, provided that both CSST A and B are available and either the 161 kV capacitor bank is

(continued)

BASES

LCO (continued)

available or the Athens line and Trinity Inter-Tie transformer are in service with 161 kV line nominal voltage ≥ 165 kV.

c. The Trinity 161 kV line may be considered as one of the qualified offsite power supplies by three separate units at any one time, provided that both CSST A and B are available, Unit 3 claims USST 3B as its other offsite power source, and either the 161 kV capacitor bank is available or the Athens line and Trinity Inter-Tie transformer are in service with 161 kV line nominal voltage ≥ 165 kV.

The only requirements for the position of the 161 kV bus 1 and bus 2 cross-tie breakers (924 and 928) are those implied by the restrictions on claiming Athens and Trinity as offsite power supplies.

The required DGs must be capable of starting, accelerating to rated speed and voltage, connecting to respective 4.16 kV shutdown boards on detection of bus undervoltage, and accepting required loads. This sequence must be accomplished within 10 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and must continue to operateuntil offsite power can be restored to the 4.16 kV shutdown boards.

Proper sequencing of loads, including tripping of nonessential loads, is a required function for DG OPERABILITY.

APPLICABILITY

The AC sources are required to be OPERABLE in MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment to provide assurance that:

a. Systems providing adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core in case of an inadvertent draindown of the reactor vessel;

b. Systems needed to mitigate a fuel handling accident are available;

(continued)

BASES

APPLICABILITY (continued)

c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

AC power requirements for MODES 1, 2, and 3 are covered in LCO 3.8.1.

ACTIONS

A.1

With the required offsite circuit inoperable, or one required DG inoperable, the remaining AC sources available may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, and operations with a potential for draining the reactor vessel. By declaring required features inoperable that are supported by the inoperable AC source, appropriate restrictions can be implemented in accordance with the affected required feature(s) LCOs' ACTIONS.

The 30 day Completion Time takes into account the OPERABILITY of the redundant required features, and their offsite and DG power availability. Additionally, the 30 day Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and low probability of an event occurring during this period. If the redundant required feature(s) is (are) not OPERABLE, the second Completion Time requires immediately declaring the required feature(s), supported by the inoperable AC source, inoperable. This results in taking the appropriate ACTIONS in the supported system Specification for the inoperable function.

B.1, B.2.1, B.2.2, B.2.3, and B.2.4

With two or more required AC sources inoperable, the option still exists to declare all required features inoperable. However, since this option may involve undesired administrative efforts, the allowance for sufficiently

(continued)

BASES

ACTIONS

B.1, B.2.1, B.2.2, B.2.3, and B.2.4 (continued)

conservative actions is made. With two or more required AC sources inoperable, the minimum required diversity of AC power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies in the secondary containment, and activities that could result in inadvertent draining of the reactor vessel.

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC sources and to continue this action until restoration is accomplished in order to provide the necessary AC power to the plant safety systems.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required AC electrical power sources should be completed as quickly as possible in order to minimize the time during which the plant safety systems may be without sufficient power.

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition B have been modified by a Note to indicate that when Condition B is entered with no AC power to any required 4.16 kV shutdown board, ACTIONS for LCO 3.8.8 must be immediately entered. This Note allows Condition B to provide requirements for the loss of the offsite circuit whether or not a division is de-energized. LCO 3.8.8 provides the appropriate restrictions for the situation involving a de-energized 4.16 kV shutdown board.

SURVEILLANCE REQUIREMENTS

SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the Unit 1 and 2

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.2.1 (continued)

AC sources in other than MODES 1, 2, and 3. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR.

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DG(s) from being paralleled with the offsite power network or otherwise rendered inoperable during the performance of SRs, and to preclude deenergizing a required 4.16 kV shutdown board or disconnecting a required offsite circuit during performance of SRs. With limited AC sources available, a single event could compromise both the required circuit and the DG. It is the intent that these SRs must still be capable of being met, but actual performance is not required during periods when the DG and offsite circuit is required to be OPERABLE.

SR 3.8.2.2

This Surveillance is provided to direct that the appropriate Surveillances for the required Unit 3 DGs are governed by the Unit 3 Technical Specifications. Performance of the applicable Unit 3 Surveillances will satisfy any Unit 3 requirements, as well as satisfying this Unit 2 Surveillance requirement. The Frequency required by the applicable Unit 3 SR also governs performance of that SR for both Units.

REFERENCES

1. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.3 Diesel Fuel Oil, Lube Oil, and Starting Air

BASES

BACKGROUND

Each diesel generator (DG) is provided with three interconnected storage tanks having a minimum usable fuel oil volume (35,280 gallons) sufficient to operate that DG for a period of 7 days while the DG is supplying maximum post loss of coolant accident (LOCA) load demand discussed in FSAR, Section 8.5.3.4 (Ref. 1). A transfer pump is located at the fuel oil storage tanks which can supply fuel oil from two 71,000-gallon fuel oil storage tanks to the 7-day storage tanks. In addition, it is possible to transfer fuel from one 7-day storage tank to any other by using transfer pumps. This onsite fuel oil capacity is sufficient to operate the DGs for longer than the time to replenish the onsite supply from outside sources.

Fuel oil is transferred from the 7-day storage tank to the day tank by either of two transfer pumps associated with each diesel generator. This is accomplished automatically by level switches on the day tank. Redundancy of pumps and piping precludes the failure of one pump, or the rupture of any pipe, valve, or tank to result in the loss of more than one DG. All 7-day tanks are embedded in the substructure of the Standby Diesel Generator Building.

For proper operation of the standby DGs, it is necessary to ensure the proper quality of the stored fuel oil. The fuel oil property monitored is the total particulate concentration. Periodic testing of the stored fuel oil total particulate concentration is a method to monitor the potential degradation related to long term storage and the potential impact to fuel filter plugging as a result of high particulate levels.

The DG lubrication system is designed to provide sufficient lubrication to permit proper operation of its associated DG under all loading conditions. The system is required to circulate the lube oil to the diesel engine working surfaces and to remove excess heat generated by friction during operation. Each engine oil sump contains an inventory capable of supporting a minimum of 7 days of operation.

(continued)

BASES

BACKGROUND (continued)

The 175-gallon and 150-gallon capacities listed in Condition B are based upon the DG seven-day consumption and six-day consumption of lube oil, respectively. The total lube oil system capacity is 465 gallons, of which, 235 gallons are useable (i.e., 230 gallons are not useable). If the seven-day and six-day capacities are added to the non-useable capacity, a minimum value of lube oil capacity can be established for purposes of this LCO. Therefore, 405 gallons are required to ensure the seven-day requirement (i.e., 230 + 175); while, 380 gallons (i.e., 230 + 150) are required to ensure the six-day requirement. Note: actual lube oil consumption is 0.98 gal/hr or 23.52 gal/day - 25 gal/day was conservatively chosen to establish the seven-day and six-day requirements.

This supply is sufficient to allow the operator to replenish lube oil from outside sources.

Each DG has two fully redundant air start systems, either of which is capable of starting the engine, with adequate capacity for at least one start attempt on the DG without recharging the air start receiver(s).

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in FSAR, Chapter 6 (Ref. 3), and Chapter 14 (Ref. 4), assume Engineered Safety Feature (ESF) systems are OPERABLE. The DGs are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that fuel, Reactor Coolant System, and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.5, Emergency Core Cooling System (ECCS) and Reactor Core Isolation Cooling (RCIC) System; and Section 3.6, Containment Systems.

Since diesel fuel oil, lube oil, and starting air subsystems support the operation of the standby AC power sources, they satisfy Criterion 3 of the NRC Policy Statement (Ref. 5).

(continued)

BASES (continued)

LCO

Stored diesel fuel oil is required to have sufficient supply for 7 days of full load operation. It is also required to meet specific standards for quality. Additionally, sufficient lube oil supply must be available to ensure the capability to operate at full load for 7 days. This requirement, in conjunction with an ability to obtain replacement supplies within 7 days, supports the availability of DGs required to shut down the reactor and to maintain it in a safe condition for an abnormal operational transient or a postulated DBA with loss of offsite power. DG day tank fuel oil requirements, as well as transfer capability from the 7-day storage tank to the day tank, are addressed in LCO 3.8.1, "AC Sources – Operating," and LCO 3.8.2, "AC Sources – Shutdown."

One of the two redundant starting air systems is required to have a minimum capacity for one DG start attempt without recharging the air start receiver.

APPLICABILITY

The AC sources (LCO 3.8.1 and LCO 3.8.2) are required to ensure the availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an abnormal operational transient or a postulated DBA. Because stored diesel fuel oil, lube oil, and starting air subsystem support LCO 3.8.1 and LCO 3.8.2, stored diesel fuel oil, lube oil, and starting air are required to be within limits when the associated DG is required to be OPERABLE.

(continued)

BASES (continued)

ACTIONS

The ACTIONS Table is modified by a Note indicating that separate Condition entry is allowed for each DG. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable DG subsystem. Complying with the Required Actions for one inoperable DG subsystem may allow for continued operation, and subsequent inoperable DG subsystem(s) governed by separate Condition entry and application of associated Required Actions.

A.1

In this condition, the 7 day fuel oil supply for a DG is not available. However, the Condition is restricted to fuel oil level reductions that maintain at least a 6 day supply. These circumstances may be caused by events such as:

a. Full load operation required for an inadvertent start while at minimum required level; or

b. Feed and bleed operations that may be necessitated by increasing particulate levels or any number of other oil quality degradations.

This restriction allows sufficient time for obtaining the requisite replacement volume and performing the analyses required prior to addition of the fuel oil to the tank. A period of 48 hours is considered sufficient to complete restoration of the required level prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> 6 days), the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

B.1

With lube oil inventory < 175 gal, sufficient lube oil to support 7 days of continuous DG operation at full load conditions may not be available. However, the Condition is restricted to lube oil volume reductions that maintain at least a 6 day supply. This restriction allows sufficient time for obtaining the requisite replacement volume. A period of 48 hours is considered sufficient to complete

(continued)

BASES

ACTIONS

B.1 (continued)

restoration of the required volume prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> 6 days), the low rate of usage, the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

C.1

This Condition is entered as a result of a failure to meet the acceptance criterion for particulates. Normally, trending of particulate levels allows sufficient time to correct high particulate levels prior to reaching the limit of acceptability. Poor sample procedures (bottom sampling), contaminated sampling equipment, and errors in laboratory analysis can produce failures that do not follow a trend. Since the presence of particulates does not mean failure of the fuel oil to burn properly in the diesel engine, since particulate concentration is unlikely to change significantly between Surveillance Frequency intervals, and since proper engine performance has been recently demonstrated (within 31 days), it is prudent to allow a brief period prior to declaring the associated DG inoperable. The 7 day Completion Time allows for further evaluation, re-sampling, and re-analysis of the DG fuel oil.

D.1

With the starting air receiver pressure < 165 psig in the required starting air system, sufficient capacity to start the associated DG may not exist. The associated DG may be incapable of performing its intended function and must be immediately declared inoperable. This declaration also requires entry into applicable Conditions and Required Actions for an inoperable DG, LCO 3.8.1, "AC Sources - Operating."

(continued)

BASES

ACTIONS (continued)

E.1

With a Required Action and associated Completion Time not met, or the stored diesel fuel oil, lube oil, or starting air subsystem not within limits for reasons other than addressed by Conditions A through D, the associated DG may be incapable of performing its intended function and must be immediately declared inoperable.

SURVEILLANCE REQUIREMENTS

SR 3.8.3.1

This SR provides verification that there is an adequate inventory of fuel oil in the storage tanks to support each DG's operation for 7 days at full load. The 7 day period is sufficient time to place the unit in a safe shutdown condition and to bring in replenishment fuel from an offsite location.

The 31 day Frequency is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and unit operators would be aware of any large uses of fuel oil during this period.

SR 3.8.3.2

This Surveillance ensures that sufficient lubricating oil inventory is available to support at least 7 days of full load operation for each DG. The 175 gal requirement is based on the DG manufacturer's consumption values for the run time of the DG. Implicit in this SR is the requirement to verify the capability to transfer the lube oil from its storage location to the DG, when the DG lube oil sump does not hold adequate inventory for 7 days of full load operation without the level reaching the manufacturer's recommended minimum level.

A 31 day Frequency is adequate to ensure that a sufficient lube oil supply is onsite, since DG starts and run time are closely monitored by the plant staff.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.3.3

This SR verifies that the required fuel oil testing is performed in accordance with the Diesel Fuel Oil Testing Program. Tests are a means of monitoring the potential degradation related to long term storage and the potential impact to fuel filter plugging as a result of high particulate levels. Specific sampling requirements, frequencies, and additional information are discussed in detail in the Diesel Fuel Oil Testing Program.

SR 3.8.3.4

This Surveillance ensures that, without the aid of the refill compressor, sufficient air start capacity for each DG is available. The system design requirements provide for at least one start cycle from one of two redundant air start systems without recharging. A start cycle is defined by the DG vendor, but usually is measured in terms of time (seconds of cranking) or engine cranking speed. The pressure specified in this SR is the lowest pressure at which at least one start attempt can be accomplished using one of two redundant air start systems.

The 31 day Frequency takes into account the capacity, capability, redundancy, and diversity of the AC sources and other indications available in the control room, including alarms, to alert the operator to below normal air start pressure.

REFERENCES

1. FSAR, Section 8.5.3.4.
2. Regulatory Guide 1.137.
3. FSAR, Chapter 6.
4. FSAR, Chapter 14.
5. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.4 DC Sources — Operating

BASES

BACKGROUND

The DC electrical power system provides the AC emergency power system with control power. It also provides both motive and control power to selected safety related equipment. As required by 10 CFR 50, Appendix A, GDC 17 (Ref. 1), the DC electrical power system is designed to have sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure. The DC electrical power system also conforms to the recommendations of Regulatory Guide 1.6 (Ref. 2) and meets the intent of IEEE-279 (Ref. 3).

Three separate DC Source Systems consist of:

1. Three 250 VDC Unit DC subsystems, together with the associated charger, circuitry, switches, indicators, and alarms. Each Unit DC battery board can be supplied from its own battery charger or from the spare charger. The three Unit batteries have engineered safety feature loads for the three units distributed among them so that redundant subsystems on each unit have separate normal and alternate power supplies. The Unit DC battery boards also supply control power for the bus-tie board, the cooling tower switchgear, three Unit 3 shutdown boards, and the alternate feeder to Unit 1 and 2 shutdown boards and one Unit 3 shutdown board. The battery boards, motor-operated valve boards, and distribution panels supply nominal 250 VDC power to their loads without interruption unless the supply battery is discharged and power to the charger is lost. All transfers from normal to alternate sources are done manually.

2. Four 250 VDC shutdown board subsystems supply control power for 4.16 kV shutdown boards A, B, C, and D, respectively, and 480 V shutdown boards 1A, 1B, 2A and 2B. Each DC shutdown board subsystem consists of a battery together with the associated charger, circuitry, switches, indicators, and alarms. Each shutdown board DC subsystem can receive power from its

(continued)

BASES

BACKGROUND (continued)

own battery, battery charger, or from the spare charger. Normal 250 VDC control power for 4.16 kV shutdown boards A, B, C, and D is supplied by one of the shutdown board DC subsystems with an alternate supply from one of the Unit DC battery boards through a manual transfer switch; and control power for 480 V shutdown boards 1A, 1B, 2A, and 2B is supplied by one of the shutdown board DC subsystems with an alternate supply from one of the Unit DC battery boards through a manual transfer switch. Alternate supplies have been provided through manual transfer switches. Separation between redundant control power circuits is maintained external to and within the switchgear.

3. The diesel generator (DG) DC subsystems provide control and instrumentation power for their respective DG. Each DG DC subsystem is energized by one 125 V battery and one of two 125 V battery chargers per 125 V subsystem.

During normal operation, the DC loads are powered from the battery chargers with the batteries floating on the system. In case of loss of normal power to the battery charger, the DC loads are automatically powered from the batteries.

The DC power distribution system is described in more detail in Bases for LCO 3.8.7, "Distribution System — Operating," and LCO 3.8.8, "Distribution System — Shutdown."

Each Unit and Shutdown Board battery has adequate storage capacity to carry the required load continuously for approximately 30 minutes (Ref. 4).

Each diesel battery has adequate storage capacity to carry required loads. These include control and logic power, governor booster pumps, generator relay protection, generator field flashing, and the motor-driven fuel pumps. The governor booster pumps and generator field flashing require power for only a relatively short time during a diesel start. Approximately 5.5 seconds after start, the diesel battery load is about 4.2 amps.

Each Unit and Shutdown Board DC battery subsystem is separately housed in a ventilated room apart from its charger and distribution centers. Each subsystem is located

(continued)

BASES

BACKGROUND (continued)

in an area separated physically and electrically from the other subsystems to ensure that a single failure in one subsystem does not cause a failure in a redundant subsystem. Each diesel battery is located in the room with the diesel generator it serves. One of its chargers is also in the room; the other is immediately outside the door in the Diesel Generator Building hallway.

The batteries for Unit DC, Shutdown Board DC, and DG DC electrical power subsystems are sized to produce required capacity at 80% of nameplate rating, corresponding to warranted capacity at end of life cycles and the 100% design demand. The minimum design voltage limit for the Unit DC and Shutdown Board DC subsystems is 210 V. The minimum design voltage limit for the DG DC subsystems is 105 V.

Each battery charger for a DC electrical power subsystem has ample power output capacity for the steady state operation of connected loads required during normal operation, while at the same time maintaining its battery bank fully charged. Each battery charger has sufficient capacity to restore the battery from the design minimum charge to its fully charged state within 12 hours while supplying normal steady state loads (Ref. 4).

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the FSAR, Chapter 6 (Ref. 5) and Chapter 14 (Ref. 5), assume that Engineered Safety Feature (ESF) systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the DGs, emergency auxiliaries, and control and switching during all MODES of operation. The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining DC sources OPERABLE during accident conditions in the event of:

a. An assumed loss of all offsite AC power or all onsite AC power sources; and

b. A postulated worst case single failure.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

The DC sources satisfy Criterion 3 of the NRC Policy statement (Ref. 11).

LCO

The DC Electrical Power System—with: 1) three Unit DC subsystems, each consisting of one 250 V battery, one battery charger, and the corresponding control equipment and interconnecting cabling supplying power to the associated Unit battery board; 2) four shutdown board DC subsystems (and the Unit 3 shutdown board DC subsystem needed to support OPERABILITY of the CREV System), each consisting of one 250 V battery, its associated charger, and the corresponding control equipment and interconnecting cabling supplying power to the associated DC shutdown board; and 3) four Unit 2 and two Unit 3 DG DC subsystems each consisting of one battery bank, one battery charger, and the corresponding control equipment and interconnecting cabling, is required to be OPERABLE to ensure the availability of the required power to shut down the reactor and maintain it in a safe condition after an abnormal operational transient or a postulated DBA. Loss of any DC electrical power subsystem does not prevent the minimum safety function from being performed (Ref. 4).

APPLICABILITY

The DC electrical power sources are required to be OPERABLE in MODES 1, 2, and 3 to ensure safe unit operation and to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of abnormal operational transients; and

b. Adequate core cooling is provided, and containment integrity and other vital functions are maintained in the event of a postulated DBA.

The DC electrical power requirements for MODES 4 and 5 are addressed in the Bases for LCO 3.8.5, "DC Sources—Shutdown."

(continued)

BASES (continued)

ACTIONS

A.1

Condition A represents one Unit or Shutdown Board DC subsystem with a loss of ability to completely respond to an event, and a potential loss of ability to remain energized during normal operation. It is therefore imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for complete loss of DC power to the affected division. The 7 day limit is consistent with the allowed time for an inoperable Unit DC Board or Shutdown Board Distribution Panel.

If one Unit or Shutdown Board DC electrical power subsystem is inoperable (e.g., inoperable battery, inoperable battery charger(s), or inoperable battery charger and associated inoperable battery), the remaining Unit or Shutdown Board DC electrical power subsystems have the capacity to support a safe shutdown and cooldown of all three units in the event of a loss of offsite power and a DBA on one Unit. Since a subsequent worst case single failure could, however, result in the loss of minimum necessary DC electrical subsystems to mitigate a worst case accident, continued power operation should not exceed 7 days. The loss of one shutdown board electrical power subsystem affects normal control power supply for the 480 V and 4.16 kV shutdown board(s) which it supplies. Loss of uninterrupted control power to these shutdown boards may result in loss of those engineered safety features supplied by these boards. Therefore, 7 days is considered a reasonable time to effect repairs and perform required testing of the unit or shutdown board DC electrical power subsystem, recognizes the ability to connect alternate sources to support continued operation or accident mitigation, and, if the unit or shutdown board DC electrical power subsystem is not restored to OPERABLE status, to prepare to effect an orderly and safe unit shutdown.

B.1 and B.2

If the Unit or Shutdown Board DC electrical power subsystem cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit

(continued)

BASES

ACTIONS

B.1 AND B.2 (continued)

must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems. The Completion Time to bring the unit to MODE 4 is consistent with the time required in Regulatory Guide 1.93 (Ref. 6).

C.1

If a DG DC electrical power subsystem is inoperable, the associated DG may be incapable of performing its intended function and must be immediately declared inoperable. This declaration also requires entry into applicable Conditions and Required Actions for an inoperable DG, LCO 3.8.1, "AC Sources — Operating."

D.1

Required Action D.1 is intended to provide assurance that a loss of Unit 3 Shutdown Board DC electrical power subsystem 3EB does not result in a complete loss of safety function of critical systems (i.e., CREVS). With Unit 3 Shutdown Board DC electrical power subsystem 3EB inoperable, the CREVS train supported by that shutdown board is inoperable. Therefore, the associated CREVS subsystem must be declared inoperable immediately, and the ACTIONS in the appropriate system Specification taken.

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1

Verifying battery terminal voltage while on float charge for the batteries helps to ensure the effectiveness of the charging system and the ability of the batteries to perform their intended function. Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery (or battery cell) and maintain the battery (or a battery cell) in a fully charged state. The voltage requirements are

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1 (continued)

based on the nominal design voltage of the battery and are consistent with the initial voltages assumed in the battery sizing calculations. The 7 day Frequency is consistent with manufacturer recommendations and IEEE-450 (Ref. 7).

SR 3.8.4.2 and SR 3.8.4.5

Battery charger capability requirements are based on the design capacity of the chargers (Ref. 4). According to Regulatory Guide 1.32 (Ref. 8), the battery charger supply is required to be based on the largest combined demands of the various steady state loads and the charging capacity to restore the battery from the design minimum charge state to the fully charged state, irrespective of the status of the unit during these demand occurrences. The minimum required amperes and verification of the charger's ability to recharge the battery ensures that these requirements can be satisfied.

SR 3.8.4.2 verifies that the chargers are capable of charging the batteries after their designed duty cycle testing and ensures that the chargers will perform their design function. This SR is modified by a Note that allows performance of SR 3.8.4.5 in lieu of this Surveillance requirement. SR 3.8.4.5 verifies that the chargers are capable of charging the batteries after each discharge test and ensures that the chargers are capable of performing at maximum output. SR 3.8.4.2 is performed at the same frequency as the 18 month service test (SR 3.8.4.3), while SR 3.8.4.5 is performed following the 60 month battery discharge test (SR 3.8.4.4).

SR 3.8.4.3

A battery service test is a special test of the battery's capability, as found, to satisfy the design requirements (battery duty cycle) of the DC electrical power system. The discharge rate and test length corresponds to the design duty cycle requirements as specified in Reference 4.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.3 (continued)

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.32 (Ref. 8) and Regulatory Guide 1.129 (Ref. 9), which state, in part, that the battery service test should be performed with intervals between tests not to exceed 18 months.

This SR is modified by a Note that allows the performance of a modified performance discharge test in lieu of a service test once per 60 months. The modified performance discharge test is a simulated duty cycle consisting of just two rates; the one minute rate published for the battery or the largest current load of the duty cycle, followed by the test rate employed for the performance test, both of which envelope the duty cycle of the service test. Since the ampere-hours removed by a rated one minute discharge represents a very small portion of the battery capacity, the test rate can be changed to that for the performance test without compromising the results of the performance discharge test. The battery terminal voltage for the modified performance discharge test should remain above the minimum battery terminal voltage specified in the battery service test for the duration of time equal to that of the service test.

A modified discharge test is a test of the battery capacity and its ability to provide a high rate, short duration load (usually the highest rate of the duty cycle). This will often confirm the battery's ability to meet the critical period of the load duty cycle, in addition to determining its percentage of rated capacity. Initial conditions for the modified performance discharge test should be identical to those specified for a service test.

SR 3.8.4.4

A battery performance discharge test is a test of constant current capacity of a battery, normally done in the as found condition, after having been in service, to detect any change in the capacity determined by the acceptance test. The test is intended to determine overall battery degradation due to age and usage.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.4 (continued)

A battery modified performance discharge test is described in the Bases for SR 3.8.4.3. Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.4.4; however, only the modified performance discharge test may be used to satisfy SR 3.8.4.4 while satisfying the requirements of SR 3.8.4.3 at the same time.

The acceptance criteria for this Surveillance is consistent with IEEE-279 (Ref. 3) and IEEE-485 (Ref. 10). These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements.

The Frequency for this test is normally 60 months. If the battery shows degradation, or if the battery has reached 85% of its expected life and capacity is < 100% of the manufacturer's rating, the Surveillance Frequency is reduced to 12 months. However, if the battery shows no degradation but has reached 85% of its expected life, the Surveillance Frequency is only reduced to 24 months for batteries that retain capacity ≥ 100% of the manufacturer's rating. Degradation is indicated, according to IEEE-279 (Ref. 3), when the battery capacity drops by more than 10% relative to its capacity on the previous performance test or when it is 10% below the manufacturer's rating. All these Frequencies are consistent with the recommendations in IEEE-279 (Ref. 3).

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.
2. Regulatory Guide 1.6.
3. IEEE Standard 279.
4. FSAR, Sections 8.5 and 8.6.
5. FSAR, Chapters 6 and 14.

(continued)

BASES

REFERENCES (continued)

6. Regulatory Guide 1.93.
7. IEEE Standard 450.
8. Regulatory Guide 1.32, February 1977.
9. Regulatory Guide 1.129, December 1974.
10. IEEE Standard 485, 1983.
11. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.5 DC Sources — Shutdown

BASES

BACKGROUND

A description of the DC sources is provided in the Bases for LCO 3.8.4, "DC Sources — Operating."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident and transient analyses in the FSAR, Chapter 6 (Ref. 1) and Chapter 14 (Ref. 2), assume that Engineered Safety Feature systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the diesel generators (DGs), emergency auxiliaries, and control and switching during all MODES of operation.

The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and the requirements for the supported systems' OPERABILITY.

The OPERABILITY of the minimum DC electrical power sources during MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment ensures that:

a. The facility can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate DC electrical power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

The DC sources satisfy Criterion 3 of the NRC Policy Statement (Ref. 3).

(continued)

BASES (continued)

LCO

The DC Electrical Power Systems—with: 1) each Unit DC subsystem, supporting Unit battery boards required OPERABLE by LCO 3.8.8, consisting of one 250 V battery, one battery charger, and the corresponding control equipment and interconnecting cabling supplying power to the associated Unit battery board; 2) each shutdown board DC subsystem, supporting DC shutdown boards required OPERABLE by LCO 3.8.8, consisting of one 250 V battery, its associated charger, and the corresponding control equipment and interconnecting cabling supplying power to the associated DC shutdown board; and 3) each DG DC subsystem supporting DGs required OPERABLE for 4.16 kV shutdown boards required OPERABLE by LCO 3.8.8, consisting of one 125 V battery, one battery charger, and the corresponding control equipment and interconnecting cabling. This requirement ensures the availability of sufficient DC electrical power sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents and inadvertent reactor vessel draindown).

APPLICABILITY

The DC electrical power sources required to be OPERABLE in MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment provide assurance that:

a. Required features to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core in case of an inadvertent draindown of the reactor vessel;

b. Required features needed to mitigate a fuel handling accident are available;

c. Required features necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

(continued)

BASES

APPLICABILITY (continued)

The DC electrical power requirements for MODES 1, 2, and 3 are covered in LCO 3.8.4.

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4

If more than one DC distribution subsystem is required according to LCO 3.8.8, the DC subsystems remaining OPERABLE with one or more DC power sources inoperable may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, and operations with a potential for draining the reactor vessel. By allowance of the option to declare required features inoperable with associated DC power sources inoperable, appropriate restrictions are implemented in accordance with the affected system LCOs' ACTIONS. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and any activities that could result in inadvertent draining of the reactor vessel).

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required DC electrical power subsystems and to continue this action until restoration is accomplished in order to provide the necessary DC electrical power to the plant safety systems.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required DC electrical power subsystems should be completed as quickly as possible in order to minimize the time during which the plant safety systems may be without sufficient power.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.5.1

SR 3.8.5.1 requires performance of all Surveillances required by SR 3.8.4.1 through SR 3.8.4.5. Therefore, see the corresponding Bases for LCO 3.8.4 for a discussion of each SR.

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DC sources from being discharged below their capability to provide the required power supply or otherwise rendered inoperable during the performance of SRs. It is the intent that these SRs must still be capable of being met, but actual performance is not required.

REFERENCES

1. FSAR, Chapter 6.
2. FSAR, Chapter 14.
3. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.6 Battery Cell Parameters

BASES

BACKGROUND

This LCO delineates the limits on electrolyte temperature, level, float voltage, and specific gravity for the DC electrical power subsystems batteries. At BFN, these batteries were designed to IEEE-279 Standards (Ref. 4). However, the batteries have been analyzed and meet IEEE-450 Standards (Ref. 3). A discussion of these batteries and their OPERABILITY requirements is provided in the Bases for LCO 3.8.4, "DC Sources— Operating," and LCO 3.8.5, "DC Sources—Shutdown."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in FSAR, Chapter 6 (Ref. 1) and Chapter 14 (Ref. 2), assume Engineered Safety Feature systems are OPERABLE. The DC electrical power subsystems provide normal and emergency DC electrical power for the diesel generators (DGs), emergency auxiliaries, and control and switching during all MODES of operation.

The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining at least one division of DC sources OPERABLE during accident conditions, in the event of:

a. An assumed loss of all offsite AC or all onsite AC power sources; and

b. A postulated worst case single failure.

Since battery cell parameters support the operation of the DC electrical power subsystems, they satisfy Criterion 3 of the NRC Policy Statement (Ref. 5).

LCO

Battery cell parameters must remain within acceptable limits to ensure availability of the required DC power to shut down the reactor and maintain it in a safe condition after an

(continued)

BASES

LCO (continued)

anticipated operational occurrence or a postulated DBA. Electrolyte limits are conservatively established, allowing continued DC electrical system function even with Category A and B limits not met.

APPLICABILITY

The battery cell parameters are required solely for the support of the associated DC electrical power subsystem. Therefore, battery electrolyte is only required when the DC power source is required to be OPERABLE. Refer to the Applicability discussions in Bases for LCO 3.8.4 and LCO 3.8.5.

ACTIONS

A Note has been added providing that, for this LCO, separate Condition entry is allowed for each battery. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable battery. Complying with the Required Actions for battery cell parameters allows for restoration and continued operation, and subsequent out of limit battery cell parameters may be governed by separate Condition entry and application of associated Required Action.

A.1, A.2, and A.3

With parameters of one or more cells in one or more batteries not within limits (i.e., Category A limits not met or Category B limits not met, or Category A and B limits not met) but within the Category C limits specified in Table 3.8.6-1, the battery is degraded but there is still sufficient capacity to perform the intended function. Therefore, the affected battery is not required to be considered inoperable solely as a result of Category A or B limits not met, and continued operation is permitted for a limited period.

The pilot cell electrolyte level and float voltage are required to be verified to meet the Category C limits within 1 hour (Required Action A.1). This check provides a quick indication of the status of the remainder of the battery

(continued)

BASES

ACTIONS

A.1, A.2, and A.3 (continued)

cells. One hour provides time to inspect the electrolyte level and to confirm the float voltage of the pilot cells. One hour is considered a reasonable amount of time to perform the required verification.

Verification that the Category C limits are met (Required Action A.2) provides assurance that during the time needed to restore the parameters to the Category A and B limits, the battery is still capable of performing its intended function. A period of 24 hours is allowed to complete the initial verification because specific gravity measurements must be obtained for each connected cell. Taking into consideration both the time required to perform the required verification and the assurance that the battery cell parameters are not severely degraded, this time is considered reasonable. The verification is repeated at 7 day intervals until the parameters are restored to Category A and B limits. This periodic verification is consistent with the normal Frequency of pilot cell Surveillances.

Continued operation is only permitted for 31 days before battery cell parameters must be restored to within Category A and B limits. Taking into consideration that, while battery capacity is degraded, sufficient capacity exists to perform the intended function and to allow time to fully restore the battery cell parameters to normal limits, this time is acceptable for operation prior to declaring the associated DC battery inoperable.

B.1

When any battery parameter is outside the Category C limit for any connected cell, sufficient capacity to supply the maximum expected load requirement is not ensured and the corresponding DC electrical power subsystem must be declared inoperable. Additionally, other potentially extreme conditions, such as not completing the Required Actions of Condition A within the required Completion Time or average electrolyte temperature of representative cells falling below 60°F for each Unit and Shutdown Board battery (except Shutdown Board battery 3EB) and 40°F for Shutdown Board battery 3EB and each DG battery, also are cause for

(continued)

BASES

ACTIONS

B.1 (continued)

immediately declaring the associated DC electrical power subsystem inoperable.

SURVEILLANCE REQUIREMENTS

SR 3.8.6.1

This SR verifies that Category A battery cell parameters are consistent with IEEE-450 (Ref. 3), which recommends regular battery inspections (at least one per month) including voltage, specific gravity, and electrolyte temperature of pilot cells.

SR 3.8.6.2

The 92 day inspection of specific gravity and voltage is consistent with IEEE-450 (Ref. 3).

SR 3.8.6.3

This Surveillance verification that the average temperature of representative cells is within limits is consistent with a recommendation of IEEE-450 (Ref. 3) that states that the temperature of electrolytes in representative (10 percent of) cells should be determined on a quarterly basis.

Lower than normal temperatures act to inhibit or reduce battery capacity. This SR ensures that the operating temperatures remain within an acceptable operating range. This limit is based on manufacturer's recommendations.

Table 3.8.6-1

This table delineates the limits on electrolyte level, float voltage, and specific gravity for three different categories. The meaning of each category is discussed below.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

Category A defines the normal parameter limit for each designed pilot cell in each battery. The cells selected as pilot cells are those whose temperature, voltage, and electrolyte specific gravity approximate the state of charge of the entire battery.

The Category A limits specified for electrolyte level are based on manufacturer's recommendations and are consistent with the guidance in IEEE-450 (Ref. 3), with the extra ¼ inch allowance above the high water level indication for operating margin to account for temperature and charge effects. In addition to this allowance, footnote a to Table 3.8.6-1 permits the electrolyte level to be above the specified maximum level during equalizing charge, provided it is not overflowing. These limits ensure that the plates suffer no physical damage, and that adequate electron transfer capability is maintained in the event of transient conditions. IEEE-450 (Ref. 3) recommends that electrolyte level readings should be made only after the battery has been at float charge for at least 72 hours.

The Category A limit specified for float voltage is ≥ 2.13 V per cell. This value is based on the recommendation of IEEE-450 (Ref. 3), which states that prolonged operation of cells below 2.13 V can reduce the life expectancy of cells. The Category A limit specified for specific gravity for each pilot cell is ≥ 1.200 (0.015 below the manufacturer's fully charged nominal specific gravity or a battery charging current that had stabilized at a low value). This value is characteristic of a charged cell with adequate capacity. According to IEEE-450 (Ref. 3), the specific gravity readings are based on a temperature of 77°F (25°C).

The specific gravity readings are corrected for actual electrolyte temperature. For each 3°F (1.67°C) above 77°F (25°C), 1 point (0.001) is added to the reading; 1 point is subtracted for each 3°F below 77°F. The specific gravity of the electrolyte in a cell increases with a loss of water due to electrolysis or evaporation.

Category B defines the normal parameter limits for each connected cell. The term "connected cell" excludes any battery cell that may be jumpered out.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

The Category B limits specified for electrolyte level and float voltage are the same as those specified for Category A and have been discussed above. The Category B limit specified for specific gravity for each connected cell is ≥ 1.195 (0.020 below the manufacturer's fully charged, nominal specific gravity) with the average of all connected cells 1.205 (0.010 below the manufacturer's fully charged, nominal specific gravity). These values are based on manufacturer's recommendations. The minimum specific gravity value required for each cell ensures that the effects of a highly charged or newly installed cell do not mask overall degradation of the battery.

Category C defines the limits for each connected cell. These values, although reduced, provide assurance that sufficient capacity exists to perform the intended function and maintain a margin of safety. When any battery parameter is outside the Category C limits, the assurance of sufficient capacity described above no longer exists, and the battery must be declared inoperable.

The Category C limit specified for electrolyte level (above the top of the plates and not overflowing) ensures that the plates suffer no physical damage and maintain adequate electron transfer capability. The Category C Allowable Value for voltage is based on IEEE-450 (Ref. 3), which states that a cell voltage of 2.07 V or below, under float conditions and not caused by elevated temperature of the cell, indicates internal cell problems and may require cell replacement.

The Category C limit on average specific gravity ≥ 1.195, is based on manufacturer's recommendations (0.020 below the manufacturer's recommended fully charged, nominal specific gravity). In addition to that limit, it is required that the specific gravity for each connected cell must be no less than 0.020 below the average of all connected cells. This limit ensures that the effect of a highly charged or new cell does not mask overall degradation of the battery.

The footnotes to Table 3.8.6-1 that apply to specific gravity are applicable to Category A, B, and C specific

(continued)

BASES

SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

gravity. Footnote (b) of Table 3.8.6-1 requires the above mentioned correction for electrolyte temperature.

Because of specific gravity gradients that are produced during the recharging process, delays of several days may occur while waiting for the specific gravity to stabilize. A stabilized charger current is an acceptable alternative to specific gravity measurement for determining the state of charge of the designated pilot cell. This phenomenon is discussed in IEEE-450 (Ref. 3). Footnote (c) to Table 3.8.6-1 allows the float charge current to be used as an alternate to specific gravity for up to 7 days following a battery recharge. Within 7 days, each connected cell's specific gravity must be measured to confirm the state of charge. Following a minor battery recharge (such as equalizing charge that does not follow a deep discharge) specific gravity gradients are not significant, and confirming measurements may be made in less than 7 days. Footnote (d) to Table 3.8.6-1 allows alternate values recommended by the manufacturer to be used for specific gravity as appropriate (Ref. 6). For the DG and Shutdown batteries, up to 10 cells for each DG battery and up to 20 cells for each Shutdown battery can have specific gravities of 1.180 to 1.200 provided the demonstrated battery capacity at the last discharge test is ≥ 81.2 percent. For the Unit batteries, up to 12 cells for each battery can have specific gravities of 1.180 to 1.200 provided the demonstrated battery capacity at the last discharge test is ≥ 80.7 percent.

REFERENCES

1. FSAR, Chapter 6.
2. FSAR, Chapter 14.
3. IEEE Standard 450, 1987.
4. IEEE Standard 279.
5. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.
6. TVA Internal Memorandum from H.B. Bounds to G.G. Campbell dated January 27, 1989 (RIMS B22 890127002).

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.7 Distribution Systems—Operating

BASES

BACKGROUND

The onsite Class 1E AC and DC electrical power distribution system is divided into redundant and independent AC and DC electrical power distribution subsystems.

The primary AC distribution system consists of four Unit 1 and 2 4.16 kV shutdown boards each having an offsite source of power as well as a dedicated onsite diesel generator (DG) source. Each 4.16 kV shutdown board is normally connected to a unit station service transformer (USST) (1B or 2B) via a 4.16 kV unit board and a shutdown bus (1 or 2). If no offsite source is available, the onsite emergency DGs supply power to the 4.16 kV shutdown boards. A shutdown board must be fed through its normal feeder to have a qualified offsite source. The alternate feeder trips on CAS A/CAS B logic initiation.

The secondary plant distribution system includes 480 VAC shutdown boards and associated load centers, and transformers.

There are three Unit DC and five Shutdown Board 250 V DC electrical power distribution subsystems and one 125 V DC DG electrical power distribution subsystem for each DG that support the necessary power for Unit 1 and 2 ESF functions.

The list of all distribution boards is presented in Table B 3.8.7-1.

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the FSAR, Chapter 6 (Ref. 1) and Chapter 14 (Ref. 2), assume ESF systems are OPERABLE. The AC and DC electrical power distribution systems are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.5, Emergency Core

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Cooling System (ECCS) and Reactor Core Isolation Cooling (RCIC) System; and Section 3.6 Containment Systems.

The OPERABILITY of the AC and DC electrical power distribution subsystems is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining distribution systems OPERABLE during accident conditions in the event of:

a. An assumed loss of all offsite power or all onsite AC electrical power sources; and

b. A postulated worst case single failure.

The AC and DC electrical power distribution system satisfies Criterion 3 of the NRC Policy Statement (Ref. 4).

LCO

The required electrical power distribution subsystems listed in Table B 3.8.7-1 ensure the availability of AC and DC electrical power for the systems required to shut down the reactor and maintain it in a safe condition after an abnormal operational transient or a postulated DBA. The AC and DC electrical power distribution subsystems are required to be OPERABLE.

Maintaining the AC and DC electrical power distribution subsystems OPERABLE ensures that the redundancy incorporated into the design of ESF is not defeated. Therefore, a single failure within any system or within the electrical power distribution subsystems will not prevent safe shutdown of the reactor.

The AC electrical power distribution subsystems require the associated buses and electrical circuits to be energized to their proper voltages. In addition, for the D or E RMOV Boards to be OPERABLE, they must be able to auto-transfer on loss of voltage. This feature ensures that the failure of one Diesel Generator will not result in the loss of an RHR subsystem. OPERABLE DC electrical power distribution subsystems require the associated buses to be energized to their proper voltage from either the associated battery or charger.

(continued)

BASES

LCO (continued)

The Unit 2 480 V RMOV boards 2A, 2B, and 2C are not specifically listed in Table B 3.8.7-1. Should one of these boards become inoperable due to a failure not affecting the operability of a board listed in Table B 3.8.7-1, the individual loads on the board would be considered inoperable and the appropriate conditions and required actions of the LCOs governing the individual loads would be entered. If however, one or more of the 2A, 2B, or 2C RMOV boards are inoperable due to a failure also affecting the operability of 2A or 2B 480 V shutdown board; the conditions and required actions are not required to be entered since LCO 3.0.6 allows this exception, and the required actions for the inoperable 480 V shutdown board are sufficient. In addition, the alternate supply breakers to 480 V RMOV boards 2A, 2B, and 2C must be open. This prevents a single malfunction causing a failure of a redundant subsystem and a loss of safety function. If any alternate breakers for the 2A, 2B, or 2C 480 V RMOV boards are closed, the affected systems/components which are not powered from its normal source are inoperable.

The 480 V shutdown boards and diesel auxiliary boards can be placed on their alternate feeder breakers and considered OPERABLE as long as the restrictions on the associated drawings are met. In addition, tie breakers between redundant safety related DC power distribution subsystems, if they exist, must be open. This prevents any electrical malfunction in any DC power distribution subsystem from propagating to the redundant subsystem, which could cause the failure of a redundant DC subsystem and a loss of essential safety function(s). If any DC tie breakers are closed, the affected redundant DC electrical power distribution subsystems are considered inoperable. This applies to the onsite, safety related, redundant DC electrical power distribution subsystems.

The Unit DC Boards are sized to accommodate alternate loads normally supplied by the Shutdown DC Distribution Panels with no effect on OPERABILITY.

APPLICABILITY

The electrical power distribution subsystems are required to be OPERABLE in MODES 1, 2, and 3 to ensure that:

(continued)

BASES

APPLICABILITY (continued)

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of abnormal operational transients; and

b. Adequate core cooling is provided, and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

Electrical power distribution subsystem requirements for MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment are covered in the Bases for LCO 3.8.8, "Distribution Systems—Shutdown."

ACTIONS

A.1

With one Unit 1 and 2 4.16 kV shutdown board inoperable, the remaining Unit 1 and 2 4.16 kV shutdown boards are capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming a single failure. The overall reliability is reduced, however, because another single failure in the remaining three 4.16 kV shutdown boards could result in the minimum required ESF functions not being supported. Therefore, the 4.16 kV shutdown board must be restored to OPERABLE status within 5 days.

The Condition A postulated worst scenario is one 4.16 kV shutdown board without AC power (i.e., no offsite power to the 4.16 kV shutdown board and the associated DG inoperable). In this condition, ESF capabilities are not at their maximum, however, they remain adequate. The four 4.16 kV shutdown boards have ESF loads for Units 1 and 2 distributed among them so that an additional single failure will not result in a loss of safety function (e.g., one RHR pump for Unit 1 and one for Unit 2 on each board). Therefore, loss of two shutdown boards still leaves two RHR pumps per Unit. The 5 day time limit before requiring a unit shutdown in this Condition is acceptable because:

a. The remaining 4.16 kV shutdown boards have AC power available.

(continued)

BASES

ACTIONS

A.1 (continued)

b. The potential for an event in conjunction with a single failure of a redundant component in the 4.16 kV shutdown board with AC power. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

The second Completion Time for Required Action A.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition A is entered while, for instance, a Unit DC board is inoperable and subsequently returned OPERABLE, this LCO may already have been not met for up to 7 days. This situation could lead to a total duration of 12 days, since initial failure of the LCO, to restore the 4.16 kV shutdown board. At this time a Unit DC board could again become inoperable, and the 4.16 kV shutdown board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This results in establishing the "time zero" at the time this LCO was initially not met, instead of at the time Condition A was entered. The 12 day Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely.

Pursuant to LCO 3.0.6, the Distribution System Actions B, C, D, or G would not be entered even if the 4.16 kV shutdown board was inoperable, resulting in de-energization of a 480 V board. Therefore, the Required Actions of Condition A are modified by a Note to indicate that when Condition A is entered with no power source to a required 480 V board, Actions B, C, D, or G must be immediately entered. This allows Condition A to provide requirements for the loss of the 4.16 kV shutdown board without regard to whether a 480 V shutdown board is de-energized. Actions B, C, D, or G provide the appropriate restrictions for a de-energized 480 V board.

(continued)

BASES

ACTIONS (continued)

B.1

With one Unit 2 480 V shutdown board inoperable, the remaining 480 V shutdown board is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 480 V shutdown board could result in the minimum required ESF functions not being supported. Therefore, the inoperable 480 V shutdown board must be restored to OPERABLE status within 8 hours.

The Condition B postulated worst case scenario is one division (480 V shutdown board) without AC power (i.e., no offsite power to the division and the associated DG inoperable). In this condition, the unit is more vulnerable to a complete loss of AC power. It is, therefore, imperative that the unit operators' attention be focused on minimizing the potential for loss of power to the remaining division by stabilizing the unit, and on restoring power to the affected division. The 8 hour time period before requiring a unit shutdown is acceptable because:

a. There is a potential for decreased safety if the unit operator's attention is diverted from the evaluations and actions necessary to restore power to the affected division to the actions associated with taking the unit to shutdown within this time limits.

b. The potential for an event in conjunction with a single failure of a redundant component in the division with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

The second Completion Time (12 days) for Required Action B.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO. If Condition B is entered while, for instance, a 4.16 kV shutdown board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 5 days and 8 hours, since initial

(continued)

BASES

ACTIONS

B.1 (continued)

failure of the LCO, to restore the 480 V shutdown board. At this time, a 4.16 kV shutdown board could again become inoperable, and the 480 V shutdown board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition B was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

Pursuant to LCO 3.0.6, the Distribution System Action C would not be entered even if the 480 V shutdown board was inoperable, resulting in de-energization of a 480 V RMOV board. Therefore, the Required Actions of Condition B are modified by a Note to indicate that when Condition B is entered with no power source to a required 480 V RMOV board, Action C must be immediately entered. This allows Condition B to provide requirements for the loss of the 480 V shutdown board without regard to whether a 480 V RMOV board is de-energized. Action C provides the appropriate restrictions for a de-energized 480 V RMOV board.

C.1

With 480 V RMOV Board D or E inoperable the respective RHR subsystem supported by each affected board is inoperable for LPCI. The overall reliability is reduced because of the loss of one LPCI/RHR subsystem. In this condition, the remaining OPERABLE ECCS subsystems provide adequate core cooling during a LOCA. However, overall ECCS reliability is reduced, because a single failure in one of the remaining OPERABLE subsystems, concurrent with a LOCA may result in the ECCS not being able to perform its intended safety function. Therefore, the associated RHR subsystem must be declared inoperable immediately, and the actions in the appropriate system specification taken.

(continued)

BASES

ACTIONS (continued)

D.1

With one Units 1 and 2 480 V diesel auxiliary board inoperable, the remaining 480 V diesel auxiliary board is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 480 V diesel auxiliary board could result in the minimum required ESF functions not being supported. Therefore, the 480 V diesel auxiliary board must be restored to OPERABLE status within 5 days.

The Condition D postulated worst scenario is one 480 V diesel auxiliary board without AC power (i.e., no offsite power to the diesel auxiliary board). In this Condition, the Unit 1 and 2 DGs and SGT trains A and B are more vulnerable to a complete loss of AC power. These boards are normally fed from Shutdown Boards A and D. However, both of these boards have an alternate source of power coming from 4.16 kV shutdown board B. Thus, each auxiliary board has access to two DGs. Therefore, the 5 day time limit before requiring a unit shutdown in this Condition is acceptable because:

a. The remaining diesel auxiliary board has an alternate source of AC power in addition to the normal source and their dedicated DG.

b. The potential for an event in conjunction with a single failure of a redundant component in the 480 V diesel auxiliary board with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

The second Completion Time (12 days) for Required Action D.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO. If Condition D is entered while, for instance, a 4.16 kV shutdown board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration

(continued)

BASES

ACTIONS

D.1 (continued)

of 10 days, since initial failure of the LCO, to restore the 480 V DG auxiliary board. At this time, a 4.16 kV shutdown board could again become inoperable, and the 480 V DG auxiliary board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition D was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

E.1

With one Unit DC board or one Unit 1 and 2 Shutdown Board DC Distribution Panel inoperable, the remaining boards are capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. The overall reliability is reduced, however, because a single failure in the remaining boards could result in the minimum required ESF functions not being supported. Therefore, the required Unit DC board or Unit 1 and 2 Shutdown Board DC Distribution Panel must be restored to OPERABLE status within 7 days by powering it from the associated battery or charger.

Condition E represents one Unit DC board or one Unit 1 and 2 Shutdown Board DC Distribution Panel without adequate DC power, potentially with both the battery significantly degraded and the associated charger nonfunctioning. In this situation the plant is significantly more vulnerable to a partial loss of DC power. However, the three Unit DC boards have ESF loads for the three BFN units distributed among them so that redundant subsystems on each unit have separate normal and alternate power supplies. The 7 day Completion Time is partially based on this and reflects a reasonable time to assess unit status as a function of the inoperable Unit DC board or Unit 1 and 2 Shutdown Board DC Distribution Panel and, if not restored to OPERABLE status, to prepare to effect an orderly and safe shutdown.

(continued)

BASES

ACTIONS

E.1 (continued)

The second Completion Time for Required Action E.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition E is entered while, for instance, a 4.16 kV shutdown board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 12 days, since initial failure of the LCO, to restore the Unit DC board or the Shutdown Board DC Distribution Panel. At this time, a 4.16 kV shutdown board could again become inoperable, and the Unit DC board or the Shutdown Board DC Distribution Panel could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition E was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

F.1

With one division of 4.16 kV shutdown boards inoperable, the remaining division of shutdown boards is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 4.16 kV shutdown boards could result in the minimum required ESF functions not being supported. Therefore, one of the inoperable 4.16 kV shutdown board must be restored to OPERABLE status within 8 hours.

The Condition F postulated worst case scenario is one division of 4.16 kV shutdown board without AC power (i.e., no offsite power to the division and the associated DGs inoperable). In this condition, the unit is more vulnerable to a complete loss of AC power. It is, therefore, imperative that the unit operators' attention be focused on

(continued)

BASES

ACTIONS

F.1 (continued)

minimizing the potential for loss of power to the remaining division by stabilizing the unit, and on restoring power to the affected division. The 8 hour time period before requiring a unit shutdown is acceptable because:

a. There is a potential for decreased safety if the unit operator's attention is diverted from the evaluations and actions necessary to restore power to the affected division to the actions associated with taking the unit to shutdown within this time limit.

b. The potential for an event in conjunction with a single failure of a redundant component in the division with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

The second Completion Time (12 days) for Required Action F.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO. If Condition F is entered while, for instance, a 480 V DG auxiliary board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 5 days and 8 hours, since initial failure of the LCO, to restore the 480 V shutdown board. At this time, a 480 V DG auxiliary board could again become inoperable, and a 4.16 kV shutdown board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition F was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

Pursuant to LCO 3.0.6, the Distribution System Actions B, C, D, or G would not be entered even if the 4.16 kV shutdown boards were inoperable, resulting in de-energization of a

(continued)

BASES

ACTIONS

F.1 (continued)

480 V board. Therefore, the Required Actions of Condition F are modified by a Note to indicate that when Condition F is entered with no AC source to the 4.16 kV shutdown boards, Actions B, C, D, or G must be immediately entered. This allows Condition F to provide requirement for the loss of the 4.16 kV shutdown boards without regard to whether 480 V board is de-energized. Actions B, C, D, or G provide the appropriate restrictions for a de-energized 480 V board.

G.1

Required Action G.1 is intended to provide assurance that a loss of one or more required Unit 1 or 3 AC or DC boards, does not result in a complete loss of safety function of critical systems (i.e., SGT or CREVS). With one or more of the required boards inoperable, the SGT or CREVS train supported by each affected board is inoperable. Therefore, the associated SGT or CREVS subsystem must be declared inoperable immediately, and the ACTIONS in the appropriate system Specification taken.

H.1 and H.2

If the inoperable distribution subsystem cannot be restored to OPERABLE status within the associated Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

I.1

Condition I corresponds to a level of degradation in the electrical distribution system that causes a required safety function to be lost. When more than one AC or DC electrical power distribution subsystem is lost, and this results in

(continued)

BASES

ACTIONS

I.1 (continued)

the loss of a required function, the plant is in a condition outside the accident analysis. Therefore, no additional time is justified for continued operation. LCO 3.0.3 must be entered immediately to commence a controlled shutdown.

SURVEILLANCE REQUIREMENTS

SR 3.8.7.1

This Surveillance verifies that the AC and DC electrical power distribution subsystem is functioning properly, with the buses energized. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the redundant capability of the electrical power distribution subsystems, as well as other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. FSAR, Chapter 6.
2. FSAR, Chapter 14.
3. Regulatory Guide 1.93, December 1974.
4. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

Table B 3.8.7-1 (page 1 of 1)
AC and DC Electrical Power Distribution Systems

TYPE	VOLTAGE	ELECTRICAL POWER DISTRIBUTION SUBSYSTEMS
AC safety boards	4160 V	Shutdown Board A Shutdown Board B Shutdown Board C Shutdown Board D Shutdown Board 3EB or 3EC Shutdown Board 3ED
	480 V	Shutdown Board 1A Shutdown Board 2A Shutdown Board 2B Shutdown Board 3B RMOV Board 2D RMOV Board 2E SGT Board Diesel Auxiliary Board A Diesel Auxiliary Board B
DC boards	250 V	Unit DC Board 1 Unit DC Board 2 Unit DC Board 3 Shutdown Board DC Distribution Panel A Shutdown Board DC Distribution Panel B Shutdown Board DC Distribution Panel C Shutdown Board DC Distribution Panel D Shutdown Board DC Distribution Panel 3EB

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.8 Distribution Systems – Shutdown

BASES

BACKGROUND

A description of the AC and DC electrical power distribution system is provided in the Bases for LCO 3.8.7, "Distribution Systems – Operating."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident and transient analyses in the FSAR, Chapter 6 (Ref. 1) and Chapter 14 (Ref. 2), assume Engineered Safety Feature (ESF) systems are OPERABLE. The AC and DC electrical power distribution systems are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded.

The OPERABILITY of the AC and DC electrical power distribution system is consistent with the initial assumptions of the accident analyses and the requirements for the supported systems' OPERABILITY.

The OPERABILITY of the minimum AC and DC electrical power sources and associated power distribution subsystems during MODES 4 and 5, and during movement of irradiated fuel assemblies in the secondary containment ensures that:

a. The facility can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

The AC and DC electrical power distribution systems satisfy Criterion 3 of the NRC Policy Statement (Ref. 3).

(continued)

BASES (continued)

LCO

Various combinations of subsystems, equipment, and components are required OPERABLE by other LCOs, depending on the specific plant condition. Implicit in those requirements is the required OPERABILITY of necessary support required features. This LCO explicitly requires energization of the portions of the electrical distribution system necessary to support OPERABILITY of Technical Specifications required systems, equipment, and components – both specifically addressed by their own LCO, and implicitly required by the definition of OPERABILITY.

In addition, some components that may be required by Unit 2 receive power through the Unit 3 electrical power distribution subsystems (e.g., Standby Gas Treatment (SGT) System, and Control Room Emergency Ventilation System (CREVS)). Therefore, the Unit 3 AC and DC electrical power distribution subsystems needed to support the required equipment must also be OPERABLE.

For a unit in MODE 4 or 5, the AC and DC boards can be placed on their alternate feeder breakers and considered OPERABLE as long as the restrictions on the associated drawings are met.

Maintaining these portions of the distribution system energized ensures the availability of sufficient power to operate the plant in a safe manner to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents and inadvertent reactor vessel draindown).

APPLICABILITY

The AC and DC electrical power distribution subsystems required to be OPERABLE in MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel in the core in case of an inadvertent draindown of the reactor vessel;

b. Systems needed to mitigate a fuel handling accident are available;

(continued)

BASES

APPLICABILITY (continued)

c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

The AC and DC electrical power distribution subsystem requirements for MODES 1, 2, and 3 are covered in LCO 3.8.7.

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.5

Although redundant required features may require redundant divisions of electrical power distribution subsystems to be OPERABLE, one OPERABLE distribution subsystem division may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, and operations with a potential for draining the reactor vessel. By allowing the option to declare required features associated with an inoperable distribution subsystem inoperable, appropriate restrictions are implemented in accordance with the affected distribution subsystem LCO's Required Actions. In many instances this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made, (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies in the secondary containment, and any activities that could result in inadvertent draining of the reactor vessel).

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC and DC electrical power distribution subsystems and to continue this action until restoration is accomplished in order to provide the necessary power to the plant safety systems.

(continued)

BASES

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.5 (continued)

Notwithstanding performance of the above conservative Required Actions, a required residual heat removal-shutdown cooling (RHR-SDC) subsystem may be inoperable. In this case, Required Actions A.2.1 through A.2.4 do not adequately address the concerns relating to coolant circulation and heat removal. Pursuant to LCO 3.0.6, the RHR-SDC ACTIONS would not be entered. Therefore, Required Action A.2.5 is provided to direct declaring RHR-SDC inoperable, which results in taking the appropriate RHR-SDC ACTIONS.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required distribution subsystems should be completed as quickly as possible in order to minimize the time the plant safety systems may be without power.

SURVEILLANCE REQUIREMENTS

SR 3.8.8.1

This Surveillance verifies that the AC and DC electrical power distribution subsystem is functioning properly, with the buses energized. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the redundant capability of the electrical power distribution subsystems, as well as other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. FSAR, Chapter 6.

2. FSAR, Chapter 14.

3. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

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SECTION 3.8
LIST OF REVISED PAGES

UNIT 3 ITS BASES SECTIONS

Replaced pages B 3.8-1 through B 3.8-78 *R1 with pages B 3.8-1 through B 3.8-83 *R2

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources – Operating

BASES

BACKGROUND

The unit Class 1E AC Electrical Power Distribution System AC sources consist of the offsite power sources (preferred power sources, normal and alternates), and the onsite standby power sources (Unit 1 and 2 diesel generators (DGs) A, B, C, and D, and Unit 3 DGs 3A, 3B, 3C, and 3D). As required by 10 CFR 50, Appendix A, GDC 17 (Ref. 1), the design of the AC electrical power system provides independence and redundancy to ensure an available source of power to the Engineered Safety Feature (ESF) systems.

The Class 1E AC distribution system is divided into redundant divisions, so loss of any one division does not prevent the minimum safety functions from being performed. Each of four 4.16 kV shutdown boards has two offsite power supplies available and a single DG.

An offsite circuit consists of all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network to the 3EA and 3EB (Division I) or 3EC and 3ED (Division II) 4.16 kV shutdown boards. Offsite power is supplied to the 161 kV and 500 kV switchyards from the transmission network by seven transmission lines (two 161 kV lines and five 500 kV lines; Trinity I and II 500 kV lines are not included in the 500 kV line totals). Three basic circuits from the transmission network to the safety related Division I (3EA and 3EB 4.16 kV shutdown boards) and Division II (3EC and 3ED 4.16 kV shutdown boards), are as follows:

1. From the 500 kV switchyard, through unit station service transformer (USST) 3B to 4.16 kV unit board 3A and/or 3B. Each unit board feeds two of the Unit 3 4.16 kV shutdown boards (3EA and 3EB or 3EC and 3ED);

(continued)

BASES

BACKGROUND (continued)

2. From the Trinity 161 kV transmission system, through common station service transformer (CSST) A or B to start bus 1A or 1B, then to a 4.16 kV unit board. That unit board feeds two of the Unit 3 4.16 kV shutdown boards (3EA and 3EB or 3EC and 3ED); and

3. From the Athens 161 kV transmission system, through CSST A or B to start bus 1A or 1B, and then to a 4.16 kV unit board. That unit board feeds two of the Unit 3 4.16 kV shutdown boards (3EA and 3EB or 3EC and 3ED).

4.16 kV unit board 3A normally feeds 4.16 kV shutdown boards 3EA and 3EB and 4.16 kV Unit board 3B normally feeds 4.16 kV shutdown boards 3EC and 3ED. The 4.16 kV shutdown boards are normally aligned to power associated divisional 480 V safety equipment (two divisions per unit). This results in one DG powering only one 480 V division. A detailed description of the offsite power network and circuits to the onsite Class 1E ESF buses is found in the FSAR, Chapter 8 (Ref. 2).

USST 3B, and the CSSTs are sized to accommodate all required ESF loads on receipt of an accident signal on Unit 3.

The onsite standby power source for 4.16 kV shutdown boards 3EA, 3EB, 3EC, and 3ED consists of four Unit 3 DGs, each dedicated to a shutdown board. Each DG starts automatically on a loss of coolant accident (LOCA) signal (i.e., low reactor water level signal or high drywell pressure signal), or on its respective 4.16 kV shutdown board degraded voltage or undervoltage signal. Common Accident Signal Logic (CAS A/CAS B) actuates on high drywell pressure with low reactor

(continued)

BASES

BACKGROUND (continued)

pressure, or low water level. After the DG has started, it automatically ties to its respective bus after offsite power is tripped as a consequence of 4.16 kV shutdown board undervoltage or degraded voltage, independent of or coincident with a LOCA signal. The DGs also start and operate in the standby mode without tying to the 4.16 kV shutdown board on a LOCA signal alone. Following the tripof offsite power, an under or degraded voltage activated load shed logic strips all loads from the 4.16 kV Shutdown Board except transformer feeds. When the DG is tied to the 4.16 kV shutdown board, large loads are then sequentially connected to its respective 4.16 kV shutdown board by individual pump timers. The individual pump timers control the permissive and starting signals to motor breakers to prevent overloading the DG.

In the event of a loss of offsite power, the ESF electrical loads are automatically connected to the DGs in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a LOCA.

Certain required plant loads are returned to service in a predetermined sequence in order to prevent overloading of the DGs in the process. Within 40 seconds after the initiating signal (DG breaker closure with accident signal) is received, all automatic and permanently connected loads needed to recover the unit or maintain it in a safe condition are returned to service.

Ratings for the DGs satisfy the intent of Safety Guide 9 (Ref. 3). The DGs have the following ratings (Non-derated for intake air temperature ≤ 90°F/Derated for either intake air temperature >90°F or a combination of intake air temperature >90°F and engine cooling water outlet temperature >190°F) (Reference 12):

a. 2600/2550 kW — continuous,

b. 2860/2800 kW — 0 to 2 hours (Short Time Steady State),

(continued)

BASES

BACKGROUND (continued)

c. 2850/2815 kW – 0 to 3 minutes (Cold Engine Instantaneous),

d. 3050/3025 kW – >3 minutes (Hot Engine Instantaneous).

APPLICABLE SAFETY ANALYSES

The initial conditions of DBA and transient analyses in the FSAR, Chapter 6 (Ref. 4) and Chapter 14 (Ref. 5), assume ESF systems are OPERABLE. The AC electrical power sources are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

The OPERABILITY of the AC electrical power sources is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining the onsite or offsite AC sources OPERABLE during accident conditions in the event of:

a. An assumed loss of all offsite power or all onsite AC power sources; and

b. A postulated worst case single failure.

AC sources satisfy Criterion 3 of the NRC Policy Statement (Ref. 15).

LCO

Two qualified circuits between the offsite transmission network and the onsite Class 1E Distribution System, four separate and independent Unit 3 DGs (3A, 3B, 3C, and 3D), and the Unit 1 and 2 DG(s) needed to support required Standby Gas Treatment (SGT) trains and Control Room Emergency Ventilation System (CREVS) trains are required to be OPERABLE. Two divisions of 480 V load shed logic and two divisions of CAS logic are required to be OPERABLE to support Unit 3 DG OPERABILITY and post-accident loads. In the case of the Unit 1 and 2 DG(s), during MODES 1, 2, and

(continued)

BASES

LCO (continued)

3, Unit 1 and 2 Technical Specifications will require the OPERABILITY of all Unit 1 and 2 DGs and provide appropriate compensatory actions for inoperable Unit 1 and 2 DG(s). However, when Unit 1 or 2 is not in MODE 1, 2, or 3, DG(s) necessary to support the operation of Unit 3 may not be required. Therefore, the Unit 3 LCO for AC Sources requires the necessary DG(s) to support SGT and CREVS only when Unit 1 or 2 is not in MODES 1, 2, or 3. These requirements ensure availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an abnormal operational transient or a postulated DBA.

Qualified offsite circuits are those that are described in the FSAR, and are part of the licensing basis for the unit. Each offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the 4.16 kV shutdown boards. An offsite circuit is considered OPERABLE if the offsite source is available to 3EA and 3EB or 3EC and 3ED 4.16 kV shutdown boards.

Each offsite circuit consists of incoming breakers to each 4.16 kV shutdown board from unit boards, which are fed from transformers (via start buses as appropriate). Specific circuits and limitations for considering the offsite circuit qualified are described below. Qualified circuits are one or more of the following:

1. From the 500 kV switchyard (with no credit for the two 500 kV Trinity lines), through unit station service transformer (USST) 3B to 4.16 kV unit board 3A and/or 3B. Each unit board feeds two of the Unit 3 4.16 kV shutdown boards (3EA and 3EB or 3EC and 3ED).

2. From the Trinity 161 kV transmission system, through common station service transformer (CSST) A or B to start bus 1A or 1B, then to a 4.16 kV unit board. That unit board feeds two of the Unit 3 4.16 kV shutdown boards (3EA and 3EB or 3EC and 3ED).

(continued)

BASES

LCO (continued)

3. From the Athens 161 kV transmission system, through CSST A or B to start bus 1A or 1B, and then to a 4.16 kV unit board. That unit board feeds two of the Unit 3 4.16 kV shutdown boards (3EA and 3EB or 3EC and 3ED).

For the Athens 161 kV offsite power to be considered as one of the qualified offsite power supplies, the following restrictions must also be met:

a. The 161 kV capacitor bank must be available for the Athens 161 kV line.

b. Credit for offsite power from the Athens 161 kV line may be taken by only one unit at one time. However, more than one unit may be aligned to the Athens line without invalidating the offsite power supply for the unit claiming it.

For the Trinity 161 kV offsite power to be considered as one of the qualified offsite power supplies, the following restrictions must also be met:

a. For the Trinity 161 kV line to be considered as one of the qualified offsite power supplies by only one unit, either the 161 kV capacitor bank must be available or the Trinity Inter-Tie transformer must be in service with 161 kV line nominal voltage $\geq$ 165 kV.

b. The Trinity 161 kV line may be considered as one of the qualified offsite power supplies by two separate units at any one time, provided that both CSST A and B are available and either the 161 kV capacitor bank is available or the Athens line and Trinity Inter-Tie transformer are in service with 161 kV line nominal voltage $\geq$ 165 kV.

(continued)

BASES

LCO (continued)

c. The Trinity 161 kV line may be considered as one of the qualified offsite power supplies by three separate units at any one time, provided that both CSST A and B are available and either the 161 kV capacitor bank is available or the Athens line and Trinity Inter-Tie transformer are in service with 161 kV line nominal voltage $\geq$ 165 kV.

The only requirements for the position of the 161 kV bus 1 and bus 2 cross-tie breakers (924 and 928) are those implied by the restrictions on claiming Athens and Trinity as offsite power supplies.

Each DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective 4.16 kV shutdown board on detection of bus undervoltage. This sequence must be accomplished within 10 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and must continue to operate until offsite power can be restored to the 4.16 kV shutdown board. The Unit 3 DGs are provided with a 480 V load shed logic system with two redundant divisions. The common accident signal logic system, with two redundant divisions, is common to the Unit 1, 2, and 3 DGs. These logic systems must be OPERABLE to ensure the DGs will perform and alignments will occur as assumed during a DBA.

Proper sequencing of loads, including tripping of nonessential loads, is a required function for DG OPERABILITY.

The AC sources must be separate and independent (to the extent possible) of other AC sources. For the DGs, the separation and independence are complete. For the offsite AC sources, the separation and independence are to the extent practical. A qualified offsite circuit may be connected to more than one division of 4.16 kV shutdown boards and not violate separation criteria. A circuit that is not connected to the Division I or Division II 4.16 kV

(continued)

BASES

LCO (continued)

shutdown boards is required to have the capability to be connected to at least one division of 4.16 kV shutdown boards to be considered OPERABLE.

The inability to supply qualified offsite power to an individual 4.16 kV shutdown board from a 4.16 kV shutdown bus constitutes the failure of only one offsite circuit as long as offsite power is available to ther other division's shutdown boards. Thus, if one 4.16 kV shutdown board or complete division of shutdown boards (i.e., 3EA and 3EB or 3EC and 3ED) does not have a qualified offsite circuit available, then only one offsite circuit would be inoperable. If one or more shutdown boards in each division (i.e., 3EA or 3EB and 3EC or 3ED) or all four shutdown boards do not have a qualified offsite circuit available, then both (2) offsite circuits would be inoperable.

APPLICABILITY

The AC sources are required to be OPERABLE with Unit 3 in MODES 1, 2, and 3 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of abnormal operational transients; and

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

The AC power requirements for Unit 3 in MODES 4 and 5 are covered in LCO 3.8.2, "AC Sources — Shutdown."

ACTIONS

A.1

To ensure a highly reliable power source remains with one required offsite circuit inoperable, it is necessary to verify the availability of the remaining required offsite circuit on a more frequent basis. This action ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and

(continued)

BASES

ACTIONS

A.1 (continued)

availability of offsite AC electrical power. If a second required circuit is not available, the second offsite circuit is inoperable, and Condition E, for two offsite circuits inoperable, is entered.

A.2

Required Action A.2, which only applies if one or both 4.16 kV shutdown boards in a division cannot be powered from a qualified offsite source, is intended to provide assurance that an event with a coincident single failure of a DG does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related divisions (i.e., single division systems are not included). Redundant required features failures consist of inoperable features associated with a division redundant to the division that has no offsite power. For example, if no qualified offsite power source was available to 4.16 kV shutdown board 3EA and RHR pump 3D was inoperable for maintenance, then RHR pump 3A would have to be declared inoperable.

The Completion Time for Required Action A.2 is intended to allow time for the operator to evaluate and repair any discovered inoperabilities. This Completion Time also allows an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

a. The 4.16 kV shutdown board has no offsite power supplying its loads or no qualified offsite power available; and

b. A required feature on, or supported by, the opposite or other division's 4.16 kV shutdown board is inoperable.

If, at any time during the existence of this Condition (one required offsite circuit inoperable) a required feature in a redundant division subsequently becomes inoperable, this Completion Time would begin to be tracked.

(continued)

BASES

ACTIONS

A.2 (continued)

Discovering no offsite power to one or both 4.16 kV shutdown boards of a division coincident with one or more inoperable required support or supported features, or both, that are associated with another division's 4.16 kV shutdown board that has offsite power, results in starting the Completion Time for the Required Action. Twenty-four hours is acceptable because it minimizes risk while allowing time for restoration before the unit is subjected to transients associated with shutdown.

The remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection may have been lost for the required feature's function; however, function is not lost. The 24 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 24 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

A.3

Based on the diversity of AC electrical power sources, and the remaining redundancy and reliability, operation may continue in Condition A for a period that should not exceed 7 days. With one required offsite circuit inoperable, the reliability of the offsite system is degraded, and the potential for a loss of offsite power is increased, with attendant potential for a challenge to the plant safety systems. In this condition, however, the remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to the onsite Class 1E Distribution System.

The 7 day Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and the low probability of a DBA occurring during this period.

(continued)

BASES

ACTIONS

A.3 (continued)

The second Completion Time for Required Action A.3 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition A is entered while, for instance, a DG is inoperable, and that DG is subsequently returned OPERABLE, the LCO may already have been not met for up to 7 days. This situation could lead to a total of 14 days, since initial failure to meet the LCO, to restore the offsite circuit. At this time, a DG could again become inoperable, the circuit restored OPERABLE, and an additional 7 days (for a total of 21 days) allowed prior to complete restoration of the LCO. The 14 day Completion Time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "AND" connector between the 7 days and 14 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

As in Required Action A.2, the Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This exception results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time that Condition A was entered.

B.1

To ensure a highly reliable power source remains with one Unit 3 DG inoperable, it is necessary to verify the availability of the required offsite circuits on a more frequent basis. This action ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. However, if an offsite circuit is not available, the offsite circuit is inoperable, and additional Conditions must then be entered.

(continued)

BASES

ACTIONS (continued)

B.2

Required Action B.2 is intended to provide assurance that a loss of offsite power, during the period that a Unit 3 DG is inoperable, does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related divisions (i.e., single division systems are not included). Redundant required features failures consist of inoperable features associated with a division redundant to the division that has an inoperable Unit 3 DG. For example, if DG 3A was inoperable and RHR pump 3D was inoperable for maintenance, then RHR pump 3A would have to be declared inoperable.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock."

In this Required Action the Completion Time only begins on discovery that both:

a. An inoperable Unit 3 DG exists; and

b. A required feature on, or supported by, the opposite or other division's 4.16 kV shutdown board is inoperable.

If, at any time during the existence of this Condition (one Unit 3 DG inoperable), a required feature in a redundant division subsequently becomes inoperable, this Completion Time begins to be tracked.

Discovering one Unit 3 DG inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the other division's OPERABLE DG[s] results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

(continued)

BASES

ACTIONS

B.2 (continued)

The remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and low probability of a DBA occurring during this period.

B.3.1 and B.3.2

Required Action B.3.1 provides an allowance to avoid unnecessary testing of OPERABLE DGs. If it can be determined that the cause of the inoperable DG does not exist on the OPERABLE Unit 3 DGs, SR 3.8.1.1 does not have to be performed. If the cause of inoperability exists on other Unit 3 DG(s), they are declared inoperable upon discovery, and Condition H of LCO 3.8.1 is entered. Once the failure is repaired, and the common cause failure no longer exists, Required Action B.3.1 is satisfied. If the cause of the initial inoperable DG cannot be confirmed not to exist on the remaining Unit 3 DG(s), performance of SR 3.8.1.1 suffices to provide assurance of continued OPERABILITY of those DGs.

In the event the inoperable DG is restored to OPERABLE status prior to completing either B.3.1 or B.3.2, the plant corrective action program will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in Condition B.

According to Generic Letter 84-15 (Ref. 7), 24 hours is a reasonable time to confirm that the OPERABLE DGs are not affected by the same problem as the inoperable DG.

(continued)

BASES

ACTIONS (continued)

B.4

Based on the diversity of AC electrical power sources, and the remaining redundancy and reliability, operation may continue in Condition B for a period that should not exceed 7 days. In Condition B, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The 7 day Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and low probability of a DBA occurring during this period.

The second Completion Time for Required Action B.4 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition B is entered while, for instance, an offsite circuit is inoperable and that circuit is subsequently restored OPERABLE, the LCO may already have been not met for up to 7 days. This situation could lead to a total of 14 days, since initial failure to meet the LCO, to restore the DG. At this time, an offsite circuit could again become inoperable, the DG restored OPERABLE, and an additional 7 days (for a total of 21 days) allowed prior to complete restoration of the LCO. The 14 day Completion Time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "<u>AND</u>" connector between the 7 day and 14 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive must be met.

As in Required Action B.2, the Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This exception results in establishing the "time zero" at the time that the LCO was initially not met, instead of the time that Condition B was entered.

(continued)

BASES

ACTIONS (continued)

C.1

With one division of Unit 3 480 V load shed logic inoperable, the reliability of the DGs is degraded, and the potential for the loss of the affected Unit 3 DG is increased with attendant potential challenge to plant safety systems. In this condition, however, the remaining division of Unit 3 480 V load shed logic is capable of performing its intended function of limiting the load on the affected Unit 3 DG.

The 7 day Completion Time takes into account the capability of the remaining division of Unit 3 480 V load shed logic, reasonable time for repairs, and the low probability of a DBA occurring during this period.

D.1

With one division of common accident signal logic inoperable, the plant electrical system response is degraded, and the potential for inappropriate electrical system alignment is increased with attendant potential challenge to plant safety systems. In this condition, however, the remaining division of common accident signal logic is capable of performing its intended function of providing a start signal to the Unit 3 DGs during a DBA.

The 7 day Completion Time takes into account the capability of the remaining division of common accident signal logic, reasonable time for repairs, and the low probability of a DBA occurring during this period.

(continued)

BASES

ACTIONS (continued)

E.1 and E.2

Required Action E.1 addresses actions to be taken in the event of inoperability of redundant required features concurrent with inoperability of two required offsite circuits. Required Action E.1 reduces the vulnerability to a loss of function. The Completion Time for taking these actions is reduced to 12 hours from that allowed with one or both 4.16 kV shutdown boards in a division without offsite power (Required Action A.2). The rationale for the reduction to 12 hours is that Regulatory Guide 1.93 (Ref. 6) allows a Completion Time of 24 hours for two required offsite circuits inoperable, based upon the assumption that two complete safety divisions are OPERABLE. When a concurrent redundant required feature failure exists, this assumption is not the case, and a shorter Completion Time of 12 hours is appropriate. These features are designed with redundant safety related divisions, (i.e., single division systems are not included in the list). Redundant required features failures consist of any of these features that are inoperable because any inoperability is on a division redundant to a division with inoperable offsite circuits.

The Completion Time for Required Action E.1 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. All required offsite circuits are inoperable; and

b. A required feature is inoperable.

If, at any time during the existence of this Condition (two offsite circuits inoperable), a required feature subsequently becomes inoperable, this Completion Time begins to be tracked.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition E for a period that should not exceed 24 hours. This level of degradation means that the offsite electrical power system does not have the capability to effect a safe shutdown and to mitigate the effects of an

(continued)

BASES

ACTIONS

E.1 and E.2 (continued)

accident; however, the onsite AC sources have not been degraded. This level of degradation generally corresponds to a total loss of accessible offsite power sources.

Because of the normally high availability of the offsite sources, this level of degradation may appear to be more severe than other combinations of two AC sources inoperable that involve one or more DGs inoperable. However, two factors tend to decrease the severity of this degradation level:

a. The configuration of the redundant AC electrical power system that remains available is not susceptible to a single bus or switching failure; and

b. The time required to detect and restore an unavailable offsite power source is generally much less than that required to detect and restore an unavailable onsite AC source.

With both of the required offsite circuits inoperable, sufficient onsite AC sources are available to maintain the unit in a safe shutdown condition in the event of a DBA or transient. In fact, a simultaneous loss of offsite AC sources, a LOCA, and a worst case single failure were postulated as a part of the design basis in the safety analysis. Thus, the 24 hour Completion Time provides a period of time to effect restoration of one of the offsite circuits commensurate with the importance of maintaining an AC electrical power system capable of meeting its design criteria.

According to Regulatory Guide 1.93 (Ref. 6), with the available offsite AC sources two less than required by the LCO, operation may continue for 24 hours. If two offsite sources are restored within 24 hours, unrestricted operation may continue. If only one offsite source is restored within 24 hours, power operation continues in accordance with Condition A.

(continued)

BASES

ACTIONS (continued)

F.1 and F.2

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it were inoperable, resulting in de-energization. Therefore, the Required Actions of Condition F are modified by a Note to indicate that when Condition F is entered with no AC source to any 4.16 kV shutdown board, ACTIONS for LCO 3.8.7, "Distribution Systems – Operating," must be immediately entered. This allows Condition F to provide requirements for the loss of the offsite circuit and one DG without regard to whether a 4.16 kV shutdown board is de-energized. LCO 3.8.7 provides the appropriate restrictions for a de-energized 4.16 kV shutdown board.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition F for a period that should not exceed 12 hours. In Condition F, individual redundancy is lost in both the offsite electrical power system and the onsite AC electrical power system. Since power system redundancy is provided by two diverse sources of power, however, the reliability of the power systems in this Condition may appear higher than that in Condition E (loss of both required offsite circuits). This difference in reliability is offset by the susceptibility of this power system configuration to a single bus or switching failure. The 12 hour Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and the low probability of a DBA occurring during this period.

A Note has been added to Condition F to clarify that the Condition is only applicable when more than one shutdown board is affected. The situation where only one shutdown board is affected is covered by Condition G.

G.1

Condition G addresses the situation where both one required offsite circuit and one DG are inoperable and affect only one 4.16 kV shutdown board. The Note clarifies the applicability. The Required Action is to declare the affected 4.16 kV shutdown board inoperable immediately. This requires entry into the applicable Conditions and

(continued)

BASES

ACTIONS

G.1 (continued)

Required Actions of LCO 3.8.7, "Distribution Systems - Operating," which provides the appropriate restrictions for the affected 4.16 kV shutdown board. LCO 3.8.1 Conditions and Required Actions continue to apply until the required offsite circuit and DG are made OPERABLE.

H.1

With two or more DGs inoperable, an assumed loss of offsite electrical power may result in insufficient standby AC sources available to power the minimum required ESF functions. Since the offsite electrical power system may be the only source of AC power for the majority of ESF equipment at this level of degradation, the risk associated with continued operation for a very short time could be less than that associated with an immediate controlled shutdown. (The immediate shutdown could cause grid instability, which could result in a total loss of AC power.) Since any inadvertent unit generator trip could also result in a total loss of offsite AC power, however, the time allowed for continued operation is severely restricted. The intent here is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

According to Regulatory Guide 1.93 (Ref. 6), with all DGs inoperable, operation may continue for a period that should not exceed 2 hours.

I.1 and I.2

If the inoperable AC electrical power sources cannot be restored to OPERABLE status within the associated Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

(continued)

BASES

ACTIONS (continued)

J.1

Condition J corresponds to a level of degradation in which all redundancy in the AC electrical power supplies has been lost. At this severely degraded level, any further losses in the AC electrical power system will cause a loss of function. Therefore, no additional time is justified for continued operation. The unit is required by LCO 3.0.3 to commence a controlled shutdown.

K.1

Required Action K.1, where Unit 1 or 2 is not in MODE 1, 2, or 3, is intended to provide assurance that a loss of offsite power, during the period that a required Unit 1 and 2 DG is inoperable, does not result in a complete loss of safety function of critical systems (i.e., SGT or CREVS). These features consist of SGT or CREVS trains redundant to trains supported by the inoperable Unit 1 and 2 DG.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

a. An inoperable required Unit 1 and 2 DG exists; and

b. An SGT or CREVS train supported by another DG, is inoperable.

If, at any time during the existence of this Condition (a required Unit 1 and 2 DG inoperable), a required SGT or CREVS train subsequently becomes inoperable, this Completion Time begins to be tracked.

Discovering a required Unit 1 and 2 DG inoperable coincident with an inoperable SGT or CREVS train, or both, that are associated with the OPERABLE DGs results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for

(continued)

BASES

ACTIONS

K.1 (continued)

restoration before subjecting the unit to transients associated with shutdown.

The remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and low probability of a DBA occurring during this period.

K.2

In Condition K, where Unit 1 or 2 is in MODES 4, 5, or defueled, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System to support operation of Unit 3. The 30 day Completion Time is commensurate with the importance of the affected system considering the low probability of a DBA in these conditions and the availability of the remaining power sources. If the inoperable Unit 1 and 2 DG cannot be restored to OPERABLE status within the associated Completion Time, the associated SGT or CREVS subsystem must be declared inoperable, and the ACTIONS in the appropriate system Specification taken.

SURVEILLANCE REQUIREMENTS

The AC sources are designed to permit inspection and testing of all important areas and features, especially those that have a standby function. Periodic component tests are supplemented by extensive functional tests (under simulated accident conditions). The SRs for demonstrating the OPERABILITY of the DGs meet the intent of Safety Guide 9 (Ref. 3), as addressed by References 13 and 14.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

Where the SRs discussed herein specify voltage and frequency tolerances, the following summary is applicable. The minimum steady state output voltage of 3740 V is 90% of the nominal 4160 V output voltage. This value, which is specified in ANSI C84.1 (Ref. 9), allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage is specified as 90% or 3600 V. It also allows for voltage drops to motors and other equipment down through the 120 V level where minimum operating voltage is also usually specified as 90% of name plate rating. The specified maximum steady state output voltage of 4580 V is equal to the maximum operating voltage specified for 4000 V motors. It ensures that for a lightly loaded distribution system, the voltage at the terminals of 4000 V motors is no more than the maximum rated operating voltages. The specified minimum and maximum frequencies of the DG are 58.8 Hz and 61.2 Hz, respectively. These values are equal to ± 2% of the 60 Hz nominal frequency and are derived from the recommendations found in Safety Guide 9 (Ref. 3).

SR 3.8.1.1 and SR 3.8.1.4

These SRs help to ensure the availability of the standby electrical power supply to mitigate DBAs and transients and maintain the unit in a safe shutdown condition.

For the purposes of this testing, the DGs are started from standby conditions. Standby conditions for a DG mean that the diesel engine coolant and oil are being continuously circulated and temperature is being maintained consistent with manufacturer recommendations.

In order to reduce stress and wear on diesel engines, a modified start may be utilized for SR 3.8.1.1 in which the starting speed of DGs is limited, engine warmup is allowed at this lower speed, and the DGs are gradually accelerated to synchronous speed prior to loading. These start procedures are the intent of the Note.

SR 3.8.1.4 requires that, at a 184 day Frequency, the DG starts from standby conditions and achieves required voltage and frequency within 10 seconds. The 10 second start requirement supports the assumptions in the design basis LOCA analysis of FSAR, Section 14.6.3 (Ref. 10). The

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.1 and SR 3.8.1.4 (continued)

10 second start requirement is not applicable to SR 3.8.1.1 (see the Note for SR 3.8.1.1), when a modified start procedure as described above is used. If a modified start is not used, the 10 second start requirement of SR 3.8.1.4 applies.

Since SR 3.8.1.4 does require a 10 second start, it is more restrictive than SR 3.8.1.1, and it may be performed in lieu of SR 3.8.1.1. This procedure is the intent of the Note for SR 3.8.1.1.

The 31 day Frequency for SR 3.8.1.1 is consistent with Safety Guide 9 (Ref. 3). The 184 day Frequency for SR 3.8.1.4 is a reduction in cold testing consistent with Generic Letter 84-15 (Ref. 7). These Frequencies provide adequate assurance of DG OPERABILITY, while minimizing degradation resulting from testing.

SR 3.8.1.2

This Surveillance verifies that the DGs are capable of synchronizing and accepting greater than or equal to the continuous rating. A minimum run time of 60 minutes is required to stabilize engine temperatures, while minimizing the time that the DG is connected to the offsite source.

Although no power factor requirements are established by this SR, the DG is normally operated at a power factor between 0.8 lagging and 1.0.

The 31 day Frequency for this Surveillance is consistent with Safety Guide 9 (Ref. 3).

Note 1 modifies this Surveillance to indicate that diesel engine runs for this Surveillance may include gradual loading, as recommended by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized.

Note 2 modifies this Surveillance by stating that momentary transients because of changing bus loads do not invalidate

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.2 (continued)

this test. Similarly, momentary power factor transients above the limit do not invalidate the test.

Note 3 indicates that this Surveillance should be conducted on only one DG at a time in order to avoid common cause failures that might result from offsite circuit or grid perturbations.

Note 4 stipulates a prerequisite requirement for performance of this SR. A successful DG start must precede this test to credit satisfactory performance. Additionally, prior to loading, an engine-idle warmup period is allowed.

SR 3.8.1.3

This Surveillance demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated 7-day storage tank to its associated engine fuel oil tank. It is required to support continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oil piping system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer systems are OPERABLE.

The design of fuel transfer systems is such that pumps that transfer the fuel oil operate automatically in order to maintain an adequate volume of fuel oil in the engine tank during or following DG operation. A 31 day Frequency is appropriate, since proper operation of fuel transfer systems is an inherent part of DG OPERABILITY.

SR 3.8.1.4

See SR 3.8.1.1.

SR 3.8.1.5

Each DG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by

(continued)

BASES

SURVEILLANCE REQUIREMENTS

3.8.1.5 (continued)

the loss of a large load could cause diesel engine overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. The largest single load for each DG is a residual heat removal pump (2000 hp). This Surveillance may be accomplished by:

a. Tripping the DG output breaker with the DG carrying greater than or equal to its associated single largest post-accident load while paralleled to offsite power, or while solely supplying the board; or

b. Tripping its associated single largest post-accident load with the DG solely supplying the board.

As required by IEEE-308 (Ref. 11), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint, or 15% above synchronous speed, whichever is lower. This represents 66.75 Hz, equivalent to 75% of the difference between nominal speed and the overspeed trip setpoint.

The voltage and frequency tolerances specified in this SR are derived from Safety Guide 9 (Ref. 3) recommendations for response during load sequence intervals. The voltage and frequency specified are consistent with the design range of the equipment powered by the DG. SR 3.8.1.5.a corresponds to the maximum frequency excursion, while SR 3.8.1.5.b is a steady state voltage value to which the system must recover following load rejection. The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 8).

This SR is modified by a Note. In order to ensure that the DG is tested under load conditions that are as close to design basis conditions as possible, the Note requires that, if synchronized to offsite power, testing must be performed using a power factor ≤ 0.9. This power factor is chosen to

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.5 (continued)

be representative of the actual design basis inductive loading that the DG would experience.

SR 3.8.1.6

This Surveillance demonstrates that the DG automatically starts from the design basis actuation signal (LOCA signal). This test will also verify the start of the Unit 1 and 2 DGs aligned to the SGT and CREV Systems on an accident signal from Unit 3. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

SR 3.8.1.7

Demonstration once per 18 months that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours — 22 hours of which is at a load equivalent to the continuous rating of the DG, and 2 hours of which is at a load equivalent to the two-hour rating, which is greater than the maximum expected post-accident loading on the DG, confirms the DG capability for long term operation. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for gradual loading, discussed in SR 3.8.1.2, are applicable to this SR.

In order to ensure that the DG is tested under load conditions that are as close to design conditions as possible, testing must be performed using a power factor ≤ 0.9. This power factor is chosen to be representative of the actual design basis inductive loading that the DG could experience. A load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 8), paragraph 2.a.(3).

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.7 (continued)

This Surveillance has been modified by a Note that states that momentary transients due to changing bus loads do not invalidate this test. Similarly, momentary power factor transients above the limit do not invalidate the test.

SR 3.8.1.8

Under accident conditions (and loss of offsite power) loads are sequentially connected to the shutdown boards by automatic individual pump timers. The individual pump timers control the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. This SR is demonstrated by performance of SR 3.3.5.1.5 for the Core Spray and LPCI pump timers, SR 3.7.2.3 for the EECW pump timers, and SR 3.8.1.9.b for the 480 V load shed logic timers. These calibration tolerances ensure that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Reference 2 provides a summary of the automatic loading of ESF shutdown boards.

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 8), paragraph 2.a.(2).

SR 3.8.1.9

In the event of a DBA coincident with a loss of offsite power, the DGs are required to supply the necessary power to ESF systems so that the fuel, RCS, and containment design limits are not exceeded.

This Surveillance demonstrates the as designed operation of the standby power sources during a loss of offsite power actuation test signal in conjunction with an ECCS initiation signal. This test verifies all actions encountered from the loss of offsite power in conjunction with an ECCS initiation signal, including shedding of the nonessential loads and energization of the 4.16 kV shutdown boards and respective loads from the DG. It further demonstrates the capability

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.9 (continued)

of the DG to automatically achieve the required voltage and frequency within the specified time.

The requirement to verify the connection and power supply of permanent and auto-connected loads is intended to satisfactorily show the relationship of these loads to the DG loading logic. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, Emergency Core Cooling Systems (ECCS) injection valves are not desired to be stroked open, some systems are not capable of being operated at full flow, and RHR systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of the connection and loading of these loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of 18 months takes into consideration plant conditions required to perform the Surveillance and is intended to be consistent with an expected fuel cycle length of 18 months.

SR 3.8.1.10

This Surveillance is provided to direct that the appropriate Surveillances for the required Unit 1 and 2 DGs are governed by the Unit 1 and 2 Technical Specifications. Performance of the applicable Unit 1 and 2 Surveillances will satisfy any Unit 1 and 2 requirements, as well as this Unit 3 Surveillance requirement. The Frequency required by the applicable Unit 1 and 2 SR also governs performance of that SR for both Units.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.

2. FSAR, Chapter 8.

(continued)

BASES

REFERENCES (continued)

3. Safety Guide 9.
4. FSAR, Chapter 6.
5. FSAR, Chapter 14.
6. Regulatory Guide 1.93.
7. Generic Letter 84-15.
8. Regulatory Guide 1.108.
9. ANSI C84.1, 1982.
10. FSAR, Section 14.6.3.
11. IEEE Standard 308.
12. FSAR, Section 8.5, Table 8.5-6.
13. FSAR, Section 8.5.2.
14. TVA Design Criteria BFN-50-7082.
15. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.2 AC Sources — Shutdown

BASES

BACKGROUND

A description of the AC sources is provided in the Bases for LCO 3.8.1, "AC Sources — Operating."

APPLICABLE SAFETY ANALYSES

The OPERABILITY of the minimum AC sources during MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment ensures that:

a. The facility can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate AC electrical power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

In general, when the unit is shut down the Technical Specifications requirements ensure that the unit has the capability to mitigate the consequences of postulated accidents. However, assuming a single failure and concurrent loss of all offsite or loss of all onsite power is not required. The rationale for this is based on the fact that many Design Basis Accidents (DBAs) that are analyzed in MODES 1, 2, and 3 have no specific analyses in MODES 4 and 5. Worst case bounding events are deemed not credible in MODES 4 and 5 because the energy contained within the reactor pressure boundary, reactor coolant temperature and pressure, and corresponding stresses result in the probabilities of occurrences significantly reduced or eliminated, and minimal consequences. These deviations from DBA analysis assumptions and design requirements during shutdown conditions are allowed by the LCO for required systems.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

During MODES 1, 2, and 3, various deviations from the analysis assumptions and design requirements are allowed within the ACTIONS. This allowance is in recognition that certain testing and maintenance activities must be conducted, provided an acceptable level of risk is not exceeded. During MODES 4 and 5, performance of a significant number of required testing and maintenance activities is also required. In MODES 4 and 5, the activities are generally planned and administratively controlled. Relaxations from typical MODES 1, 2, and 3 LCO requirements are acceptable during shutdown MODES, based on:

a. The fact that time in an outage is limited. This is a risk prudent goal as well as a utility economic consideration.

b. Requiring appropriate compensatory measures for certain conditions. These may include administrative controls, reliance on systems that do not necessarily meet typical design requirements applied to systems credited in operation MODE analyses, or both.

c. Prudent utility consideration of the risk associated with multiple activities that could affect multiple systems.

d. Maintaining, to the extent practical, the ability to perform required functions (even if not meeting MODES 1, 2, and 3 OPERABILITY requirements) with systems assumed to function during an event.

In the event of an accident during shutdown, this LCO ensures the capability of supporting systems necessary for avoiding immediate difficulty, assuming either a loss of all offsite power or a loss of all onsite (diesel generator (DG)) power.

The AC sources satisfy Criterion 3 of the NRC Policy Statement (Ref. 1).

LCO

One offsite circuit capable of supplying the onsite Class 1E power distribution subsystem(s) of LCO 3.8.8, "Distribution Systems—Shutdown," ensures that all required loads are

(continued)

BASES

LCO (continued)

powered from offsite power. Two Unit 3 DGs, and when Unit 1 or 2 are not in MODE 1, 2, or 3 with SGT and CREV Systems required OPERABLE, Unit 1 and 2 DGs OPERABLE, each associated with a Distribution System Engineered Safety Feature (ESF) 4.16 kV shutdown board required OPERABLE by LCO 3.8.8, ensures that a diverse LCO power source is available for providing electrical power support assuming a loss of the offsite circuit. Together, OPERABILITY of the required offsite circuit and DGs ensures the availability of sufficient AC sources to operate the plant in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents and reactor vessel draindown).

The qualified offsite circuit(s) must be capable of maintaining rated frequency and voltage while connected to their respective 4.16 kV shutdown boards, and of accepting required loads during an accident. Qualified offsite circuits are those that are described in the FSAR and are part of the licensing basis for the unit. An offsite circuit is considered OPERABLE if the offsite source is available to one or more required 4.16 kV shutdown boards, through its normal supply breaker.

The offsite circuit consists of incoming breakers from one 4.16 kV unit board to each 4.16 kV shutdown board required by LCO 3.8.8. Each unit board is fed from transformers, via start buses as appropriate. Specific circuits and limitations for considering the offsite circuit qualified are described below.

1. From the 500 kV switchyard (with no credit for the two 500 kV Trinity lines), through unit station service transformer (USST) 3B to 4.16 kV unit board 3A and/or 3B. Each unit board feeds two of the Unit 3 4.16 kV shutdown boards (3EA and 3EB or 3EC and 3ED).

2. From the Trinity 161 kV transmission system, through common station service transformer (CSST) A or B to start bus 1A or 1B, then to a 4.16 kV unit board. That unit board feeds two of the Unit 3 4.16 kV shutdown boards (3EA and 3EB or 3EC and 3ED).

(continued)

BASES

LCO (continued)

3. From the Athens 161 kV transmission system, through CSST A or B to start bus 1A or 1B, and then to a 4.16 kV unit board. That unit board feeds two of the Unit 3 4.16 kV shutdown boards (3EA and 3EB or 3EC and 3ED).

For the Athens 161 kV offsite power to be considered as one of the qualified offsite power supplies, the following restrictions must also be met:

a. The 161 kV capacitor bank must be available for the Athens 161 kV line.

b. Credit for offsite power from the Athens 161 kV line may be taken by only one unit at one time. However, more than one unit may be aligned to the Athens line without invalidating the offsite power supply for the unit claiming it.

For the Trinity 161 kV offsite power to be considered as one of the qualified offsite power supplies, the following restrictions must also be met:

a. For the Trinity 161 kV line to be considered as one of the qualified offsite power supplies by only one unit, either the 161 kV capacitor bank must be available or the Trinity Inter-Tie transformer must be in service with 161 kV line nominal voltage $\geq$ 165 kV.

b. The Trinity 161 kV line may be considered as one of the qualified offsite power supplies by two separate units at any one time, provided that both CSST A and B are available and either the 161 kV capacitor bank is

(continued)

BASES

LCO (continued)

available or the Athens line and Trinity Inter-Tie transformer are in service with 161 kV line nominal voltage $\geq$ 165 kV.

c. The Trinity 161 kV line may be considered as one of the qualified offsite power supplies by three separate units at any one time, provided that both CSST A and B are available and either the 161 kV capacitor bank is available or the Athens line and Trinity Inter-Tie transformer are in service with 161 kV line nominal voltage $\geq$ 165 kV.

The only requirements for the position of the 161 kV bus 1 and bus 2 cross-tie breakers (924 and 928) are those implied by the restrictions on claiming Athens and Trinity as offsite power supplies.

The required DGs must be capable of starting, accelerating to rated speed and voltage, connecting to respective 4.16 kV shutdown boards on detection of bus undervoltage, and accepting required loads. This sequence must be accomplished within 10 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and must continue to operate until offsite power can be restored to the 4.16 kV shutdown boards.

Proper sequencing of loads, including tripping of nonessential loads, is a required function for DG OPERABILITY.

APPLICABILITY

The AC sources are required to be OPERABLE in MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment to provide assurance that:

a. Systems providing adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core in case of an inadvertent draindown of the reactor vessel;

b. Systems needed to mitigate a fuel handling accident are available;

(continued)

BASES

APPLICABILITY (continued)

c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

AC power requirements for MODES 1, 2, and 3 are covered in LCO 3.8.1.

ACTIONS

A.1

With the required offsite circuit inoperable, or one required DG inoperable, the remaining AC sources available may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, and operations with a potential for draining the reactor vessel. By declaring required features inoperable that are supported by the inoperable AC source, appropriate restrictions can be implemented in accordance with the affected required feature(s) LCOs' ACTIONS.

The 30 day Completion Time takes into account the OPERABILITY of the redundant required features, and their offsite and DG power availability. Additionally, the 30 day Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and low probability of an event occurring during this period. If the redundant required feature(s) is (are) not OPERABLE, the second Completion Time requires immediately declaring the required feature(s), supported by the inoperable AC source, inoperable. This results in taking the appropriate ACTIONS in the supported system Specification for the inoperable function.

B.1, B.2.1, B.2.2, B.2.3, and B.2.4

With two or more required AC sources inoperable, the option still exists to declare all required features inoperable. However, since this option may involve undesired administrative efforts, the allowance for sufficiently

(continued)

BASES

ACTIONS

B.1, B.2.1, B.2.2, B.2.3, and B.2.4 (continued)

conservative actions is made. With two or more required AC sources inoperable, the minimum required diversity of AC power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies in the secondary containment, and activities that could result in inadvertent draining of the reactor vessel.

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC sources and to continue this action until restoration is accomplished in order to provide the necessary AC power to the plant safety systems.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required AC electrical power sources should be completed as quickly as possible in order to minimize the time during which the plant safety systems may be without sufficient power.

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition B have been modified by a Note to indicate that when Condition B is entered with no AC power to any required 4.16 kV shutdown board, ACTIONS for LCO 3.8.8 must be immediately entered. This Note allows Condition B to provide requirements for the loss of the offsite circuit whether or not a division is de-energized. LCO 3.8.8 provides the appropriate restrictions for the situation involving a de-energized 4.16 kV shutdown board.

SURVEILLANCE REQUIREMENTS

SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the Unit 3

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.2.1 (continued)

AC sources in other than MODES 1, 2, and 3. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR.

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DG(s) from being paralleled with the offsite power network or otherwise rendered inoperable during the performance of SRs, and to preclude deenergizing a required 4.16 kV shutdown board or disconnecting a required offsite circuit during performance of SRs. With limited AC sources available, a single event could compromise both the required circuit and the DG. It is the intent that these SRs must still be capable of being met, but actual performance is not required during periods when the DG and offsite circuit is required to be OPERABLE.

SR 3.8.2.2

This Surveillance is provided to direct that the appropriate Surveillances for the required Unit 1 and 2 DGs are governed by the Unit 1 and 2 Technical Specifications. Performance of the applicable Unit 1 and 2 Surveillances will satisfy any Unit 1 and 2 requirements, as well as satisfying this Unit 3 Surveillance requirement. The Frequency required by the applicable Unit 1 and 2 SR also governs performance of that SR for both Units.

REFERENCES

1. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.3 Diesel Fuel Oil, Lube Oil, and Starting Air

BASES

BACKGROUND

Each diesel generator (DG) is provided with three interconnected storage tanks having a minimum usable fuel oil volume (35,280 gallons) sufficient to operate that DG for a period of 7 days while the DG is supplying maximum post loss of coolant accident (LOCA) load demand discussed in FSAR, Section 8.5.3.4 (Ref. 1). A transfer pump is located at the fuel oil storage tanks which can supply fuel oil from two 71,000-gallon fuel oil storage tanks to the 7-day storage tanks. In addition, it is possible to transfer fuel from one 7-day storage tank to any other by using transfer pumps. This onsite fuel oil capacity is sufficient to operate the DGs for longer than the time to replenish the onsite supply from outside sources.

Fuel oil is transferred from the 7-day storage tank to the day tank by either of two transfer pumps associated with each diesel generator. This is accomplished automatically by level switches on the day tank. Redundancy of pumps and piping precludes the failure of one pump, or the rupture of any pipe, valve, or tank to result in the loss of more than one DG. All 7-day tanks are embedded in the substructure of the Standby Diesel Generator Building.

For proper operation of the standby DGs, it is necessary to ensure the proper quality of the fuel oil. The fuel oil property monitored is the total particulate concentration. Periodic testing of the stored fuel oil total particulate concentration is a method to monitor the potential degradation related to long term storage and the potential impact to fuel filter plugging as a result of high particulate levels.

The DG lubrication system is designed to provide sufficient lubrication to permit proper operation of its associated DG under all loading conditions. The system is required to circulate the lube oil to the diesel engine working surfaces and to remove excess heat generated by friction during operation. Each engine oil sump contains an inventory capable of supporting a minimum of 7 days of operation.

(continued)

BASES

BACKGROUND (continued)

The 175-gallon and 150-gallon capacities listed in Condition B are based upon the DG seven-day consumption and six-day consumption of lube oil, respectively. The total lube oil system capacity is 465 gallons, of which, 235 gallons are useable (i.e., 230 gallons are not useable). If the seven-day and six-day capacities are added to the non-useable capacity, a minimum value of lube oil capacity can be established for purposes of this LCO. Therefore, 405 gallons are required to ensure the seven-day requirement (i.e., 230 + 175); while, 380 gallons (i.e., 230 + 150) are required to ensure the six-day requirement. Note: actual lube oil consumption is 0.98 gal/hr or 23.52 gal/day - 25 gal/day was conservatively chosen to establish the seven-day and six-day requirements.

This supply is sufficient to allow the operator to replenish lube oil from outside sources.

Each DG has two fully redundant air start systems, either of which is capable of starting the engine, with adequate capacity for at least one start attempt on the DG without recharging the air start receiver(s).

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in FSAR, Chapter 6 (Ref. 3), and Chapter 14 (Ref. 4), assume Engineered Safety Feature (ESF) systems are OPERABLE. The DGs are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that fuel, Reactor Coolant System, and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.5, Emergency Core Cooling System (ECCS) and Reactor Core Isolation Cooling (RCIC) System; and Section 3.6, Containment Systems.

Since diesel fuel oil, lube oil, and starting air subsystems support the operation of the standby AC power sources, they satisfy Criterion 3 of the NRC Policy Statement (Ref. 5).

(continued)

BASES (continued)

LCO

Stored diesel fuel oil is required to have sufficient supply for 7 days of full load operation. It is also required to meet specific standards for quality. Additionally, sufficient lube oil supply must be available to ensure the capability to operate at full load for 7 days. This requirement, in conjunction with an ability to obtain replacement supplies within 7 days, supports the availability of DGs required to shut down the reactor and to maintain it in a safe condition for an abnormal operational transient or a postulated DBA with loss of offsite power. DG day tank fuel oil requirements, as well as transfer capability from the 7-day storage tank to the day tank, are addressed in LCO 3.8.1, "AC Sources – Operating," and LCO 3.8.2, "AC Sources – Shutdown."

One of the two redundant starting air systems is required to have a minimum capacity for one DG start attempt without recharging the air start receiver.

APPLICABILITY

The AC sources (LCO 3.8.1 and LCO 3.8.2) are required to ensure the availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an abnormal operational transient or a postulated DBA. Because stored diesel fuel oil, lube oil, and starting air subsystem support LCO 3.8.1 and LCO 3.8.2, stored diesel fuel oil, lube oil, and starting air are required to be within limits when the associated DG is required to be OPERABLE.

(continued)

BASES (continued)

ACTIONS

The ACTIONS Table is modified by a Note indicating that separate Condition entry is allowed for each DG. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable DG subsystem. Complying with the Required Actions for one inoperable DG subsystem may allow for continued operation, and subsequent inoperable DG subsystem(s) governed by separate Condition entry and application of associated Required Actions.

A.1

In this condition, the 7 day fuel oil supply for a DG is not available. However, the Condition is restricted to fuel oil level reductions that maintain at least a 6 day supply. These circumstances may be caused by events such as:

a. Full load operation required for an inadvertent start while at minimum required level; or

b. Feed and bleed operations that may be necessitated by increasing particulate levels or any number of other oil quality degradations.

This restriction allows sufficient time for obtaining the requisite replacement volume and performing the analyses required prior to addition of the fuel oil to the tank. A period of 48 hours is considered sufficient to complete restoration of the required level prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> 6 days), the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

B.1

With lube oil inventory < 175 gal, sufficient lube oil to support 7 days of continuous DG operation at full load conditions may not be available. However, the Condition is restricted to lube oil volume reductions that maintain at least a 6 day supply. This restriction allows sufficient time for obtaining the requisite replacement volume. A period of 48 hours is considered sufficient to complete

(continued)

BASES

ACTIONS

B.1 (continued)

restoration of the required volume prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> 6 days), the low rate of usage, the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

C.1

This Condition is entered as a result of a failure to meet the acceptance criterion for particulates. Normally, trending of particulate levels allows sufficient time to correct high particulate levels prior to reaching the limit of acceptability. Poor sample procedures (bottom sampling), contaminated sampling equipment, and errors in laboratory analysis can produce failures that do not follow a trend. Since the presence of particulates does not mean failure of the fuel oil to burn properly in the diesel engine, since particulate concentration is unlikely to change significantly between Surveillance Frequency intervals, and since proper engine performance has been recently demonstrated (within 31 days), it is prudent to allow a brief period prior to declaring the associated DG inoperable. The 7 day Completion Time allows for further evaluation, re-sampling, and re-analysis of the DG fuel oil.

D.1

With the starting air receiver pressure < 165 psig in the required starting air system, sufficient capacity to start the associated DG may not exist. The associated DG may be incapable of performing its intended function and must be immediately declared inoperable. This declaration also requires entry into applicable Conditions and Required Actions for an inoperable DG, LCO 3.8.1, "AC Sources—Operating."

(continued)

BASES

ACTIONS (continued)

E.1

With a Required Action and associated Completion Time not met, or the stored diesel fuel oil, lube oil, or starting air subsystem not within limits for reasons other than addressed by Conditions A through D, the associated DG may be incapable of performing its intended function and must be immediately declared inoperable.

SURVEILLANCE REQUIREMENTS

SR 3.8.3.1

This SR provides verification that there is an adequate inventory of fuel oil in the storage tanks to support each DG's operation for 7 days at full load. The 7 day period is sufficient time to place the unit in a safe shutdown condition and to bring in replenishment fuel from an offsite location.

The 31 day Frequency is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and unit operators would be aware of any large uses of fuel oil during this period.

SR 3.8.3.2

This Surveillance ensures that sufficient lubricating oil inventory is available to support at least 7 days of full load operation for each DG. The 175 gal requirement is based on the DG manufacturer's consumption values for the run time of the DG. Implicit in this SR is the requirement to verify the capability to transfer the lube oil from its storage location to the DG, when the DG lube oil sump does not hold adequate inventory for 7 days of full load operation without the level reaching the manufacturer's recommended minimum level.

A 31 day Frequency is adequate to ensure that a sufficient lube oil supply is onsite, since DG starts and run time are closely monitored by the plant staff.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.3.3

This SR verifies that the required fuel oil testing is performed in accordance with the Diesel Fuel Oil Testing Program. Tests are a means of monitoring the potential degradation related to long term storage and the potential impact to fuel filter plugging as a result of high particulate levels. Specific sampling requirements, frequencies, and additional information are discussed in detail in the Diesel Fuel Oil Testing Program.

SR 3.8.3.4

This Surveillance ensures that, without the aid of the refill compressor, sufficient air start capacity for each DG is available. The system design requirements provide for at least one start cycle from one of two redundant air start systems without recharging. A start cycle is defined by the DG vendor, but usually is measured in terms of time (seconds of cranking) or engine cranking speed. The pressure specified in this SR is the lowest pressure at which at least one start attempt can be accomplished using one of two redundant air start systems.

The 31 day Frequency takes into account the capacity, capability, redundancy, and diversity of the AC sources and other indications available in the control room, including alarms, to alert the operator to below normal air start pressure.

REFERENCES

1. FSAR, Section 8.5.3.4.
2. Regulatory Guide 1.137.
3. FSAR, Chapter 6.
4. FSAR, Chapter 14.
5. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.4 DC Sources — Operating

BASES

BACKGROUND

The DC electrical power system provides the AC emergency power system with control power. It also provides both motive and control power to selected safety related equipment. As required by 10 CFR 50, Appendix A, GDC 17 (Ref. 1), the DC electrical power system is designed to have sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure. The DC electrical power system also conforms to the recommendations of Regulatory Guide 1.6 (Ref. 2) and meets the intent of IEEE-279 (Ref. 3).

Three separate DC Source Systems consist of:

1. Three 250 VDC Unit DC subsystems, together with the associated charger, circuitry, switches, indicators, and alarms. Each Unit DC battery board can be supplied from its own battery charger or from the spare charger. The three Unit batteries have engineered safety feature loads for the three units distributed among them so that redundant subsystems on each unit have separate normal and alternate power supplies. The Unit DC battery boards also supply control power for the bus-tie board, the cooling tower switchgear, three Unit 3 shutdown boards, and the alternate feeder to Unit 1 and 2 shutdown boards and one Unit 3 shutdown board. The battery boards, motor-operated valve boards, and distribution panels supply nominal 250 VDC power to their loads without interruption unless the supply battery is discharged and power to the charger is lost. All transfers from normal to alternate sources are done manually.

2. One 250 VDC shutdown board subsystem supplies control power for 4.16 kV shutdown board 3EB. The DC shutdown board subsystem consists of a battery together with the associated charger, circuitry, switches, indicators, and alarms. The shutdown board DC subsystem can receive power from its own battery, battery charger, or from the spare charger. Normal 250 VDC control power for 4.16 kV shutdown board 3EB is supplied by the

(continued)

BASES

BACKGROUND (continued)

shutdown board DC subsystem with an alternate supply from one of the Unit DC battery boards through a manual transfer switch. Separations between redundant control power circuits are maintained external to and within the switchgear.

3. The diesel generator (DG) DC subsystems provide control and instrumentation power for their respective DG. Each DG DC subsystem is energized by one 125 V battery and one of two 125 V battery chargers per 125 V subsystem.

During normal operation, the DC loads are powered from the battery chargers with the batteries floating on the system. In case of loss of normal power to the battery charger, the DC loads are automatically powered from the batteries.

The DC power distribution system is described in more detail in Bases for LCO 3.8.7, "Distribution System – Operating," and LCO 3.8.8, "Distribution System – Shutdown."

Each Unit and Shutdown Board battery has adequate storage capacity to carry the required load continuously for approximately 30 minutes (Ref. 4).

Each diesel battery has adequate storage capacity to carry required loads. These include control and logic power, governor booster pumps, generator relay protection, generator field flashing, and the motor-driven fuel pumps. The governor booster pumps and generator field flashing require power for only a relatively short time during a diesel start. Approximately 5.5 seconds after start, the diesel battery load is about 4.2 amps.

Each Unit and Shutdown Board DC battery subsystem is separately housed in a ventilated room apart from its charger and distribution centers. Each subsystem is located

(continued)

BASES

BACKGROUND (continued)

in an area separated physically and electrically from the other subsystems to ensure that a single failure in one subsystem does not cause a failure in a redundant subsystem. Each diesel battery is located in the room with the diesel generator it serves. One of its chargers is also in the room; the other is immediately outside the door in the Diesel Generator Building hallway.

The batteries for Unit DC, Shutdown Board DC, and DG DC electrical power subsystems are sized to produce required capacity at 80% of nameplate rating, corresponding to warranted capacity at end of life cycles and the 100% design demand. The minimum design voltage limit for the Unit DC and Shutdown Board DC subsystems is 210 V. The minimum design voltage limit for the DG DC subsystems is 105 V.

Each battery charger for a DC electrical power subsystem has ample power output capacity for the steady state operation of connected loads required during normal operation, while at the same time maintaining its battery bank fully charged. Each battery charger has sufficient capacity to restore the battery from the design minimum charge to its fully charged state within 12 hours while supplying normal steady state loads (Ref. 4).

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the FSAR, Chapter 6 (Ref. 5) and Chapter 14 (Ref. 5), assume that Engineered Safety Feature (ESF) systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the DGs, emergency auxiliaries, and control and switching during all MODES of operation. The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining DC sources OPERABLE during accident conditions in the event of:

a. An assumed loss of all offsite AC power or all onsite AC power sources; and

b. A postulated worst case single failure.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)	The DC sources satisfy Criterion 3 of the NRC Policy Statement (Ref. 11).
LCO	The DC Electrical Power System — with: 1) three Unit DC subsystems, each consisting of one 250 V battery, one battery charger, and the corresponding control equipment and interconnecting cabling supplying power to the associated Unit battery board; 2) one shutdown board DC subsystem (and the Unit 1 and 2 shutdown board DC subsystems needed to support OPERABILITY of the SGT and CREV Systems), consisting of one 250 V battery, its associated charger, and the corresponding control equipment and interconnecting cabling supplying power to the associated DC shutdown board; and 3) four Unit 3 and two Unit 1 and 2 DG DC subsystems each consisting of one battery bank, one battery charger, and the corresponding control equipment and interconnecting cabling, is required to be OPERABLE to ensure the availability of the required power to shut down the reactor and maintain it in a safe condition after an abnormal operational transient or a postulated DBA. Loss of any DC electrical power subsystem does not prevent the minimum safety function from being performed (Ref. 4).
APPLICABILITY	The DC electrical power sources are required to be OPERABLE in MODES 1, 2, and 3 to ensure safe unit operation and to ensure that: a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of abnormal operational transients; and b. Adequate core cooling is provided, and containment integrity and other vital functions are maintained in the event of a postulated DBA. The DC electrical power requirements for MODES 4 and 5 are addressed in the Bases for LCO 3.8.5, "DC Sources — Shutdown."

(continued)

BASES (continued)

ACTIONS

A.1

Condition A represents one Unit or Shutdown Board DC subsystem with a loss of ability to completely respond to an event, and a potential loss of ability to remain energized during normal operation. It is therefore imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for complete loss of DC power to the affected division. The 7 day limit is consistent with the allowed time for an inoperable Unit DC Board or Shutdown Board Distribution Panel.

If one Unit or Shutdown Board DC electrical power subsystem is inoperable (e.g., inoperable battery, inoperable battery charger(s), or inoperable battery charger and associated inoperable battery), the remaining Unit or Shutdown Board DC electrical power subsystems have the capacity to support a safe shutdown and cooldown of all three units in the event of a loss of offsite power and a DBA on one Unit. Since a subsequent worst case single failure could, however, result in the loss of minimum necessary DC electrical subsystems to mitigate a worst case accident, continued power operation should not exceed 7 days. The loss of one shutdown board electrical power subsystem affects normal control power supply for the 480 V and 4.16 kV shutdown board(s) which it supplies. Loss of uninterrupted control power to these shutdown boards may result in loss of those engineered safety features supplied by these boards. Therefore, 7 days is considered a reasonable time to effect repairs and perform required testing of the unit or shutdown board DC electrical power subsystem, recognizes the ability to connect alternate sources to support continued operation or accident mitigation, and, if the unit or shutdown board DC electrical power subsystem is not restored to OPERABLE status, to prepare to effect an orderly and safe unit shutdown.

B.1 and B.2

If the Unit or Shutdown Board DC electrical power subsystem cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit

(continued)

BASES

ACTIONS

B.1 and B.2 (continued)

must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems. The Completion Time to bring the unit to MODE 4 is consistent with the time required in Regulatory Guide 1.93 (Ref. 6).

C.1

If a DG DC electrical power subsystem is inoperable, the associated DG may be incapable of performing its intended function and must be immediately declared inoperable. This declaration also requires entry into applicable Conditions and Required Actions for an inoperable DG, LCO 3.8.1, "AC Sources – Operating."

D.1

Required Action D.1 is intended to provide assurance that a loss of a required Unit 1 and 2 Shutdown Board DC electrical power subsystem does not result in a complete loss of safety function of critical systems (i.e., SGT or CREVS). With one of the required Unit 1 and 2 Shutdown Board DC electrical power subsystems inoperable, the SGT or CREVS train supported by that shutdown board is inoperable. Therefore, the associated SGT or CREVS subsystem must be declared inoperable immediately, and the ACTIONS in the appropriate system Specification taken.

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1

Verifying battery terminal voltage while on float charge for the batteries helps to ensure the effectiveness of the charging system and the ability of the batteries to perform their intended function. Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery (or battery cell) and maintain the battery (or a battery cell)

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1 (continued)

in a fully charged state. The voltage requirements are based on the nominal design voltage of the battery and are consistent with the initial voltages assumed in the battery sizing calculations. The 7 day Frequency is consistent with manufacturer recommendations and IEEE-450 (Ref. 7).

SR 3.8.4.2 and SR 3.8.4.5

Battery charger capability requirements are based on the design capacity of the chargers (Ref. 4). According to Regulatory Guide 1.32 (Ref. 8), the battery charger supply is required to be based on the largest combined demands of the various steady state loads and the charging capacity to restore the battery from the design minimum charge state to the fully charged state, irrespective of the status of the unit during these demand occurrences. The minimum required amperes and verification of the charger's ability to recharge the battery ensures that these requirements can be satisfied.

SR 3.8.4.2 verifies that the chargers are capable of charging the batteries after their designed duty cycle testing and ensures that the chargers will perform their design function. This SR is modified by a Note that allows performance of SR 3.8.4.5 in lieu of this Surveillance requirement. SR 3.8.4.5 verifies that the chargers are capable of charging the batteries after each discharge test and ensures that the chargers are capable of performing at maximum output. SR 3.8.4.2 is performed at the same frequency as the 18 month service test (SR 3.8.4.3), while SR 3.8.4.5 is performed following the 60 month battery discharge test (SR 3.8.4.4).

SR 3.8.4.3

A battery service test is a special test of the battery's capability, as found, to satisfy the design requirements (battery duty cycle) of the DC electrical power system. The discharge rate and test length corresponds to the design duty cycle requirements as specified in Reference 4.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.3 (continued)

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.32 (Ref. 8) and Regulatory Guide 1.129 (Ref. 9), which state, in part, that the battery service test should be performed with intervals between tests not to exceed 18 months.

This SR is modified by a Note that allows the performance of a modified performance discharge test in lieu of a service test once per 60 months. The modified performance discharge test is a simulated duty cycle consisting of just two rates; the one minute rate published for the battery or the largest current load of the duty cycle, followed by the test rate employed for the performance test, both of which envelope the duty cycle of the service test. Since the ampere-hours removed by a rated one minute discharge represents a very small portion of the battery capacity, the test rate can be changed to that for the performance test without compromising the results of the performance discharge test. The battery terminal voltage for the modified performance discharge test should remain above the minimum battery terminal voltage specified in the battery service test for the duration of time equal to that of the service test.

A modified discharge test is a test of the battery capacity and its ability to provide a high rate, short duration load (usually the highest rate of the duty cycle). This will often confirm the battery's ability to meet the critical period of the load duty cycle, in addition to determining its percentage of rated capacity. Initial conditions for the modified performance discharge test should be identical to those specified for a service test.

SR 3.8.4.4

A battery performance discharge test is a test of constant current capacity of a battery, normally done in the as found condition, after having been in service, to detect any change in the capacity determined by the acceptance test. The test is intended to determine overall battery degradation due to age and usage.

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.4 (continued)

A battery modified performance discharge test is described in the Bases for SR 3.8.4.3. Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.4.4; however, only the modified performance discharge test may be used to satisfy SR 3.8.4.4 while satisfying the requirements of SR 3.8.4.3 at the same time.

The acceptance criteria for this Surveillance is consistent with IEEE-279 (Ref. 3) and IEEE-485 (Ref. 10). These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements.

The Frequency for this test is normally 60 months. If the battery shows degradation, or if the battery has reached 85% of its expected life and capacity is < 100% of the manufacturer's rating, the Surveillance Frequency is reduced to 12 months. However, if the battery shows no degradation but has reached 85% of its expected life, the Surveillance Frequency is only reduced to 24 months for batteries that retain capacity ≥ 100% of the manufacturer's rating. Degradation is indicated, according to IEEE-279 (Ref. 3), when the battery capacity drops by more than 10% relative to its capacity on the previous performance test or when it is 10% below the manufacturer's rating. All these Frequencies are consistent with the recommendations in IEEE-279 (Ref. 3).

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.
2. Regulatory Guide 1.6.
3. IEEE Standard 279.
4. FSAR, Sections 8.5 and 8.6.
5. FSAR, Chapters 6 and 14.

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BASES

REFERENCES (continued)

6. Regulatory Guide 1.93.
7. IEEE Standard 450.
8. Regulatory Guide 1.32, February 1977.
9. Regulatory Guide 1.129, December 1974.
10. IEEE Standard 485, 1983.
11. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.5 DC Sources — Shutdown

BASES

BACKGROUND

A description of the DC sources is provided in the Bases for LCO 3.8.4, "DC Sources — Operating."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident and transient analyses in the FSAR, Chapter 6 (Ref. 1) and Chapter 14 (Ref. 2), assume that Engineered Safety Feature systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the diesel generators (DGs), emergency auxiliaries, and control and switching during all MODES of operation.

The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and the requirements for the supported systems' OPERABILITY.

The OPERABILITY of the minimum DC electrical power sources during MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment ensures that:

a. The facility can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate DC electrical power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

The DC sources satisfy Criterion 3 of the NRC Policy Statement (Ref. 3).

(continued)

BASES (continued)

LCO

The DC Electrical Power Systems – with: 1) each Unit DC subsystem, supporting Unit battery boards required OPERABLE by LCO 3.8.8, consisting of one 250 V battery, one battery charger, and the corresponding control equipment and interconnecting cabling supplying power to the associated Unit battery board; 2) each shutdown board DC subsystem, supporting DC shutdown boards required OPERABLE by LCO 3.8.8, consisting of one 250 V battery, its associated charger, and the corresponding control equipment and interconnecting cabling supplying power to the associated DC shutdown board; and 3) each DG DC subsystem supporting DGs required OPERABLE for 4.16 kV shutdown boards required OPERABLE by LCO 3.8.8, consisting of one 125 V battery, one battery charger, and the corresponding control equipment and interconnecting cabling. This requirement ensures the availability of sufficient DC electrical power sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents and inadvertent reactor vessel draindown).

APPLICABILITY

The DC electrical power sources required to be OPERABLE in MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment provide assurance that:

a. Required features to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core in case of an inadvertent draindown of the reactor vessel;

b. Required features needed to mitigate a fuel handling accident are available;

c. Required features necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

(continued)

BASES

APPLICABILITY (continued)

The DC electrical power requirements for MODES 1, 2, and 3 are covered in LCO 3.8.4.

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4

If more than one DC distribution subsystem is required according to LCO 3.8.8, the DC subsystems remaining OPERABLE with one or more DC power sources inoperable may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, and operations with a potential for draining the reactor vessel. By allowance of the option to declare required features inoperable with associated DC power sources inoperable, appropriate restrictions are implemented in accordance with the affected system LCOs' ACTIONS. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and any activities that could result in inadvertent draining of the reactor vessel).

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required DC electrical power subsystems and to continue this action until restoration is accomplished in order to provide the necessary DC electrical power to the plant safety systems.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required DC electrical power subsystems should be completed as quickly as possible in order to minimize the time during which the plant safety systems may be without sufficient power.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.5.1

SR 3.8.5.1 requires performance of all Surveillances required by SR 3.8.4.1 through SR 3.8.4.5. Therefore, see the corresponding Bases for LCO 3.8.4 for a discussion of each SR.

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DC sources from being discharged below their capability to provide the required power supply or otherwise rendered inoperable during the performance of SRs. It is the intent that these SRs must still be capable of being met, but actual performance is not required.

REFERENCES

1. FSAR, Chapter 6.

2. FSAR, Chapter 14.

3. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.6 Battery Cell Parameters

BASES

BACKGROUND

This LCO delineates the limits on electrolyte temperature, level, float voltage, and specific gravity for the DC electrical power subsystems batteries. At BFN, these batteries were designed to IEEE-279 Standards (Ref. 4). However, the batteries have been analyzed and meet IEEE-450 Standards (Ref. 3). A discussion of these batteries and their OPERABILITY requirements is provided in the Bases for LCO 3.8.4, "DC Sources – Operating," and LCO 3.8.5, "DC Sources – Shutdown."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in FSAR, Chapter 6 (Ref. 1) and Chapter 14 (Ref. 2), assume Engineered Safety Feature systems are OPERABLE. The DC electrical power subsystems provide normal and emergency DC electrical power for the diesel generators (DGs), emergency auxiliaries, and control and switching during all MODES of operation.

The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining at least one division of DC sources OPERABLE during accident conditions, in the event of:

a. An assumed loss of all offsite AC or all onsite AC power sources; and

b. A postulated worst case single failure.

Since battery cell parameters support the operation of the DC electrical power subsystems, they satisfy Criterion 3 of the NRC Policy Statement (Ref. 5).

LCO

Battery cell parameters must remain within acceptable limits to ensure availability of the required DC power to shut down the reactor and maintain it in a safe condition after an

(continued)

BASES

LCO (continued)

anticipated operational occurrence or a postulated DBA. Electrolyte limits are conservatively established, allowing continued DC electrical system function even with Category A and B limits not met.

APPLICABILITY

The battery cell parameters are required solely for the support of the associated DC electrical power subsystem. Therefore, battery electrolyte is only required when the DC power source is required to be OPERABLE. Refer to the Applicability discussions in Bases for LCO 3.8.4 and LCO 3.8.5.

ACTIONS

A Note has been added providing that, for this LCO, separate Condition entry is allowed for each battery. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable battery. Complying with the Required Actions for battery cell parameters allows for restoration and continued operation, and subsequent out of limit battery cell parameters may be governed by separate Condition entry and application of associated Required Action.

A.1, A.2, and A.3

With parameters of one or more cells in one or more batteries not within limits (i.e., Category A limits not met or Category B limits not met, or Category A and B limits not met) but within the Category C limits specified in Table 3.8.6-1, the battery is degraded but there is still sufficient capacity to perform the intended function. Therefore, the affected battery is not required to be considered inoperable solely as a result of Category A or B limits not met, and continued operation is permitted for a limited period.

The pilot cell electrolyte level and float voltage are required to be verified to meet the Category C limits within 1 hour (Required Action A.1). This check provides a quick indication of the status of the remainder of the battery

(continued)

BASES

ACTIONS

A.1, A.2, and A.3 (continued)

cells. One hour provides time to inspect the electrolyte level and to confirm the float voltage of the pilot cells. One hour is considered a reasonable amount of time to perform the required verification.

Verification that the Category C limits are met (Required Action A.2) provides assurance that during the time needed to restore the parameters to the Category A and B limits, the battery is still capable of performing its intended function. A period of 24 hours is allowed to complete the initial verification because specific gravity measurements must be obtained for each connected cell. Taking into consideration both the time required to perform the required verification and the assurance that the battery cell parameters are not severely degraded, this time is considered reasonable. The verification is repeated at 7 day intervals until the parameters are restored to Category A and B limits. This periodic verification is consistent with the normal Frequency of pilot cell Surveillances.

Continued operation is only permitted for 31 days before battery cell parameters must be restored to within Category A and B limits. Taking into consideration that, while battery capacity is degraded, sufficient capacity exists to perform the intended function and to allow time to fully restore the battery cell parameters to normal limits, this time is acceptable for operation prior to declaring the associated DC battery inoperable.

B.1

When any battery parameter is outside the Category C limit for any connected cell, sufficient capacity to supply the maximum expected load requirement is not ensured and the corresponding DC electrical power subsystem must be declared inoperable. Additionally, other potentially extreme conditions, such as not completing the Required Actions of Condition A within the required Completion Time or average electrolyte temperature of representative cells falling below 60°F for each Unit and Shutdown Board battery (except Shutdown Board battery 3EB) and 40°F for Shutdown Board battery 3EB and each DG battery, also are cause for

(continued)

BASES

ACTIONS

B.1 (continued)

immediately declaring the associated DC electrical power subsystem inoperable.

SURVEILLANCE REQUIREMENTS

SR 3.8.6.1

This SR verifies that Category A battery cell parameters are consistent with IEEE-450 (Ref. 3), which recommends regular battery inspections (at least one per month) including voltage, specific gravity, and electrolyte temperature of pilot cells.

SR 3.8.6.2

The 92 day inspection of specific gravity and voltage is consistent with IEEE-450 (Ref. 3).

SR 3.8.6.3

This Surveillance verification that the average temperature of representative cells is within limits is consistent with a recommendation of IEEE-450 (Ref. 3) that states that the temperature of electrolytes in representative (10 percent of) cells should be determined on a quarterly basis.

Lower than normal temperatures act to inhibit or reduce battery capacity. This SR ensures that the operating temperatures remain within an acceptable operating range. This limit is based on manufacturer's recommendations.

Table 3.8.6-1

This table delineates the limits on electrolyte level, float voltage, and specific gravity for three different categories. The meaning of each category is discussed below.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

Category A defines the normal parameter limit for each designed pilot cell in each battery. The cells selected as pilot cells are those whose temperature, voltage, and electrolyte specific gravity approximate the state of charge of the entire battery.

The Category A limits specified for electrolyte level are based on manufacturer's recommendations and are consistent with the guidance in IEEE-450 (Ref. 3), with the extra ¼ inch allowance above the high water level indication for operating margin to account for temperature and charge effects. In addition to this allowance, footnote a to Table 3.8.6-1 permits the electrolyte level to be above the specified maximum level during equalizing charge, provided it is not overflowing. These limits ensure that the plates suffer no physical damage, and that adequate electron transfer capability is maintained in the event of transient conditions. IEEE-450 (Ref. 3) recommends that electrolyte level readings should be made only after the battery has been at float charge for at least 72 hours.

The Category A limit specified for float voltage is ≥ 2.13 V per cell. This value is based on the recommendation of IEEE-450 (Ref. 3), which states that prolonged operation of cells below 2.13 V can reduce the life expectancy of cells. The Category A limit specified for specific gravity for each pilot cell is ≥ 1.200 (0.015 below the manufacturer's fully charged nominal specific gravity or a battery charging current that had stabilized at a low value). This value is characteristic of a charged cell with adequate capacity. According to IEEE-450 (Ref. 3), the specific gravity readings are based on a temperature of 77°F (25°C).

The specific gravity readings are corrected for actual electrolyte temperature. For each 3°F (1.67°C) above 77°F (25°C), 1 point (0.001) is added to the reading; 1 point is subtracted for each 3°F below 77°F. The specific gravity of the electrolyte in a cell increases with a loss of water due to electrolysis or evaporation.

Category B defines the normal parameter limits for each connected cell. The term "connected cell" excludes any battery cell that may be jumpered out.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

The Category B limits specified for electrolyte level and float voltage are the same as those specified for Category A and have been discussed above. The Category B limit specified for specific gravity for each connected cell is ≥ 1.195 (0.020 below the manufacturer's fully charged, nominal specific gravity) with the average of all connected cells 1.205 (0.010 below the manufacturer's fully charged, nominal specific gravity). These values are based on manufacturer's recommendations. The minimum specific gravity value required for each cell ensures that the effects of a highly charged or newly installed cell do not mask overall degradation of the battery.

Category C defines the limits for each connected cell. These values, although reduced, provide assurance that sufficient capacity exists to perform the intended function and maintain a margin of safety. When any battery parameter is outside the Category C limits, the assurance of sufficient capacity described above no longer exists, and the battery must be declared inoperable.

The Category C limit specified for electrolyte level (above the top of the plates and not overflowing) ensures that the plates suffer no physical damage and maintain adequate electron transfer capability. The Category C Allowable Value for voltage is based on IEEE-450 (Ref. 3), which states that a cell voltage of 2.07 V or below, under float conditions and not caused by elevated temperature of the cell, indicates internal cell problems and may require cell replacement.

The Category C limit on average specific gravity ≥ 1.195, is based on manufacturer's recommendations (0.020 below the manufacturer's recommended fully charged, nominal specific gravity). In addition to that limit, it is required that the specific gravity for each connected cell must be no less than 0.020 below the average of all connected cells. This limit ensures that the effect of a highly charged or new cell does not mask overall degradation of the battery.

The footnotes to Table 3.8.6-1 that apply to specific gravity are applicable to Category A, B, and C specific

(continued)

BASES

SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

gravity. Footnote (b) of Table 3.8.6-1 requires the above mentioned correction for electrolyte temperature.

Because of specific gravity gradients that are produced during the recharging process, delays of several days may occur while waiting for the specific gravity to stabilize. A stabilized charger current is an acceptable alternative to specific gravity measurement for determining the state of charge of the designated pilot cell. This phenomenon is discussed in IEEE-450 (Ref. 3). Footnote (c) to Table 3.8.6-1 allows the float charge current to be used as an alternate to specific gravity for up to 7 days following a battery recharge. Within 7 days, each connected cell's specific gravity must be measured to confirm the state of charge. Following a minor battery recharge (such as equalizing charge that does not follow a deep discharge) specific gravity gradients are not significant, and confirming measurements may be made in less than 7 days. Footnote (d) to Table 3.8.6-1 allows alternate values recommended by the manufacturer to be used for specific gravity as appropriate (Ref. 6). For the DG and Shutdown batteries, up to 10 cells for each DG battery and up to 20 cells for each Shutdown battery can have specific gravities of 1.180 to 1.200 provided the demonstrated battery capacity at the last discharge test is ≥ 81.2 percent. For the Unit batteries, up to 12 cells for each battery can have specific gravities of 1.180 to 1.200 provided the demonstrated battery capacity at the last discharge test is ≥ 80.7 percent.

REFERENCES

1. FSAR, Chapter 6.
2. FSAR, Chapter 14.
3. IEEE Standard 450, 1987.
4. IEEE Standard 279.
5. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.
6. TVA Internal Memorandum from H.B. Bounds to G.G. Campbell dated January 27, 1989 (RIMS B22 890127002).

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.7 Distribution Systems — Operating

BASES

BACKGROUND

The onsite Class 1E AC and DC electrical power distribution system is divided into redundant and independent AC and DC electrical power distribution subsystems.

The primary AC distribution system consists of four Unit 3 4.16 kV shutdown boards each having an offsite source of power as well as a dedicated onsite diesel generator (DG) source. Each 4.16 kV shutdown board is normally connected to the 3B unit station service transformer (USST) via a 4.16 kV unit board. If no offsite source is available, the onsite emergency DGs supply power to the 4.16 kV shutdown boards.

The secondary plant distribution system includes 480 VAC shutdown boards and associated load centers, and transformers.

There are three Unit DC and five Shutdown Board 250 V DC electrical power distribution subsystems that support the necessary power for Unit 3 ESF functions.

The list of all distribution boards is presented in Table B 3.8.7-1.

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the FSAR, Chapter 6 (Ref. 1) and Chapter 14 (Ref. 2), assume ESF systems are OPERABLE. The AC and DC electrical power distribution systems are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.5, Emergency Core

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Cooling System (ECCS) and Reactor Core Isolation Cooling (RCIC) System; and Section 3.6 Containment Systems.

The OPERABILITY of the AC and DC electrical power distribution subsystems is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining distribution systems OPERABLE during accident conditions in the event of:

a. An assumed loss of all offsite power or all onsite AC electrical power sources; and

b. A postulated worst case single failure.

The AC and DC electrical power distribution system satisfies Criterion 3 of the NRC Policy Statement (Ref. 4).

LCO

The required electrical power distribution subsystems listed in Table B 3.8.7-1 ensure the availability of AC and DC electrical power for the systems required to shut down the reactor and maintain it in a safe condition after an abnormal operational transient or a postulated DBA. The AC and DC electrical power distribution subsystems are required to be OPERABLE.

Maintaining the AC and DC electrical power distribution subsystems OPERABLE ensures that the redundancy incorporated into the design of ESF is not defeated. Therefore, a single failure within any system or within the electrical power distribution subsystems will not prevent safe shutdown of the reactor.

The AC electrical power distribution subsystems require the associated buses and electrical circuits to be energized to their proper voltages. In addition, for the D or E RMOV Boards to be OPERABLE, they must be able to auto-transfer on loss of voltage. This feature ensures that the failure of one Diesel Generator will not result in the loss of an RHR subsystem. OPERABLE DC electrical power distribution subsystems require the associated buses to be energized to their proper voltage from either the associated battery or charger.

(continued)

BASES

LCO (continued)

The Unit 3 480 V RMOV boards 3A, 3B, and 3C are not specifically listed in Table B 3.8.7-1. Should one of these boards become inoperable due to a failure not affecting the operability of a board listed in Table B 3.8.7-1, the individual loads on the board would be considered inoperable and the appropriate conditions and required actions of the LCOs governing the individual loads would be entered. If however, one or more of the 3A, 3B, or 3C RMOV boards are inoperable due to a failure also affecting the operability of 3A or 3B 480 V shutdown board; the conditions and required actions are not required to be entered since LCO 3.0.6 allows this exception, and the required actions for the inoperable 480 V shutdown board are sufficient. In addition, the alternate supply breakers to 480 V RMOV boards 3A, 3B, and 3C must be open. This prevents a single malfunction causing a failure of a redundant subsystem and a loss of safety function. If any alternate breakers for the 3A, 3B, or 3C 480 V RMOV boards are closed, the affected systems/components which are not powered from its normal source are inoperable.

The 480 V shutdown boards and diesel auxiliary boards can be placed on their alternate feeder breakers and considered OPERABLE as long as the restrictions on the associated drawings are met. In addition, tie breakers between redundant safety related DC power distribution subsystems, if they exist, must be open. This prevents any electrical malfunction in any DC power distribution subsystem from propagating to the redundant subsystem, which could cause the failure of a redundant DC subsystem and a loss of essential safety function(s). If any DC tie breakers are closed, the affected redundant DC electrical power distribution subsystems are considered inoperable. This applies to the onsite, safety related, redundant DC electrical power distribution subsystems.

The Unit DC Boards are sized to accommodate alternate loads normally supplied by the Shutdown DC Distribution Panels with no effect on OPERABILITY.

APPLICABILITY

The electrical power distribution subsystems are required to be OPERABLE in MODES 1, 2, and 3 to ensure that:

(continued)

BASES

APPLICABILLITY (continued)

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of abnormal operational transients; and

b. Adequate core cooling is provided, and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

Electrical power distribution subsystem requirements for MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment are covered in the Bases for LCO 3.8.8, "Distribution Systems – Shutdown."

ACTIONS

A.1

With one Unit 3 4.16 kV shutdown board inoperable, the remaining Unit 3 4.16 kV shutdown boards are capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. The overall reliability is reduced, however, because another single failure in the remaining three 4.16 kV shutdown boards could result in the minimum required ESF functions not being supported. Therefore, the 4.16 kV shutdown board must be restored to OPERABLE status within 5 days.

The Condition A postulated worst scenario is one 4.16 kV shutdown board without AC power (i.e., no offsite power to the 4.16 kV shutdown board and the associated DG inoperable). In this condition, ESF capabilities are not at their maximum, however, they remain adequate. The four 4.16 kV shutdown boards have ESF loads for Unit 3 distributed among them so that an additional single failure will not result in a loss of safety function (e.g., one RHR pump on each board). Therefore, loss of two shutdown boards still leaves two RHR pumps. The 5 day time limit before requiring a unit shutdown in this Condition is acceptable because:

a. The remaining 4.16 kV shutdown boards have AC power available.

(continued)

BASES

ACTIONS

A.1 (continued)

b. The potential for an event in conjunction with a single failure of a redundant component in the 4.16 kV shutdown board with AC power. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

The second Completion Time for Required Action A.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition A is entered while, for instance, a Unit DC board is inoperable and subsequently returned OPERABLE, this LCO may already have been not met for up to 7 days. This situation could lead to a total duration of 12 days, since initial failure of the LCO, to restore the 4.16 kV shutdown board. At this time a Unit DC board could again become inoperable, and the 4.16 kV shutdown board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This results in establishing the "time zero" at the time this LCO was initially not met, instead of at the time Condition A was entered. The 12 day Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely.

Pursuant to LCO 3.0.6, the Distribution System Actions B, C, D, or G would not be entered even if the 4.16 kV shutdown board was inoperable, resulting in de-energization of a 480 V board. Therefore, the Required Actions of Condition A are modified by a Note to indicate that when Condition A is entered with no power source to a required 480 V board, Actions B, C, D, or G must be immediately entered. This allows Condition A to provide requirements for the loss of the 4.16 kV shutdown board without regard to whether a 480 V shutdown board is de-energized. Actions B, C, D, or G provide the appropriate restrictions for a de-energized 480 V board.

(continued)

BASES

ACTIONS (continued)

B.1

With one Unit 3 480 V shutdown board inoperable, the remaining 480 V shutdown board is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 480 V shutdown board could result in the minimum required ESF functions not being supported. Therefore, the inoperable 480 V shutdown board must be restored to OPERABLE status within 8 hours.

The Condition B postulated worst case scenario is one division (480 V shutdown board) without AC power (i.e., no offsite power to the division and the associated DG inoperable). In this condition, the unit is more vulnerable to a complete loss of AC power. It is, therefore, imperative that the unit operators' attention be focused on minimizing the potential for loss of power to the remaining division by stabilizing the unit, and on restoring power to the affected division. The 8 hour time period before requiring a unit shutdown is acceptable because:

a. There is a potential for decreased safety if the unit operator's attention is diverted from the evaluations and actions necessary to restore power to the affected division to the actions associated with taking the unit to shutdown within this time limits.

b. The potential for an event in conjunction with a single failure of a redundant component in the division with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

The second Completion Time (12 days) for Required Action B.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO. If Condition B is entered while, for instance, a 4.16 kV shutdown board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 5 days and 8 hours, since initial

(continued)

BASES

ACTIONS

B.1 (continued)

failure of the LCO, to restore the 480 V shutdown board. At this time, a 4.16 kV shutdown board could again become inoperable, and the 480 V shutdown board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition B was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

Pursuant to LCO 3.0.6, the Distribution System Action C would not be entered even if the 480 V shutdown board was inoperable, resulting in de-energization of a 480 V RMOV board. Therefore, the Required Actions of Condition B are modified by a Note to indicate that when Condition B is entered with no power source to a required 480 V RMOV board, Action C must be immediately entered. This allows Condition B to provide requirements for the loss of the 480 V shutdown board without regard to whether a 480 V RMOV board is de-energized. Action C provides the appropriate restrictions for a de-energized 480 V RMOV board.

C.1

With 480 V RMOV Board D or E inoperable the respective RHR subsystem supported by each affected board is inoperable for LPCI. The overall reliability is reduced because of the loss of one LPCI/RHR subsystem. In this condition, the remaining OPERABLE ECCS subsystems provide adequate core cooling during a LOCA. However, overall ECCS reliability is reduced, because a single failure in one of the remaining OPERABLE subsystems, concurrent with a LOCA, may result in the ECCS not being able to perform its intended safety function. Therefore, the associated RHR subsystem must be declared inoperable immediately, and the actions in the appropriate system specification taken.

(continued)

BASES

ACTIONS (continued)

D.1

With one Unit 3 480 V diesel auxiliary board inoperable, the remaining 480 V diesel auxiliary board is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 480 V diesel auxiliary board could result in the minimum required ESF functions not being supported. Therefore, the 480 V diesel auxiliary board must be restored to OPERABLE status within 5 days.

The Condition D postulated worst scenario is one 480 V diesel auxiliary board without AC power (i.e., no offsite power to the diesel auxiliary board). In this Condition, the Unit 3 DGs are more vulnerable to a complete loss of AC power. These boards can be fed from either 480 V Shutdown board 3A or 3B. Thus, each auxiliary board has access to two DGs. Therefore, the 5 day time limit before requiring a unit shutdown in this Condition is acceptable because:

a. The remaining diesel auxiliary board has an alternate source of AC power in addition to the normal source and their dedicated DG.

b. The potential for an event in conjunction with a single failure of a redundant component in the 480 V diesel auxiliary board with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

The second Completion Time (12 days) for Required Action D.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO. If Condition D is entered while, for instance, a 4.16 kV shutdown board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration

(continued)

BASES

ACTIONS

D.1 (continued)

of 10 days, since initial failure of the LCO, to restore the 480 V DG auxiliary board. At this time, a 4.16 kV shutdown board could again become inoperable, and the 480 V DG auxiliary board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition D was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

E.1

With one Unit DC board or Shutdown Board DC Distribution Panel 3EB inoperable, the remaining boards are capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. The overall reliability is reduced, however, because a single failure in the remaining boards could result in the minimum required ESF functions not being supported. Therefore, the required Unit DC board or Shutdown Board DC Distribution Panel 3EB must be restored to OPERABLE status within 7 days by powering it from the associated battery or charger.

Condition E represents one Unit DC board or Shutdown Board DC Distribution Panel 3EB without adequate DC power, potentially with both the battery significantly degraded and the associated charger nonfunctioning. In this situation the plant is significantly more vulnerable to a partial loss of DC power. However, the three Unit DC boards have ESF loads for the three BFN units distributed among them so that redundant subsystems on each unit have separate normal and alternate power supplies. The 7 day Completion Time is partially based on this and reflects a reasonable time to assess unit status as a function of the inoperable Unit DC board or Shutdown Board DC Distribution Panel 3EB and, if not restored to OPERABLE status, to prepare to effect an orderly and safe shutdown.

(continued)

BASES

ACTIONS

E.1 (continued)

The second Completion Time for Required Action E.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition E is entered while, for instance, a 4.16 kV shutdown board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 12 days, since initial failure of the LCO, to restore the Unit DC board or the Shutdown Board DC Distribution Panel. At this time, a 4.16 kV shutdown board could again become inoperable, and the Unit DC board or the Shutdown Board DC Distribution Panel could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition E was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

F.1

With one division of 4.16 kV shutdown boards inoperable, the remaining division of shutdown boards is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 4.16 kV shutdown boards could result in the minimum required ESF functions not being supported. Therefore, one of the inoperable 4.16 kV shutdown board must be restored to OPERABLE status within 8 hours.

The Condition F postulated worst case scenario is one division of 4.16 kV shutdown board without AC power (i.e., no offsite power to the division and the associated DGs inoperable). In this condition, the unit is more vulnerable to a complete loss of AC power. It is, therefore, imperative that the unit operators' attention be focused on

(continued)

BASES

ACTIONS

F.1 (continued)

minimizing the potential for loss of power to the remaining division by stabilizing the unit, and on restoring power to the affected division. The 8 hour time period before requiring a unit shutdown is acceptable because:

a. There is a potential for decreased safety if the unit operator's attention is diverted from the evaluations and actions necessary to restore power to the affected division to the actions associated with taking the unit to shutdown within this time limit.

b. The potential for an event in conjunction with a single failure of a redundant component in the division with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

The second Completion Time (12 days) for Required Action F.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO. If Condition F is entered while, for instance, a 480 V DG auxiliary board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 5 days and 8 hours, since initial failure of the LCO, to restore the 480 V shutdown board. At this time, a 480 V DG auxiliary board could again become inoperable, and a 4.16 kV shutdown board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition F was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

Pursuant to LCO 3.0.6, the Distribution System Actions B, C, D, or G would not be entered even if the 4.16 kV shutdown boards were inoperable, resulting in de-energization of a

(continued)

BASES

ACTIONS

F.1 (continued)

480 V board. Therefore, the Required Actions of Condition F are modified by a Note to indicate that when Condition F is entered with no AC source to the 4.16 kV shutdown boards, Actions B, C, D, or G must be immediately entered. This allows Condition F to provide requirement for the loss of the 4.16 kV shutdown boards without regard to whether 480 V board is de-energized. Actions B, C, D, or G provide the appropriate restrictions for a de-energized 480 V board.

G.1

Required Action G.1 is intended to provide assurance that a loss of one or more required Unit 1 or 2 AC or DC boards does not result in a complete loss of safety function of critical systems (i.e., SGT or CREVS). With one or more of the required boards inoperable, the SGT or CREVS train supported by each affected board is inoperable. Therefore, the associated SGT or CREVS subsystem must be declared inoperable immediately, and the ACTIONS in the appropriate system Specification taken.

H.1 and H.2

If the inoperable distribution subsystem cannot be restored to OPERABLE status within the associated Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

I.1

Condition I corresponds to a level of degradation in the electrical distribution system that causes a required safety function to be lost. When more than one AC or DC electrical power distribution subsystem is lost, and this results in

(continued)

BASES

ACTIONS	I.1 (continued)
	the loss of a required function, the plant is in a condition outside the accident analysis. Therefore, no additional time is justified for continued operation. LCO 3.0.3 must be entered immediately to commence a controlled shutdown.
SURVEILLANCE REQUIREMENTS	SR 3.8.7.1
	This Surveillance verifies that the AC and DC electrical power distribution subsystem is functioning properly, with the buses energized. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the redundant capability of the electrical power distribution subsystems, as well as other indications available in the control room that alert the operator to subsystem malfunctions.
REFERENCES	1. FSAR, Chapter 6. 2. FSAR, Chapter 14. 3. Regulatory Guide 1.93, December 1974. 4. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

Table B 3.8.7-1 (page 1 of 1)
AC and DC Electrical Power Distribution Systems

TYPE	VOLTAGE	ELECTRICAL POWER DISTRIBUTION SUBSYSTEMS
AC safety boards	4160 V	Shutdown Board 3EA Shutdown Board 3EB Shutdown Board 3EC Shutdown Board 3ED Shutdown Board A or B Shutdown Board D or B
	480 V	Shutdown Board 1A Shutdown Board 3A Shutdown Board 3B RMOV Board 3D RMOV Board 3E SGT Board Diesel Auxiliary Board A Diesel Auxiliary Board B Diesel Auxiliary Board 3EA Diesel Auxiliary Board 3EB
DC boards	250 V	Unit DC Board 1 Unit DC Board 2 Unit DC Board 3 Shutdown Board DC Distribution Panel A or B Shutdown Board DC Distribution Panel D or B Shutdown Board DC Distribution Panel 3EB

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.8 Distribution Systems — Shutdown

BASES

BACKGROUND

A description of the AC and DC electrical power distribution system is provided in the Bases for LCO 3.8.7, "Distribution Systems — Operating."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident and transient analyses in the FSAR, Chapter 6 (Ref. 1) and Chapter 14 (Ref. 2), assume Engineered Safety Feature (ESF) systems are OPERABLE. The AC and DC electrical power distribution systems are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded.

The OPERABILITY of the AC and DC electrical power distribution system is consistent with the initial assumptions of the accident analyses and the requirements for the supported systems' OPERABILITY.

The OPERABILITY of the minimum AC and DC electrical power sources and associated power distribution subsystems during MODES 4 and 5, and during movement of irradiated fuel assemblies in the secondary containment ensures that:

a. The facility can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

The AC and DC electrical power distribution systems satisfy Criterion 3 of the NRC Policy Statement (Ref. 3).

(continued)

BASES (continued)

LCO

Various combinations of subsystems, equipment, and components are required OPERABLE by other LCOs, depending on the specific plant condition. Implicit in those requirements is the required OPERABILITY of necessary support required features. This LCO explicitly requires energization of the portions of the electrical distribution system necessary to support OPERABILITY of Technical Specifications required systems, equipment, and components — both specifically addressed by their own LCO, and implicitly required by the definition of OPERABILITY.

In addition, some components that may be required by Unit 3 receive power through the Unit 1 and 2 electrical power distribution subsystems (e.g., Standby Gas Treatment (SGT) System, and Control Room Emergency Ventilation System (CREVS)). Therefore, the Unit 1 and 2 AC and DC electrical power distribution subsystems needed to support the required equipment must also be OPERABLE.

For a unit in MODE 4 or 5, the AC and DC boards can be placed on their alternate feederbreakers and considered OPERABLE as long as the restrictions on the associated drawings are met.

Maintaining these portions of the distribution system energized ensures the availability of sufficient power to operate the plant in a safe manner to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents and inadvertent reactor vessel draindown).

APPLICABILITY

The AC and DC electrical power distribution subsystems required to be OPERABLE in MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel in the core in case of an inadvertent draindown of the reactor vessel;

b. Systems needed to mitigate a fuel handling accident are available;

(continued)

BASES

APPLICABILITY (continued)

c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

The AC and DC electrical power distribution subsystem requirements for MODES 1, 2, and 3 are covered in LCO 3.8.7.

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.5

Although redundant required features may require redundant divisions of electrical power distribution subsystems to be OPERABLE, one OPERABLE distribution subsystem division may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, and operations with a potential for draining the reactor vessel. By allowing the option to declare required features associated with an inoperable distribution subsystem inoperable, appropriate restrictions are implemented in accordance with the affected distribution subsystem LCO's Required Actions. In many instances this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made, (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies in the secondary containment, and any activities that could result in inadvertent draining of the reactor vessel).

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC and DC electrical power distribution subsystems and to continue this action until restoration is accomplished in order to provide the necessary power to the plant safety systems.

(continued)

BASES

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.5 (continued)

Notwithstanding performance of the above conservative Required Actions, a required residual heat removal-shutdown cooling (RHR-SDC) subsystem may be inoperable. In this case, Required Actions A.2.1 through A.2.4 do not adequately address the concerns relating to coolant circulation and heat removal. Pursuant to LCO 3.0.6, the RHR-SDC ACTIONS would not be entered. Therefore, Required Action A.2.5 is provided to direct declaring RHR-SDC inoperable, which results in taking the appropriate RHR-SDC ACTIONS.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required distribution subsystems should be completed as quickly as possible in order to minimize the time the plant safety systems may be without power.

SURVEILLANCE REQUIREMENTS

SR 3.8.8.1

This Surveillance verifies that the AC and DC electrical power distribution subsystem is functioning properly, with the buses energized. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. This may be performed by verification of an absence of low voltage alarm. The 7 day Frequency takes into account the redundant capability of the electrical power distribution subsystems, as well as other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. FSAR, Chapter 6.
2. FSAR, Chapter 14.
3. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

BROWNS FERRY NUCLEAR PLANT - IMPROVED TECHNICAL SPECIFICATIONS
SECTION 3.8
LIST OF REVISED PAGES

UNIT 1 CURRENT TECH SPECS SECTIONS

Replaced Section 3.8.1, page 10 of 22 (3.9/4.9-9) Revision 1 with page 10 of 22 (3.9/4.9-9) Revision 2
Replaced Section 3.8.1, page 13 of 22 (3.9/4.9-14) Revision 1 with page 13 of 22 (3.9/4.9-14) Revision 2
Replaced Section 3.8.1, page 14 of 22 (3.9/4.9-15a) Revision 1 with page 14 of 22 (3.9/4.9-15a) Revision 2
Replaced Section 3.8.1, page 15 of 22 (3.9/4.9-15b) Revision 1 with page 15 of 22 (3.9/4.9-15b) Revision 2
Replaced Section 3.8.1, page 18 of 22 (1.0-2) Revision 1 with page 18 of 22 (1.0-2) Revision 2
Replaced Section 3.8.7, page 5 of 8 (3.9/4.9-9) Revision 1 with page 5 of 8 (3.9/4.9-9) Revision 2
Replaced Section 3.8.7, page 6 of 8 (3.9/4.9-10) Revision 1 with page 6 of 8 (3.9/4.9-10) Revision 2
Replaced Section 3.8.7, page 7 of 8 (3.9/4.9-11) Revision 1 with page 7 of 8 (3.9/4.9-11) Revision 2
Replaced Section 3.8.7, page 8 of 8 (3.9/4.9-14) Revision 1 with page 8 of 8 (3.9/4.9-14) Revision 2

~~3.9/4.9 AUXILIARY ELECTRICAL SYSTEM~~

~~LIMITING CONDITIONS FOR OPERATION~~ A1 ~~SURVEILLANCE REQUIREMENTS~~

~~3.9.B. Operation With Inoperable Equipment~~

CONDITION B

Required Action B.4

L5 and 14 days from discovery of failure to meet LCO

3. When one of the units 1 and 2 diesel generator is INOPERABLE, continued REACTOR POWER OPERATION permissible during the succeeding 7 days, provided that 2 offsite power sources are available as specified in 3.9.A.1.c ~~and all of the CS, RHR (LPCI and containment cooling) systems,~~ and the remaining three units 1 and 2 diesel generators are OPERABLE. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the COLD SHUTDOWN CONDITION within ~~24~~ 36 hours.

L8 6

L5 Proposed ACTIONS F, & H

Proposed Required ACTION H.1 M6

ACTION ~~H~~ I

L4

Proposed Action G

M1

~~4.9.B. Operation With Inoperable Equipment~~

3. When one of the units 1 and 2 diesel generators is found to be INOPERABLE, all of the remaining diesel generators shall be demonstrated to be OPERABLE within 24 hours, ~~and power availability~~ for the associated boards shall be verified within 1 hour and at least once per 8 hours thereafter.

Required Action B.3.2

Required Action B.1

L11 L3

L3 Proposed Required Action B.3.1

4. When one units 1 and 2 4-kV shutdown board is INOPERABLE, continued REACTOR POWER OPERATION is permissible for a period of 5 days provided that 2 offsite power sources are available as specified in 3.9.A.1.c and the remaining 4-kV shutdown boards and associated diesel generators, CS, RHR (LPCI and containment cooling) systems, and all 480-V emergency power boards are OPERABLE. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the COLD SHUTDOWN CONDITION within 24 hours.

4. When one 4-kV shutdown board is found to be INOPERABLE, all diesel generators associated with the remaining 4-kV shutdown boards shall be demonstrated to be OPERABLE within 24 hours, and power availability for the remaining 4-kV shutdown boards shall be verified within 1 hour and at least once per 8 hours thereafter.

See Justification for Changes for BFN ISTS 3.8.7

~~3.9/4.9 AUXILIARY ELECTRICAL SYSTEM~~

A1

~~LIMITING CONDITIONS FOR OPERATION~~	~~SURVEILLANCE REQUIREMENTS~~

~~3.9.B. Operation With Inoperable Equipment~~

12. When one 480-V shutdown board is found to be INOPERABLE, the reactor will be placed in HOT STANDBY CONDITION within 12 hours and COLD SHUTDOWN CONDITION within 24 hours.

See Justification for CHANGES for BFN ISTS 3.8.7

13. If one 480-V RMOV board mg set is INOPERABLE, REACTOR POWER OPERATION may continue for a period not to exceed seven days, provided the remaining 480-V RMOV board mg sets and their associated loads remain OPERABLE.

14. If any two 480-V RMOV board mg sets become INOPERABLE, the reactor shall be placed in the COLD SHUTDOWN CONDITION within 24 hours.

See Justification for CHANGES for BFN ISTS ~~3.5.1~~ 3.8.7

15. If the requirements for operating in the conditions specified by 3.9.B.1 through 3.9.B.14 cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the COLD SHUTDOWN CONDITION within ~~24~~ 36 hours. L4

~~L3~~

ACTION ~~H~~ I

M6

Proposed Required Action ~~H~~ I.1

Proposed ACTION ~~I~~ J

~~A6~~ L5

REV. ~~1~~ 2

Specification 3.8.1

~~3.9/4.9 AUXILIARY ELECTRICAL SYSTEM~~

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~~LIMITING CONDITIONS FOR OPERATION~~ A1	~~SURVEILLANCE REQUIREMENTS~~
~~3.9.D. Diesel Generators Required for Units 1, 2, and 3 Shared Systems~~ <See 3.8.2 for non-Mode 1, 2, 3>	~~4.9.D. Diesel Generators Required for Units 1, 2, and 3 Shared Systems~~

Applicability Mode 1, 2 + 3

LCO 3.6.4.3

A1

LCO 3.7.3

1. Whenever standby gas treatment is required to be OPERABLE in accordance with Specification ~~3.7.B~~ and/or control room emergency ventilation is required to be OPERABLE in accordance with Specification ~~3.7.E,~~ the associated diesel generator aligned to supply emergency power to that equipment shall be OPERABLE.

LA1 ~~A3~~

a. Standby gas treatment train A and/or control room emergency ventilation train A - Diesel generator 1/2A or 1/2B.

b. Standby gas treatment train B - Diesel generator 1/2D or 1/2B.

LCO 3.8.1.c

~~LA1~~

c. Standby gas treatment ~~train C - Diesel generator 3D.~~

d. Control room emergency ~~ventilation train B - Diesel generator 3C or 3B.~~

A4 for Unit 3 D/Gs

2. When the diesel generator aligned to supply emergency power to the equipment in 3.9.D.1 is inoperable on a unit that is in cold shutdown, refueling, or is defueled, the equipment may be considered OPERABLE for the purpose of satisfying the corresponding technical specification during the succeeding 30 days, provided that the redundant train(s) of equipment and their normal and emergency power supplies are OPERABLE.

Required Action ~~3.2~~ K Completion Time

Required Action ~~3.1~~ K

~~L6~~

A1

~~Surveillance requirements are as specified in 4.9.A.1, 4.9.A.2, 4.9.A.3, and 4.9.A.4 with the following provisions:~~

1. The testing provisions of 4.9.A.1.b do not apply for a defueled unit.

LA5 8

2. ~~The common accident signal testing required by 4.9.A.3 requires the signal to originate only from units that require OPERABILITY of the standby gas treatment system and/or the control room emergency ventilation system. This test will verify the automatic start of the diesel generators aligned to the standby gas treatment system and/or the control room emergency ventilation system.~~

for Unit 1 and 2 DGs

<See Justification for Changes for BFN ISTS 3.8.2>

~~3.9/4.9 AUXILIARY ELECTRICAL SYSTEM~~

A1

~~LIMITING CONDITIONS FOR OPERATION~~ ~~SURVEILLANCE REQUIREMENTS~~

~~3.9.D. Diesel Generators Required for Units 1, 2, and 3 Shared Systems~~

Required Action K.2

3. If Specification 3.9.D.2 cannot be met, the affected equipment shall be declared inoperable.

~~4.9.D. Diesel Generators Required for Units 1, 2, and 3 Shared Systems~~

Rev. 2

A1 ~~1.0 DEFINITIONS (Cont'd)~~ Specification 3.8.1 NOV 18 198

C. When a system, subsystem, train, component, or device is determined to be inoperable solely because its onsite power source is inoperable, or solely because its offsite power source is inoperable, it may be considered operable for the purpose of satisfying the requirements of its applicable Limiting Condition For Operation, provided:

L6

(1) its corresponding offsite or diesel power source is operable; and (2) all of its redundant system(s), subsystem(s), train(s), component(s), and device(s) are operable, or likewise satisfy these requirements. Unless both conditions (1) and (2) are satisfied, the unit shall be placed in at least Hot Standby within 6 hours, and in at least Cold Shutdown within the following 30 hours. This definition is not applicable in Cold Shutdown or Refueling. This provision describes what additional conditions must be satisfied to permit operation to continue consistent with the specifications for power sources, when an offsite or onsite power source is not operable. It specifically prohibits operation when one division is inoperable because its offsite or diesel power source is inoperable and a system, subsystem, train, component, or device in another division is inoperable for another reason. This provision permits the requirements associated with individual systems, subsystems, trains, components, or devices to be consistent with the requirements of the associated electrical power source. It allows operation to be governed by the time limit of the requirements associated with the Limiting Condition For Operation for the offsite or diesel power source, not the individual requirements for each system, subsystem, train, component, or device that is determined to be inoperable solely because of the inoperability of its offsite or diesel power source.

LCO 3.8.1 Required Action A.2 + Required Action B.2 + Required Action E.1 + Required Action H.2.1

D. PRIOR TO STARTUP - Prior to withdrawing the first control rod for the purpose of making the reactor critical.

E. Operable - Operability - A system, subsystem, train, component, or device shall be operable or have operability when it is capable of performing its specified function(s). Implicit in this definition shall be the assumption that all necessary attendant instrumentation, controls, normal and emergency electrical power sources, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its function(s) are also capable of performing their related support function(s).

F. Operating - Operating means that a system or component is performing its intended functions in its required manner.

G. Immediate - Immediate means that the required action will be initiated as soon as practicable considering the safe operation of the unit and the importance of the required action.

See Justification for Changes for BFN ISTS Section 1.0

REV. ~~1~~ 2

Specification 3.8.7

NOV 1

~~3.9/4.9 AUXILIARY ELECTRICAL SYSTEM~~

A1

~~LIMITING CONDITIONS FOR OPERATION~~

~~3.9.B. Operation With Inoperable Equipment~~

3. When one of the units 1 and 2 diesel generator is INOPERABLE, continued REACTOR POWER OPERATION permissible during the succeeding 7 days, provided that 2 offsite power sources are available as specified in 3.9.A.1.c and all of the CS, RHR (LPCI and containment cooling) systems, and the remaining three units 1 and 2 diesel generators are OPERABLE. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the COLD SHUTDOWN CONDITION within 24 hours.

Condition A

Required Action A.1

M1

and 12 days from discovery of failure to meet LCO

4. When one units 1 and 2 4-kV shutdown board is INOPERABLE, continued REACTOR POWER OPERATION is permissible for a period of 5 days provided that 2 offsite power sources are available as specified in 3.9.A.1.c and the remaining 4-kV shutdown boards and associated diesel generators, CS, RHR (LPCI and containment cooling) systems, and all 480-V emergency power boards are OPERABLE. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the COLD SHUTDOWN CONDITION within ~~24~~ 36 hours.

Cond ~~G~~ H I

A2

Refer to LCO 3.8.1 Req Act. B.2

H ~~G~~ ACTION ~~F~~

L1

~~SURVEILLANCE REQUIREMENTS~~

~~4.9.B. Operation With Inoperable Equipment~~

3. When one of the units 1 and 2 diesel generators is found to be INOPERABLE, all of the remaining diesel generators shall be demonstrated to be OPERABLE within 24 hours, and power availability for the associated boards shall be verified within 1 hour and at least once per 8 hours thereafter.

See Justification For Changes for BFN ISTS 3.8.1 in This Section

4. ~~When one 4-kV shutdown board is found to be INOPERABLE, all diesel generators associated with the remaining 4-kV shutdown boards shall be demonstrated to be OPERABLE within 24 hours, and power availability for the remaining 4-kV shutdown boards shall be verified within 1 hour and at least once per 8 hours thereafter.~~

L2

M2 H ~~G~~

Proposed Required Action ~~F~~.1

A1

~~3.9.B. Operation With Inoperable Equipment~~

5. When one of the shutdown buses is INOPERABLE, REACTOR POWER OPERATION is permissible for a period of 7 days.

6. When one of the 480-V diesel auxiliary boards becomes INOPERABLE, REACTOR POWER OPERATION is permissible for a period of 5 days.

ACTION ~~C~~ D

AND 12 days from discovery of failure to meet LCO

M1

7. From and after the date that one of the three 250-V unit batteries and/or its associated battery board is found to be INOPERABLE for any reason, continued REACTOR POWER OPERATION is permissable during the succeding 7 days. ~~Except for routine surveillance testing, NRC shall be notified within 24 hours of the situation, the precautions to be taken during this period, and the plans to return the failed component to an OPERABLE state.~~

ACTION ~~D~~ E (1st Part)

LA2

~~4.9.B. Operation With Inoperable Equipment~~

5. When a shutdown bus is found to be INOPERABLE, all 1 and 2 diesel generators shall be proven OPERABLE within 2 hours.

L2

6. ~~When one units 1 and 2 diesel auxiliary board is found to be INOPERABLE, each unit 1 and 2 diesel generator shall be proven OPERABLE within 24 hours and power availability for the remaining diesel auxiliary board shall be verified within 1 hour and at least once per 8 hours thereafter.~~

See Justification for changes for BFN ISTS 3.8.4 in this Section

M1

and 12 days from discovery of failure to meet LCO.

~~3.9/4.9 AUXILIARY ELECTRICAL SYSTEM~~

~~LIMITING CONDITIONS FOR OPERATION~~ A1	~~SURVEILLANCE REQUIREMENTS~~

~~3.9.B Operation With Inoperable Equipment~~

(OR) M3

ACTION E (2nd part)

L4 7

8. From and after the date that one of the 250-V shutdown board batteries and/or its associated battery board is found to be INOPERABLE for any reason, continued REACTOR POWER OPERATION IS permissible during the succeeding five days in accordance with 3.9.B.7. LA 2

See Justification for Changes for BFN ISTS 3.8.4 IN This Section

9. When one division of the logic system is INOPERABLE, continued REACTOR POWER OPERATION is permissible under this condition for seven days, provided the CSCS requirements listed in specification 3.9.B.3 are satisfied. The NRC shall be notified within 24 hours of the situation, the precautions to be taken during this period, and the plans to return the failed component to an OPERABLE state.

See Justification for Changes for BFN ISTS 3.8.1

A1 ~~10. (deleted)~~

11. The following limiting conditions for operation exist for the undervoltage relays which start the diesel generators on the 4-kV shutdown boards.

See Justification For Changes for BFN ISTS 3.3.8.1 IN SECTION 3.3

M3 Proposed Action ~~G~~ H I

M5 Proposed ACTION ~~E~~ F G

M6 Proposed Action F

REV. ~~1~~ 2

Specification 3.8.7 NOV 18

~~3.9/4.9 AUXILIARY ELECTRICAL SYSTEM~~ A1

~~LIMITING CONDITIONS FOR OPERATION~~

~~SURVEILLANCE REQUIREMENTS~~

~~3.9.B Operation With Inoperable Equipment~~

ACTION B

12. When one 480-V shutdown board is found to be INOPERABLE, the reactor will be placed in HOT ~~STANDBY~~ CONDITION within 12 hours and COLD SHUTDOWN CONDITION within ~~24~~ 36 hours.

Restore in 8 hours and 12 days from discovery of failure to meet the LCO L3

SHUTDOWN M2

L1

ACTION H ~~G~~ ~~F~~

ACTION C

~~13. If one 480-V RMOV board mg set is INOPERABLE, REACTOR POWER OPERATION may continue for a period not to exceed seven days, provided the remaining 480-V RMOV board mg sets and their associated loads remain OPERABLE.~~

declare the affected RHR Subsystem inoperable immediately.

LA5

See Justification for Changes for BFN ISTS 3.5.1

ACTION ~~H~~ I

~~14. If any two 480-V RMOV board mg sets become INOPERABLE, the reactor shall be placed in the COLD SHUTDOWN CONDITION within 24 hours.~~

Proposed required Action ~~H~~ I.1

LA5

ACTION ~~F~~ ~~G~~ H

15. If the requirements for operating in the conditions specified by 3.9.B.1 through 3.9.B.14 cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the COLD SHUTDOWN CONDITION within ~~24~~ 36 hours.

Proposed Required ACTION ~~F~~ G.1 M2

L1

BROWNS FERRY NUCLEAR PLANT - IMPROVED TECHNICAL SPECIFICATIONS
SECTION 3.8
LIST OF REVISED PAGES

UNIT 2 CURRENT TECH SPECS SECTIONS

Replaced Section 3.8.1, page 4 of 22 (3.9/4.9-3) Revision 1 with page 4 of 22 (3.9/4.9-3) Revision 2
Replaced Section 3.8.1, page 10 of 22 (3.9/4.9-9) Revision 1 with page 10 of 22 (3.9/4.9-9) Revision 2
Replaced Section 3.8.1, page 13 of 22 (3.9/4.9-14) Revision 1 with page 13 of 22 (3.9/4.9-14) Revision 2
Replaced Section 3.8.1, page 14 of 22 (3.9/4.9-15a) Revision 1 with page 14 of 22 (3.9/4.9-15a) Revision 2
Replaced Section 3.8.1, page 15 of 22 (3.9/4.9-15b) Revision 1 with page 15 of 22 (3.9/4.9-15b) Revision 2
Replaced Section 3.8.1, page 18 of 22 (1.0-2) Revision 1 with page 18 of 22 (1.0-2) Revision 2
Replaced Section 3.8.7, page 5 of 8 (3.9/4.9-9) Revision 1 with page 5 of 8 (3.9/4.9-9) Revision 2
Replaced Section 3.8.7, page 6 of 8 (3.9/4.9-10) Revision 1 with page 6 of 8 (3.9/4.9-10) Revision 2
Replaced Section 3.8.7, page 7 of 8 (3.9/4.9-11) Revision 1 with page 7 of 8 (3.9/4.9-11) Revision 2
Replaced Section 3.8.7, page 8 of 8 (3.9/4.9-14) Revision 1 with page 8 of 8 (3.9/4.9-14) Revision 2

REV. ~~1~~ 2

Specification 3.8.1

OCT 2 5 1993

~~3.9/4.9 AUXILIARY ELECTRICAL SYSTEM~~

~~LIMITING CONDITIONS FOR OPERATION~~	~~SURVEILLANCE REQUIREMENTS~~

A1

~~3.9.A. Auxiliary Electrical Equipment~~

~~3.9.A.1.c.~~ (Cont'd)

LA1

(4) The Athens 161-kV line is available to the units 1 and 2 shutdown boards through a common station-service transformer when unit 1 is in Cold Shutdown and unit 3 is not claiming the Athens line as an offsite source.

NOTE FOR (3) AND (4):

With no cooling tower pumps or fans running, a cooling tower transformer may be substituted for a common station-service transformer.

See Justification for Changes for BFN ISTS 3.8.3

~~4.9.A. Auxiliary Electrical System~~

~~4.9.A.1.b. (Cont'd)~~

SR 3.8.1.~~10~~9.c M5 emergency loads through load sequencing, and operates for greater than or equal to five minutes while its generator is loaded with the emergency loads.

3.8.1.9.b SR ~~3.8.1.6~~ (3) On diesel generator breaker trip, the loads are shed from the emergency buses and the diesel output breaker recloses on the auto-start signal, the emergency buses are energized with permanently connected loads, the auto-connected emergency loads are energized through load sequencing, and the diesel operates for greater than or equal to five minutes while its generator is loaded with the emergency loads.

Add acceptance criteria M5

SR 3.8.1.~~10~~9.c

c. Once a month the quantity of diesel fuel available shall be logged.

R1 LA2

d. Each diesel generator shall be inspected in accordance with instructions based on the manufacturer's recommendations once every 24 months.

e. Quarterly the quality of each diesel generator's (A, B, C, and D) seven-day fuel supply shall be checked. The fuel oil quality shall be within the acceptable limits specified in Table 1 of ASTM-D975-89.

A1

~~3.9.B. Operation With Inoperable Equipment~~

CONDITION B

Required Action B.4

3. When one of the units 1 and 2 diesel generator is INOPERABLE, continued REACTOR POWER OPERATION is permissible during the succeeding 7 days, and 14 days from discovery of failure to meet LCO provided that 2 offsite power sources are available as specified in 3.9.A.1.c and all of the CS, RHR (LPCI and containment cooling) systems, and the remaining three units 1 and 2 diesel generators are OPERABLE. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the COLD SHUTDOWN CONDITION within ~~24~~ 36 hours.

6 L8

L5

Proposed ACTIONS F, H

Proposed Required Action H.1 M6

ACTION H.1

L4

Proposed Action G

M9

4. When one units 1 and 2 4-kV shutdown board is INOPERABLE, continued REACTOR POWER OPERATION is permissible for a period of 5 days provided that 2 offsite power sources are available as specified in 3.9.A.1.c and the remaining 4-kV shutdown boards and associated diesel generators, CS, RHR (LPCI and containment cooling) systems, and all 480-V emergency power boards are OPERABLE. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the COLD SHUTDOWN CONDITION within 24 hours.

~~4.9.B. Operation With Inoperable Equipment~~

3. When one of the units 1 and 2 diesel generators is found to be INOPERABLE, all of the remaining diesel generators shall be demonstrated to be OPERABLE within 24 hours, ~~and power availability~~ for the associated boards shall be verified within 1 hour and at least once per 8 hours thereafter.

Required Action B.3.2

Required Action B.1

M3

L3 Proposed Required Action B.3.1

4. When one 4-kV shutdown board is found to be INOPERABLE, all diesel generators associated with the remaining 4-kV shutdown boards shall be demonstrated to be OPERABLE within 24 hours, and power availability for the remaining 4-kV shutdown boards shall be verified within 1 hours and at least once per 8 hours thereafter.

See Justification for Changes for BFN ISTS 3.8.7

~~3.9.B. Operation With Inoperable Equipment~~

12. When one 480-V shutdown board is found to be INOPERABLE, the reactor will be placed in the HOT STANDBY CONDITION within 12 hours and COLD SHUTDOWN CONDITION within 24 hours.

SEE JUSTIFICATION FOR CHANGES FOR BFN ISTS 3.8.7

13. If one 480-V RMOV board mg set is INOPERABLE, REACTOR POWER OPERATION may continue for a period not to exceed seven days, provided the remaining 480-V RMOV board mg sets and their associated loads remain OPERABLE.

14. If any two 480-V RMOV board mg sets become INOPERABLE, the reactor shall be placed in the COLD SHUTDOWN CONDITION within 24 hours.

SEE JUSTIFICATION FOR CHANGES FOR BFN ISTS ~~3.5.1~~ 3.8.7

Action ~~H~~ I

15. If the requirements for operating in the conditions specified by 3.9.B.1 through 3.9.B.14 cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the COLD SHUTDOWN CONDITION within ~~24~~ 36 hours.

~~L8~~

M6

Proposed Required Action ~~H~~ I.1

L4

Proposed ACTION ~~I~~ J

~~A6~~ L5

Rev. 2

Specification 3.8.1

MAR 09 1994

~~3.9/4.9 AUXILIARY ELECTRICAL SYSTEM~~

~~LIMITING CONDITIONS FOR OPERATION~~

~~3.9.D Diesel Generators Required for Units 1, 2, and 3 Shared Systems~~ A1

< See 3.8.2 for non-MODE 1,2,3 >

Applicability Mode 1,2,3

1. Whenever standby gas treatment is required to be OPERABLE in accordance with Specification ~~3.7.B~~ LCO 3.6.4.3 and/or control room emergency ventilation is required to be OPERABLE in accordance with Specification ~~3.7.E,~~ LCO 3.7.3 the associated diesel generator aligned to supply emergency power to that equipment shall be OPERABLE.

A1

LA1 ~~A3~~

a. Standby gas treatment train A and/or control room emergency ventilation train A - Diesel generator 1/2A or 1/2B.

b. Standby gas treatment train B - Diesel generator 1/2D or 1/2B.

LCO 3.8.1.c

c. Standby gas treatment ~~train C - Diesel generator 3D~~

~~LA1~~

d. Control room emergency ventilation ~~train B - Diesel generator 3C or 3B.~~

A4 for Unit 3 DGs

2. When the diesel generator aligned to supply emergency power to the equipment in 3.9.D.1 is inoperable on a unit that is in cold shutdown, refueling, or is defueled, the equipment may be considered OPERABLE for the purpose of satisfying the corresponding technical specification during the succeeding 30 days, provided that the redundant train(s) of equipment and their normal and emergency power supplies are OPERABLE.

Required Action K.2 Completion Time

Required Action K.1

~~A6~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.9.D Diesel Generators Required fo. Units 1, 2, and 3 Shared Systems~~

A1

~~Surveillance requirements are as specified in 4.9.A.1, 4.9.A.2, 4.9.A.3, and 4.9.A.4 with the following provisions:~~

1. The testing provisions of 4.9.A.1.b do not apply for a defueled unit.

LA8 ~~LA5~~

2. ~~The common accident signal testing required by 4.9.A.3 requires the signal to originate only from units that require OPERABILITY of the standby gas treatment system and/or the control room emergency ventilation system. This test will verify the automatic start of the diesel generators aligned to the standby gas treatment system and/or the control room emergency ventilation system.~~

for Unit 1 and 2 DGs

< See Justification for Changes for BFN ISTS 3.8.2 >

Rev. 2

Specification 3.8.1

MAR 0 9 1994

~~3.9/4.9 AUXILIARY ELECTRICAL SYSTEM~~

~~LIMITING CONDITIONS FOR OPERATION~~	~~SURVEILLANCE REQUIREMENTS~~
A1 ~~3.9.D. Diesel Generators Required for Units 1, 2, and 3 Shared Systems~~	~~4.9.D. Diesel Generators Required for Units 1, 2, and 3 Shared Systems~~
Required Action K.2 — 3. If Specification 3.9.D.2 cannot be met, the affected equipment shall be declared inoperable.	

Rev. 2

Specification 3.8.1

NOV 18 1988

A1 ~~1.0 DEFINITIONS (Cont'd)~~

L6

2. When a system, subsystem, train, component, or device is determined to be inoperable solely because its onsite power source is inoperable, or solely because its offsite power source is inoperable, it may be considered operable for the purpose of satisfying the requirements of its applicable Limiting Condition for Operation, provided:

LCO 3.8.1 Required Action A.2 + Required Action B.2 + Required Action E.1 + Required Action K.1

(1) its corresponding offsite or diesel power source is operable; and (2) all of its redundant system(s), subsystem(s), train(s), component(s), and device(s) are operable, or likewise satisfy these requirements. Unless both conditions (1) and (2) are satisfied, the unit shall be placed in at least Hot Standby within 6 hours, and in at least Cold Shutdown within the following 30 hours. This definition is not applicable in Cold Shutdown or Refueling. This provision describes what additional conditions must be satisfied to permit operation to continue consistent with the specifications for power sources, when an offsite or onsite power source is not operable. It specifically prohibits operation when one division is inoperable because its offsite or diesel power source is inoperable and a system, subsystem, train, component, or device in another division is inoperable for another reason. This provision permits the requirements associated with individual systems, subsystems, trains, components, or devices to be consistent with the requirements of the associated electrical power source. It allows operation to be governed by the time limit of the requirements associated with the Limiting Condition for Operation for the offsite or diesel power source, not the individual requirements for each system, subsystem, train, component, or device that is determined to be inoperable solely because of the inoperability of its offsite or diesel power source.

D. PRIOR TO STARTUP - Prior to withdrawing the first control rod for the purpose of making the reactor critical.

E. Operable - Operability - A system, subsystem, train, component, or device shall be Operable or have operability when it is capable of performing its specified function(s). Implicit in this definition shall be the assumption that all necessary attendant instrumentation, controls, normal and emergency electrical power sources, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its function(s) are also capable of performing their related support function(s).

F. Operating - Operating means that a system or component is performing its intended functions in its required manner.

G. Immediate - Immediate means that the required action will be initiated as soon as practicable considering the safe operation of the unit and the importance of the required action.

(See Justification for Changes for BFN ISTS Section 1.0)

AMENDMENT NO. 154

~~3.9/4.9 AUXILIARY ELECTRICAL SYSTEM~~

~~LIMITING CONDITIONS FOR OPERATION~~ A1 ~~SURVEILLANCE REQUIREMENTS~~

~~3.9.B. Operation With Inoperable Equipment~~

3. When one of the units 1 and 2 diesel generator is INOPERABLE, continued REACTOR POWER OPERATION is permissible during the succeeding 7 days, provided that 2 offsite power sources are available as specified in 3.9.A.1.c and all of the CS, RHR (LPCI and containment cooling) systems, and the remaining three units 1 and 2 diesel generators are OPERABLE. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the COLD SHUTDOWN CONDITION within 24 hours.

CONDITION A

Required ACTION A.1

M1

and 12 days from discovery of failure to meet LCO

4. When one units 1 and 2 4-kV shutdown board is INOPERABLE, continued REACTOR POWER OPERATION is permissible for a period of 5 days, provided that 2 offsite power sources are available as specified in 3.9.A.1.c and the remaining 4-kV shutdown boards and associated diesel generators, CS, RHR (LPCI and containment cooling) systems, and all 480-V emergency power boards are OPERABLE. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the COLD SHUTDOWN CONDITION within ~~24~~ 36 hours.

L1

COND ~~E~~ H

A2

Refer to LCO 3.8.1 Reg. Act A.2

ACTION ~~F~~ G H

~~4.9.B. Operation With Inoperable Equipment~~

3. When one of the units 1 and 2 diesel generators is found to be INOPERABLE, all of the remaining diesel generators shall be demonstrated to be OPERABLE within 24 hours, and power availability for the associated boards shall be verified within 1 hour and at least once per 8 hours thereafter.

SEE JUSTIFICATION FOR CHANGES FOR BFN ISTS 3.8.1 IN THIS SECTION

L2

4. When one 4-kV shutdown board is found to be INOPERABLE, all diesel generators associated with the remaining 4-kV shutdown boards shall be demonstrated to be OPERABLE within 24 hours, and power availability for the remaining 4-kV shutdown boards shall be verified within 1 hours and at least once per 8 hours thereafter.

M2

Proposed Required ACTION ~~F~~.1 H

~~3.9/4.9 AUXILIARY ELECTRICAL SYSTEM~~

See Justification for Changes for BFN ISTS 3.8.1

~~LIMITING CONDITIONS FOR OPERATION~~ | ~~SURVEILLANCE REQUIREMENTS~~

A1

~~3.9.B. Operation With Inoperable Equipment~~

5. When one of the shutdown buses is INOPERABLE, REACTOR POWER OPERATION is permissible for a period of 7 days.

6. When one of the 480-V diesel auxiliary boards becomes INOPERABLE, REACTOR POWER OPERATION is permissible for a period of 5 days.

ACTION C D

AND 12 days from discovery of failure to meet LCO

M1

7. From and after the date that one of the three 250-V unit batteries and/or its associated battery board is found to be INOPERABLE for any reason, continued REACTOR POWER OPERATION is permissible during the succeeding 7 days. ~~Except for routine surveillance testing, NRC shall be notified within 24 hours of the situation, the precautions to be taken during this period, and the plans to return the failed component to an OPERABLE state.~~

ACTION ~~D~~ E (1st part)

and 12 days from discovery of failure to meet LCO

M1

LA2

~~4.9.B. Operation With Inoperable Equipment~~

5. When a shutdown bus is found to be INOPERABLE, all 1 and 2 diesel generators shall be proven OPERABLE within 24 hours.

6. ~~When one units 1 and 2 diesel auxiliary board is found to be INOPERABLE, each unit 1 and 2 diesel generator shall be proven OPERABLE within 24 hours, and power availability for the remaining diesel auxiliary board shall be verified within 1 hour and at least once per 8 hours thereafter.~~

L2

SEE JUSTIFICATION FOR CHANGE FOR BFN ISTS 3.8.4 IN THIS SECTION

~~LIMITING CONDITIONS FOR OPERATION~~ A1 ~~SURVEILLANCE REQUIREMENTS~~

~~3.9.B Operation With Inoperable Equipment~~

OR

M3

ACTION ~~D~~ E (2nd part)

8. From and after the date that one of the 250-V shutdown board batteries and/or its associated battery board is found to be INOPERABLE for any reason, continued REACTOR POWER OPERATION is permissible during the succeeding five 7 days in accordance with 3.9.B.7.

SEE JUSTIFICATION FOR CHANGE FOR BFN ISTS 3.8.4 IN THIS SECTION

L4

LA2

9. When one division of the logic system is INOPERABLE, continued REACTOR POWER OPERATION is permissible under this condition for seven days, provided the CSCS requirements listed in Specification 3.9.B.3 are satisfied. The NRC shall be notified within 24 hours of the situation, the precautions to be taken during this period, and the plans to return the failed component to an OPERABLE state.

SEE JUSTIFICATION FOR CHANGES FOR BFN ISTS 3.8.1

A1 ~~10. (deleted)~~

11. The following limiting conditions for operation exist for the undervoltage relays which start the diesel generators on the 4-kV shutdown boards.

SEE JUSTIFICATION FOR CHANGES FOR BFN ISTS 3.3.8.1 IN SECTION 3.3

M3 Proposed ACTION ~~G~~ ~~H~~ I

M5 Proposed ACTION ~~E~~ ~~F~~ G

M6 Proposed Action F

~~3.9.B. Operation With Inoperable Equipment~~

L3

12. When one 480-V shutdown board is found to be INOPERABLE, the reactor will be placed in the HOT ~~STANDBY~~ CONDITION within 12 hours and COLD SHUTDOWN CONDITION within ~~24~~ 36 hours.

ACTION B — Restore in 8 hours and 12 days from discovery of failure to meet the LCO

ACTION ~~G~~ ~~F~~ H — SHUTDOWN M2

L1

ACTION C

13. ~~If one 480-V RMOV board mg set is INOPERABLE, REACTOR POWER OPERATION may continue for a period not to exceed seven days, provided the remaining 480-V RMOV board mg sets and their associated loads remain OPERABLE.~~

Declare the affected RHR Subsystem inoperable immediately.

LA5

~~See Justification for Changes for BFN ISTS 3.5.1~~

ACTION ~~H~~ I

14. If any two 480-V RMOV board ~~mg sets~~ become INOPERABLE, ~~the reactor shall be placed in the COLD SHUTDOWN CONDITION within 24 hours.~~

proposed required Action ~~H~~ I.1

LA5

ACTION ~~F~~ ~~G~~ H

15. If the requirements for operating in the conditions specified by 3.9.B.1 through 3.9.B.14 cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the COLD SHUTDOWN CONDITION within ~~24~~ 36 hours.

Proposed Required Action ~~F~~ H G.1 M2

L1

BROWNS FERRY NUCLEAR PLANT - IMPROVED TECHNICAL SPECIFICATIONS
SECTION 3.8
LIST OF REVISED PAGES

UNIT 3 CURRENT TECH SPECS SECTIONS

Replaced Section 3.8.1, page 9 of 21 (3.9/4.9-8) Revision 1 with page 9 of 21 (3.9/4.9-8) Revision 2
Replaced Section 3.8.1, page 12 of 21 (3.9/4.9-13) Revision 1 with page 12 of 21 (3.9/4.9-13) Revision 2
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Replaced Section 3.8.7, page 5 of 7 (3.9/4.9-9) Revision 1 with page 5 of 7 (3.9/4.9-9) Revision 2
Replaced Section 3.8.7, page 7 of 7 (3.9/4.9-13) Revision 1 with page 7 of 7 (3.9/4.9-13) Revision 2

~~3.9/4.9 AUXILIARY ELECTRICAL SYSTEM~~

~~LIMITING CONDITIONS FOR OPERATION~~ | ~~SURVEILLANCE REQUIREMENTS~~

~~3.9.B. Operation with Inoperable Equipment~~ A1

LCO 3.8.1

Whenever the reactor is in STARTUP mode or RUN mode and not in a Cold Condition, the availability of electric power shall be as specified in 3.9.A except as specified herein. LCO 3.8.1

Mode 1, 2 + 3 M1

Condition A

1. From and after the date that only one offsite power source is available, reactor operation is permissible under this condition for seven days.

Required Action A.3

L5 And 14 days from discovery of failure to meet LCO

L5 Proposed Action E

CONDITION B

2. When one unit 3 diesel generator (3A, 3B, 3C, or 3D) is inoperable, continued reactor operation is permissible during the succeeding 7 days, provided that two offsite power sources are available as specified in 3.9.A.1.c. and all of the CS, RHR (LPCI and containment cooling) systems, and the remaining three unit 3 diesel generators are OPERABLE. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be shut down and in the Cold Condition within ~~24~~ 36 hours.

Required Action B.4

5 and 14 days from discovery of failure to meet LCO

6 L8

L5 Proposed Actions F, ~~G~~ H

ACTION ~~K~~ I

Proposed Action G

M7

L4

Proposed Required Action ~~K~~.1 M6

~~4.9.B. Operation with Inoperable Equipment~~

Required Action A.1

1. When only one offsite power source is OPERABLE, all unit 3 diesel generators must be demonstrated to be OPERABLE within 24 hours, and power availability for the associated boards shall be verified within 1 hour and at least once per 8 hours thereafter.

L1

~~M3~~ 2

Proposed ~~SR 3.8.1.1~~

2. When one unit 3 diesel generator is found to be inoperable, all of the remaining unit 3 diesel generators shall be demonstrated to be OPERABLE within 24 hours, and power availability for the associated boards shall be verified within 1 hour and at least once per 8 hours thereafter.

Required Action B.~~3~~.2

Required Action B.1

M3

L3 Proposed Required Action B.3.1

~~LIMITING CONDITIONS FOR OPERATION~~	~~SURVEILLANCE REQUIREMENTS~~
~~3.9.B Operation With Inoperable Equipment~~	
10. When one 480-V shutdown board is found to be inoperable, the reactor will be placed in HOT STANDBY CONDITION within 12 hours and COLD SHUTDOWN CONDITION within 24 hours.	See Justification for Changes for BFN ISTS 3.8.7
11. If one 480-V RMOV board mg set is inoperable, REACTOR POWER OPERATION may continue for a period not to exceed seven days, provided the remaining 480-V RMOV board mg sets and their associated loads remain OPERABLE.	See Justification for CHANGES FOR BFN ISTS ~~3.5.1~~ 3.8.7
12. If any two 480-V RMOV board mg sets become inoperable, the reactor shall be placed in the COLD SHUTDOWN CONDITION within 24 hours.	
Action H I — 13. If the requirements for operation in the conditions specified by 3.9.B.1 through 3.9.B.12 cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the COLD SHUTDOWN CONDITION within ~~24~~ 36 hours. (L4)	~~L6~~ (M6) Proposed Required Action I ~~H~~.1
Proposed ACTION J ~~I~~ (~~A6~~) L5	

REV. X2

Specification 3.8.1

~~3.9/4.9 AUXILIARY ELECTRICAL SYSTEM~~

MAR 0 9 1994

~~LIMITING CONDITIONS FOR OPERATION~~

~~3.9.D. Diesel Generators Required for Units 1, 2, and 3 Shared Systems~~ A1

<See 3.8.2 for non-mode 1,2,3>

1. Whenever standby gas treatment is required to be OPERABLE in accordance with Specification ~~3.7.B~~ and/or control room emergency ventilation is required to be OPERABLE in accordance with Specification ~~3.7.E,~~ the associated diesel generator aligned to supply emergency power to that equipment shall be OPERABLE.

Applicability Mode 1,2,3

LCO 3.6.4.2

A1

LCO 3.7.3

LCO 3.8.1.c

a. ~~Standby gas treatment train A and/or control room emergency ventilation train A - Diesel generator 1/2A or 1/2B.~~

b. ~~Standby gas treatment train B - Diesel generator 1/2D or 1/2C.~~

LA1

c. Standby gas treatment train C - Diesel generator 3D.

d. Control room emergency ventilation train B - Diesel generator 3C or 3B.

LA1

2. When the diesel generator aligned to supply emergency power to the equipment in 3.9.D.1 is inoperable on a unit that is in cold shutdown, refueling, or is defueled, the equipment may be considered OPERABLE for the purpose of satisfying the corresponding technical specification during the succeeding 30 days, provided that the redundant train(a) of equipment and their normal and emergency power supplies are OPERABLE.

A4 for units 1+2 DG's

M

Required Action K.2 Completion Time

Required Action K.1

L6

~~SURVEILLANCE REQUIREMENTS~~

~~4.9.D. Diesel Generators Required for Units 1, 2, and 3 Shared Systems~~

A1

~~Surveillance requirements are as specified in 4.9.A.1, 4.9.A.2, 4.9.A.3, and 4.9.A.4 with the following provisions:~~

1. The testing provisions of 4.9.A.1.b do not apply for a defueled unit.

2. ~~The common accident signal testing required by 4.9.A.3 requires the signal to originate only from units that require OPERABILITY of the standby gas treatment system and/or the control room emergency ventilation system. This test will verify the automatic start of the diesel generators aligned to the standby gas treatment system and/or the control room emergency ventilation system.~~

8

LA5

-- for Unit 3 DG's

<See Justification for Changes for BFN ISTS 3.8.2>

Rev. 2

Specification 3.8.1

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~~3.9/4.9 AUXILIARY ELECTRICAL SYSTEM~~

~~LIMITING CONDITIONS FOR OPERATION~~ A1 ~~SURVEILLANCE REQUIREMENTS~~

~~3.9.D. Diesel Generators Required for Units 1, 2, and 3 Shared Systems~~

Required Action K.2

3. If Specification 3.9.D.2 cannot be met, the affected equipment shall be declared inoperable.

~~4.9.D. Diesel Generators Required for Units 1, 2, and 3 Shared Systems~~

L6

2. When a system, subsystem, train, component, or device is determined to be inoperable solely because its onsite power source is inoperable, or solely because its offsite power source is inoperable, it may be considered operable for the purpose of satisfying the requirements of its applicable Limiting Condition For Operation, provided:

LCO 3.8.1 Required Action A.2 Required Action B.2 + Required Action E.1 + Required Action K.1

(1) its corresponding offsite or diesel power source is operable; and (2) all of its redundant system(s), subsystem(s), train(s), component(s), and device(s) are operable, or likewise satisfy these requirements. Unless both conditions (1) and (2) are satisfied, the unit shall be placed in at least Hot Standby within 6 hours, and in at least Cold Shutdown within the following 30 hours. This definition is not applicable in Cold Shutdown or Refueling. This provision describes what additional conditions must be satisfied to permit operation to continue consistent with the specifications for power sources, when an offsite or onsite power source is not operable. It specifically prohibits operation when one division is inoperable because its offsite or diesel power source is inoperable and a system, subsystem, train, component, or device in another division is inoperable for another reason. This provision permits the requirements associated with individual systems, subsystems, trains, components, or devices to be consistent with the requirements of the associated electrical power source. It allows operation to be governed by the time limit of the requirements associated with the Limiting Condition For Operation for the offsite or diesel power source, not the individual requirements for each system, subsystem, train, component, or device that is determined to be inoperable solely because of the inoperability of its offsite or diesel power source.

D. PRIOR TO STARTUP - Prior to withdrawing the first control rod for the purpose of making the reactor critical.

E. Operable - Operability - A system, subsystem, train, component, or device shall be operable or have operability when it is capable of performing its specified function(s). Implicit in this definition shall be the assumption that all necessary attendant instrumentation, controls, normal and emergency electrical power sources, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its function(s) are also capable of performing their related support function(s).

F. Operating - Operating means that a system or component is performing its intended functions in its required manner.

G. Immediate - Immediate means that the required action will be initiated as soon as practicable considering the safe operation of the unit and the importance of the required action.

See Justification for Changes for BFN ISTS Section 1.0

REV. ~~1~~ 2

Specification 3.8.7

NOV 1

~~3.9/4.9 AUXILIARY ELECTRICAL SYSTEM~~

~~LIMITING CONDITIONS FOR OPERATION~~ A1 ~~SURVEILLANCE REQUIREMENTS~~

~~3.9.B. Operation With Inoperable Equipment~~

~~4.9.B. Operation With Inoperable Equipment~~

3. From and after the date that the 4-kV bus tie board becomes inoperable, REACTOR POWER OPERATION is permissible indefinitely provided one of the required offsite power sources is not supplied from the 161-kV system through the bus tie board.

See Justification for Changes for BFN ISTS 3.8.1 in this Section

3. When a required offsite power source is unavailable because the 4-kV bus tie board or a start bus is INOPERABLE, all unit 3 diesel generators shall be demonstrated OPERABLE within 24 hours, and power availability for the associated boards shall be verified with 1 hour and at least on per 8 hours thereafter. The remaining offsite sources and associated buses shall be checked to be energized daily.

Condition A

4. When one unit 3 4-kV shutdown board is INOPERABLE, continued REACTOR POWER OPERATION is permissible for a period of 5 days provided that 2 offsite power sources are available as specified in 3.9.A.1.c and the remaining unit 3 4-kV shutdown boards and associated diesel generators, CS, RHR (LPCI and containment cooling) systems, and all unit 3 480-V emergency power boards are OPERABLE. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be shut down and in the ~~COLD SHUTDOWN~~ CONDITION within ~~24~~ 36 hours. L1

Required Action A.1

M1 and 12 days from discovery of failure to meet LCO

Cond E, H

A2 Refer to LCO 3.8.1 Required ACT B.2

ACTION ~~F~~ H G

L2

4. ~~When one unit 3 4-kV shutdown board is found to be INOPERABLE, all diesel generators associated with the remaining 4-kV shutdown boards shall be demonstrated to be OPERABLE within 24 hours, and power availability for the remaining 4-kV shutdown boards shall be verified within 1 hour and at least once per 8 hours thereafter.~~

H G

Proposed Required ACTION ~~F~~.1 M2

5 7

REV ~~1~~ 2

Specification 3.8.7

NOV 18 1988

~~3.9/4.9 AUXILIARY ELECTRICAL SYSTEM~~

~~LIMITING CONDITIONS FOR OPERATION~~ A1 ~~SURVEILLANCE REQUIREMENTS~~

~~3.9.B Operation With Inoperable Equipment~~

ACTION B

10. When one 480-V shutdown board is found to be inoperable, the reactor will be placed in HOT ~~STANDBY~~ CONDITION within 12 hours and COLD SHUTDOWN CONDITION within ~~24~~ 36 L1 hours.

ACTION ~~F~~ G

L3 Restore in 8 hours and 12 days from discovery of failure to meet the LCO

SHUTDOWN M2

ACTION C

11. ~~If one 480-V RMOV board mg set is inoperable, REACTOR POWER OPERATION may continue for a period not to exceed seven days, provided the remaining 480-V RMOV board mg sets and their associated loads remain OPERABLE.~~

Declare the affected RHR Subsystem inoperable immediately.

LA5

See Justification for Changes for BFN ISTS 3.5.1

ACTION ~~H~~ I

12. ~~If any two 480-V RMOV board mg sets become inoperable, the reactor shall be placed in the COLD SHUTDOWN CONDITION within 24 hours.~~

Proposed Required Action ~~H~~ I.1

LA5

Proposed ACTION ~~G~~ H I M3

Proposed ACTION ~~E F~~ G M5

Proposed Action F M6

ACTION ~~F~~ ~~G~~ H

13. If the requirements for operation in the conditions specified by 3.9.B.1 through 3.9.B.12 cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the COLD SHUTDOWN CONDITION within ~~24~~ 36 L1 hours.

Proposed Required ACTION ~~F.1~~ ~~G~~ H M2

BROWNS FERRY NUCLEAR PLANT - IMPROVED TECHNICAL SPECIFICATIONS
SECTION 3.8
LIST OF REVISED PAGES

JUSTIFICATION FOR CHANGES TO CURRENT TECH SPECS

Replaced Section 3.8.1, pages 1 of 11 through 11 of 11 Revision 1 with Section 3.8 1 pages 1 of 11 through 11 of 11 Revision 2

Replaced Section 3.8.3, pages 1 of 3 through 3 of 3 Revision 1 with Section 3.8 3 pages 1 of 3 through 3 of 3 Revision 2

Replaced Section 3.8.4, pages 1 of 4 through 4 of 4 Revision 1 with Section 3.8 4 pages 1 of 4 through 4 of 4 Revision 2

Replaced Section 3.8.6, pages 1 of 3 through 3 of 3 Revision 1 with Section 3.8 6 pages 1 of 3 through 3 of 3 Revision 2

Replaced Section 3.8.7, pages 1 of 6 through 6 of 6 Revision 1 with Section 3.8 7 pages 1 of 7 through 7 of 7 Revision 2

JUSTIFICATION FOR CHANGES
BFN ISTS 3.8.1: AC SOURCES—OPERATING

ADMINISTRATIVE

A1 All reformatting and renumbering is in accordance with the BWR/4 Standard Technical Specifications (STS), NUREG-1433. As a result, the Technical Specifications (TS) should be more readily readable, and therefore understandable, by plant operators as well as other users. The reformatting, renumbering, and rewording process involves no technical changes to existing Technical Specifications.

Editorial rewording (either adding or deleting) is made consistent with NUREG-1433. During ISTS development certain wording preferences or English language conventions were adopted which resulted in no technical changes (either actual or interpretational) to the Technical Specifications. Additional information has also been added to more fully describe each subsection. This wording is consistent with the BWR Standard Technical Specifications, NUREG-1433. Since the design is already approved by the NRC, adding more detail does not result in a technical change.

A2 Notes 1, 2, 3, and 4 to proposed ITS SR 3.8.1.2 have been added. Note 1 to ITS SR 3.8.1.2 allows gradual loading. Note 2 to ITS SR 3.8.1.2 clarifies that momentary transients outside the load range do not invalidate this Surveillance. Note 3 to ITS SR 3.8.1.2 only allows the SR to be performed on one DG at a time, which is consistent with the CTS application of testing on a "staggered test basis". Note 4 to ITS SR 3.8.1.2 requires that the loading be immediately preceded by a successful performance of ITS SR 3.8.1.1 or ITS SR 3.8.1.4, with an intermediate warmup period. This is acceptable since the notes do not remove any testing requirements, reflect current approved testing methodology, and provide clarification which will ensure consistency and proper controls on testing. All of these changes are consistent with the BWR Standard Technical Specifications, NUREG-1433, and are considered administrative in nature.

A3 Not used.

A4 The Unit 3 DG requirements for Unit 1 and 2 TSs to support SGT and control room emergency ventilation are presented in proposed ITS 3.8.1.c. This presentation only establishes an OPERABILITY requirement when Unit 3 is not in MODE 1, 2, or 3. When Unit 3 is in MODE 1, 2, or 3, the Unit 3 Technical Specifications will require all Unit 3 DGs to be OPERABLE; and a Unit 3 shutdown to MODE 4 if not restored to OPERABLE in the required time. This allows the Unit 3 Technical Specifications to impose restoration limitations until Unit 3 is shutdown (at which time Unit 3 may not require the associated DG(s) to be OPERABLE). Since the Unit 1 and 2 CTS only impose Actions for an inoperable Unit 3 DG when Unit 3 is in cold shutdown, refueling or defueled, this presentation is consistent with current requirements. Therefore, the conversion is administrative.

A5 Certain equipment needed to meet Unit 1 and 2 accident analysis is powered from Unit 3 AC Sources. Current TS Surveillances only apply to the Unit 1 and 2 AC sources; the Unit 3 TS govern testing of the Unit 3 DGs. Consistent with the current approach, a proposed Note applicable to all SRs and SR 3.8.1.10 have been added to ensure Unit 3 sources are addressed in the Surveillances as they are in the LCO and ACTIONS. Therefore, this change is considered administrative.

A6 Not used.

Same as A4, except for Unit 3 CTS markup

A7 The Unit 1 and 2 DG requirements for Unit 3 TSs to support SGT and control room emergency ventilation are presented in ITS 3.8.1.c. This presentation only establishes an OPERABILITY requirement when Unit 1 or 2 are not in MODE 1, 2, or 3. When Unit 1 or 2 is in MODE 1, 2, or 3, the Unit 1 or 2 Technical Specifications will require all Unit 1 and 2 DGs to be OPERABLE; and a Unit 1 and/or 2 shutdown to MODE 4 if not restored to OPERABLE in the required time. This allows the Unit 1 or 2 Technical Specifications to impose restoration limitations until Unit 1 and 2 are shutdown (at which time Units 1 and 2 may not require the associated DG(s) to be OPERABLE). Since the Unit 3 CTS only impose Actions for an inoperable Unit 1 and 2 DG when Unit 1 and 2 are in cold shutdown, refueling or defueled, this presentation is consistent with current requirements. Therefore, the conversion is administrative.

Same as A5, except for Unit 3 CTS markup

A8 Certain equipment needed to meet Unit 3 accident analysis is powered from Unit 1 and 2 AC Sources. Current TS Surveillances only apply to the Unit 3 AC sources; the Unit 1 and/or 2 TS govern testing of the Unit 1 and 2 DGs. Consistent with the current approach, a proposed Note applicable to all SRs and SR 3.8.1.10 have been added to ensure Unit 1 and 2 sources are addressed in the Surveillances as they are in the LCO and ACTIONS. Therefore, this change, is considered administrative.

TECHNICAL CHANGE - MORE RESTRICTIVE

The items identified as More Restrictive (MR) are those which contain requirements that are more restrictive than Current Technical Specifications. These MR requirements are based on the Standard Technical Specifications for BWR/4, NUREG-1433, modified to reflect BFN specific design, and have been determined to be appropriate and safe for BFN based on a review of current design bases.

M1 Proposed Specification 3.8.1, AC Sources - Operating, will be applicable in MODES 1 (Run), 2 (Startup), and 3 (Hot Shutdown) which is more restrictive than CTS 3.9.B. CTS 3.9.B requires action for inoperable equipment "Whenever the reactor is in Startup Mode or Run Mode and not in a cold condition." Thus CTS would not require the stated requirements in the Startup Mode prior to reaching 212 degrees F or in a Hot Shutdown condition, whereas the proposed TS will. The proposed change establishes requirements for OPERABILITY of AC Sources consistent with the OPERABILITY requirements for the functions that these AC sources are required to support including ECCS and Primary Containment Isolation System. This change is consistent with the BWR Standard Technical Specifications, NUREG-1433.

M2 Not used.

M3 Not used.

M4 CTS 3.9.A.2 allows one less AC power source than required for continuous operation, to startup from the Hot Standby Condition. By eliminating this explicit allowance in the ITS, the more restrictive proposed addition of LCO 3.0.4 will result in precluding this startup. This more restrictive change will assure that the required AC Sources are available prior to any reactor startup from any condition.

M5 Proposed SRs 3.8.1.1, 3.8.1.4, 3.8.1.5, and 3.8.1.9 add the acceptance criteria for voltage and frequency. These acceptance criteria are consistent with proper operation of the governor and voltage controls necessary to assure DG OPERABILITY. In addition, SR 3.8.1.9.c has an added DG start time requirement consistent with the accident analysis. Since these requirements are not stated in CTS, their addition is considered more restrictive.

M6 A new more restrictive requirement to be in MODE 3 (Hot Shutdown) within 12 hours of entry into the LCO has been added. This is more restrictive since before the only requirement was to be in mode 4 within 24 hours and now the operator must place the reactor in a shutdown condition within a shorter time period. This requirement is consistent with the BWR Standard Technical Specifications, NUREG-1433, and is appropriate for BFN since it adds an additional measure of control for safe shutdown of the reactor and can be achieved safely in the time allotted.

M7 Not used.

M8 Proposed SR 3.8.1.8 demonstrates proper operation for the DBA loading sequence which ensures that DGs (and offsite circuits) are not overloaded, and that the required loads are started in sufficient time to adequately support the assumed function. BFN TSs currently do not have a similar specific SR directly tied to DG operability. The CTS requirements for individual pump timer testing included in CTS Table 3.2.B and the SR requirement in CTS 4.9.A.1.b for load sequencing verify the interval between each timed load block is within the calibration tolerances for each individual timer and serve the same function, therefore this additional requirement is within the current BFN design.

M9 Condition G addresses the situation where both one required offsite circuit and one DG are inoperable and affect only one 4.16 kV shutdown board. The Note clarifies the applicability. The Required Action is to declare the affected 4.16 kV shutdown board inoperable immediately. This requires entry into the applicable Conditions and Required Actions of LCO 3.8.7, "Distribution Systems - Operating," which provides the appropriate restrictions for the affected 4.16 kV shutdown board. LCO 3.8.1 Conditions and Required Actions continue to apply until the required offsite circuit and DG are made OPERABLE.

TECHNICAL CHANGE - LESS RESTRICTIVE

"Generic"

LA1 The details of what constitutes OPERABILITY of an offsite power source have been relocated to the Bases. Thus, the LCO has been written to tell what is needed, but the details of the specific requirements for operability of an offsite power source and the boards needed to route the offsite power to the shutdown boards have been relocated to the Bases. Any references to the 4-kv bus tie board and cooling tower transformer have been deleted since this source of power is no longer qualified as an offsite power source. The details of having the start buses and shutdown buses 1 and 2 energized have been relocated to the Bases since this detail is used to support an operable offsite power source. Relocation of these items to the Bases is acceptable since the details of what constitutes operability are not necessary to establish the requirement for operability. The LCO requirement for the operability of offsite power circuits is unaffected by the removal of these details. Thus the details can be moved to the Bases and controlled by the provisions of the proposed Bases Control Program in Section 5 of the Technical Specifications.

For MODE 1, 2, and 3 operation, all SGT and emergency ventilation trains, as well as all four Unit 1 and 2 DGs for Unit 1 and 2 and all four Unit 3 DGs for Unit 3, will be required to be OPERABLE. The details relating to system design (which DGs are associated with which Systems), and the explicit requirement to associate OPERABLE DGs with required OPERABLE SGT, CREV, Core Spray, and RHR Systems, have been relocated to the Bases. The 1/2A DG, 1/2B DG, and 1/2D DG listed in CTS 3.9.D are the same DGs as listed as DG A, B, and D elsewhere in CTS. The design features and system operation are also described in the FSAR. Thus, the LCO has been written to simply specify the required DGs be OPERABLE, but the details of the specific requirements for OPERABILITY have been relocated to the Bases. Changes to the current requirement to associate these required OPERABLE DGs with the required OPERABLE Systems will be controlled via changes to the Bases by the provisions of the proposed Bases Control Program in Section 5 of the Technical Specifications. Changes to the FSAR will be controlled by the provisions of 10 CFR 50.59. Relocation of these details to the Bases is acceptable since the inclusion of these details is not necessary to establish the LCO requirement.

LA2 Not used.

LA3 The diesel generator accelerated test frequency requirements are relocated in their current licensing bases form to the Technical Requirements Manual (TRM), leaving the Technical Specifications periodic surveillance frequency as 31 days. A plant procedure implements the requirements and responsibilities for tracking emergency DG failures for the determination and reporting of reaching trigger values specified in NUMARC 87-00. These requirements are more restrictive than those specified in NUREG-1433. In addition, Generic Letter 94-01, "Removal of Accelerated Testing and Special Reporting Requirements for Diesel Generators," allows Licensees to request removal from TS of provisions for accelerated testing and special reporting requirements for DGs. Browns Ferry proposes relocation only with no relaxation in the ITS conversion. The allowances of GL 94-01 will be addressed separately, post-ITS implementation. Relocation of this information to the TRM is acceptable since the proposed ITS DG surveillance requirements will continue to ensure DG OPERABILITY. Thus the details can be moved to the TRM and controlled in accordance with 10 CFR 50.59.

LA4 CTS 4.9.A.1.a requires all DG starts to be logged. The proposed change removes this specific requirement from TS. This is acceptable since inclusion of the details of what data to record is not necessary to establish the requirement for surveillance testing. Thus removal of this Surveillance from the Technical Specifications will have no effect on DG OPERABILITY.

LA5 This change involves the removal of specific details on how to perform a surveillance while leaving the actual requirement to perform testing unchanged. Removal of these details from the Technical Specifications is acceptable since their inclusion is not necessary in order to establish the testing requirements and test methods necessary to ensure operability.

LA6 This change involves the movement of descriptive details for the performance of CTS surveillance 4.9.A.3.b to the Bases. The purpose of this SR is inherent in the manner in which the test is performed and is described in the Bases for proposed ITS SR 3.8.1.9 (load shedding). Therefore, the description has been relocated to the Bases. This is acceptable since inclusion of the descriptive details is not necessary in order to establish the requirement to perform the SR. Changes to the Bases will be controlled by the provision of the proposed Bases Control Program in Section 5.0 of the proposed BFN ITS.

LA7 CTS 3.9.B.9 for Units 1 and 2 (3.9.B.7 for Unit 3) requires the NRC to be notified within 24 hours when one division of the logic system is inoperable. This condition is not reportable to the NRC per 10 CFR 50.72, 50.73, or other 10 CFR requirements and as such is being removed from TS. This is acceptable since TS cannot supercede regulations.

LA8 The descriptive details concerning testing of the CAS logic have been relocated to the Bases for proposed ITS SR 3.8.1.6. This provides a better location for details on where the accident signal originates. The requirement to perform the surveillance test is unaffected. Relocation of this information is acceptable since inclusion of the descriptive details is not necessary in order to establish the requirement to perform the SR. Changes to the Bases will be controlled by the provision of the proposed Bases Control Program in Section 5.0 of the proposed BFN ISTS.

"Specific"

L1 Proposed LCO 3.8.1, Condition A (one offsite source or one shutdown bus inoperable) will not include the requirement of CTS 4.9.B.1 (Units 1,2,3), 4.9.B.2 (Units 1,2), 4.9.B.3 (Unit 3), and 4.9.B.5 (Units 1,2) to demonstrate the OPERABILITY of the remaining DGs within 24 hours following loss of the power source. This change acknowledges that inoperability of an offsite circuit (or shutdown bus) is not indicative of a similar condition in the DG unless a common failure is suspected. Additionally, the periodic Frequencies specified to demonstrate DG OPERABILITY have been demonstrated adequate to provide a high degree of assurance that the DG is OPERABLE. Therefore, this change allows credit to be taken for the normal periodic Surveillance as a demonstration of DG OPERABILITY and reduces the challenges and wear to the DGs. Minimizing DG starts is recommended to avoid unnecessary DG wear, thereby enhancing overall DG reliability (refer to Generic Letter 84-15). This action is consistent with BWR STS, NUREG-1433, and the design of BFN.

L2 Not used.

L3 Proposed Required Action B.3.1 has been added to provide an allowance to avoid unnecessary testing of OPERABLE DGs when a DG is declared inoperable if it can be confirmed that no common cause failure has rendered more than one DG inoperable. This assurance can be ascertained in many cases by means other than the existing requirement to demonstrate DG operability by starting the DG. If an assessment can determine no common cause failure exists on the remaining OPERABLE DG(s), proposed Required Action B.3.1 eliminates the DG start. Minimizing DG starts is recommended to avoid unnecessary DG wear, thereby enhancing overall DG reliability (refer to Generic Letter 84-15). This action is consistent with BWR STS, NUREG-1433, and the design of BFN. This change is acceptable since the action to determine that the remaining DGs are not inoperable due to a common cause failure will ensure DG OPERABILITY is maintained and Required Action B.3.2 provides an alternate method to test the DG in the event this determination cannot be made without testing.

L4 The time to reach MODE 4, Cold Shutdown has been extended from 24 hours to 36 hours. This provides the necessary time to shut down and cool down the plant in a controlled and orderly manner that is within the capabilities of the unit, assuming the minimum required equipment is OPERABLE. This extra time reduces the potential for a unit upset that could challenge safety systems. This time is consistent with the BWR Standard Technical Specifications, NUREG 1433. The increased time allowed to reach MODE 4 is acceptable based on the small probability of an event during this time and the desire to minimize plant transients. The requested 12 hour extension will provide sufficient time for the unit to reach MODE 4 in an orderly manner. As a result, the potential for human error will be reduced. In addition, the unit is now required to be in MODE 3 within 12 hours (a shutdown condition). As such, any reduction in a margin of safety will be insignificant and offset by the benefit gained from providing sufficient time to reach MODE 4, thus avoiding potential plant transients from attempting to reach MODE 4 in the current time and the benefit of being subcritical (MODE 3) in a shorter required time.

L5 The following changes have been made to LCO 3.8.1:

a. Proposed ACTION E provides an out-of-service time of 24 hours, when two or more offsite circuits are concurrently inoperable, prior to requiring a unit shutdown, with a reduced allowance of 12 hours with a redundant component inoperable. The allowed completion times allow the operator time to evaluate and repair any discovered inoperabilities. With both of the required offsite circuits inoperable, sufficient onsite AC sources are available to maintain the unit in a safe shutdown condition in the event of a DBA or transient. Thus, the completion time provides a period of time to effect restoration of one of the offsite circuits commensurate with the importance of maintaining an AC electrical power system capable of meeting its design criteria.

b. Proposed ACTION F provides an out-of-service time of 12 hours, when a DG and an offsite circuit are concurrently inoperable, prior to requiring a unit shutdown. The allowed completion times allow the operator time to evaluate and repair any discovered inoperabilities. The allowed completion time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and the low probability of a DBA occurring during this period.

c. Proposed ACTION H provides an out-of-service time of 2 hours, when two or more DGs are concurrently inoperable, prior to requiring a unit shutdown. The two hour completion time is acceptable since it provides a reasonable time for repairs considering the reduced capacity and capability of the remaining AC sources, the low probability of a DBA occurring during this period minimizes the risk associated with continued operation while making repairs, and any increase in risk is offset by the risk associated with an immediate controlled shutdown (due to potential grid disturbances which could lead to a total loss of offsite AC power).

d. Proposed ACTION J provides a Required Action to enter LCO 3.0.3 immediately for conditions where all redundancy in the AC electrical power supplies has been lost. The NUREG ACTION I wording has been changed to reflect BFN specific plant details which clearly define the combinations of power sources for which this ACTION applies. The changes in the NUREG wording are administrative and serve only to incorporate plant specific details. In this case, any further losses in the AC electrical power system will cause a loss of function. Therefore, no additonal time is justified for continued operation and a shutdown per LCO 3.0.3 is warranted.

e. New restrictions have been added to proposed LCO 3.8.1 to limit the maximum time the requirements are not met (the second completion time of 14 days for the restoration actions for Actions A and B). The 14 day completion time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The limit of 14 days is acceptable based on the the capacity and capability of the remaining AC sources, reasonable time for repairs, and the low probability of a DBA occurring during this period.

Currently, items a, b, c, and d would result in imposing an immediate plant shutdown in accordance with current 1.0.C.1 (proposed LCO 3.0.3). Items a, b, and c now provide for additional time for operation while effecting repairs, as discussed above. These new ACTIONS are consistent with the BWR Standard Technical Specifications, NUREG 1433, and with the recommendations of Regulatory Guide 1.93.

The proposed Completion Times to restore multiple, inoperable AC Sources to OPERABLE status prior to requiring a shutdown is acceptable based on the overall probability of an event requiring the inoperable AC Sources during this time period. Providing Completion Times will minimize the potential for plant transients that can occur during shutdown by providing some time to restore the affected AC Sources prior to requiring a shutdown. In addition, the NRC has previously evaluated these new times and approved them in Regulatory Guide 1.93. As such, any reduction in a margin of safety by the addition of these Completion Times will be offset by the benefit gained in avoiding an unnecessary plant transient by providing time to restore the inoperable AC Source.

L6 The requirements for operability in CTS 1.0.C.2 when an offsite or onsite power source is inoperable have been retained in LCO 3.8.1, in the form of proposed Required Actions A.2, B.2, E.1, and K.1. These proposed Required Actions are the same as the current requirements, except for the proposed Completion Times associated with these checks. Therefore, the movement of the current requirements to this LCO is strictly administrative. The addition of Completion Times to verify that redundant features are not inoperable (in proposed Required Actions A.2, B.2, E.1, and K.1 proposed to be 24, 4, 12, and 4 hours, respectively) will allow the operator time to evaluate and repair any discovered inoperabilities which minimizes the risk due to subjecting the unit to transients associated with shutdown. The proposed Completion Times also consider the capacity and capability of the remaining AC sources and the low probability of a DBA occurring during this period.

CTS 3.5.A.2, 3.5.B.3, 3.5.B.5, and 3.5.B.6, allow a specified restoration time for an inoperable CS or RHR pump, only if all DGs are OPERABLE; and 3.9.B.3 for Units 1 and 2 (3.9.B.2 for Unit 3) allows a specified restoration time for an inoperable DG only if all CS and RHR systems are OPERABLE. For example, if a CS pump and its associated DG are inoperable, the CTS require an immediate shutdown. The proposed ACTIONS only require the OPERABILITY of components redundant to the components supported by the inoperable AC source. This results in the ITS allowance for a component (e.g., RHR or CS pump) and its associated offsite circuit or DG to be concurrently inoperable without imposing immediate shutdown restrictions as in the CTS.

Additionally, the proposed Required Actions A.2, B.2, E.1, and K.1 provide another allowance to avoid an immediate forced shutdown when a DG or offsite circuit is inoperable concurrent with a required "feature" (i.e., system, subsystem, component) inoperability. Certain combinations of inoperable components may allow for satisfactory compensatory actions or have been justified for some allowed restoration time. By allowing "features" associated with the inoperable offsite circuit or DG to be declared inoperable, the appropriate ACTIONS can be taken. This can potentially eliminate unnecessary forced shutdowns, and the associated risk of plant transients, while maintaining ACTION provisions previously provided concerning the specific circumstances. This allows the individual component specification to determine the restriction on continued operation based upon the components that are inoperable and whose function is impaired due to the combination of power sources inoperable and individual component inoperabilities. This different approach does not reduce the level of safety and is within the analyses for BFN in the FSAR.

L7 The proposed 24-hour Surveillance reduces the required load, which is currently required to be greater than 2800 kW for the full 24 hours, to 2800 kW for only the first 2 hours then only 2600 kW for the remainder of the 24 hour test. DG 24-hour testing is recommended by Regulatory Guide 1.108 to be performed for 2 hours at the "2-hour rating" and by Regulatory Guide 1.9 at 105 to 110% of the continuous rating. The remainder of the 24-hour run is not required to exceed the continuous rating of the DG. Additionally, in an NRC Safety Evaluation dated December 21, 1989, the NRC requested a long duration test be added to the Technical Specifications with load ranges consistent with those proposed in this change. NRC later acknowledged in NRC SER dated February 12, 1991 that the proposed testing of DGs at 2800 kW for the entire 24 hours is more conservative than the NRC requested earlier. The BFN DGs are designed with a 2-hour rating and continuous rating of - 2800 kW and 2600 kW respectively. Therefore these changes are consistent with accepted NRC recommendations for this test. This change is acceptable since performance of testing as prescribed in the proposed surveillance will continue to adequately demonstrate the OPERABILITY of the DG while minimizing the potential degradation to the DG as a result of operating the DG above its continuous rating for an extended time period beyond that required to demonstrate its capabilities.

L8 This change removes the requirement for the RHR and CS systems to be operable as a condition for the allowance of a 7 day AOT in the event of inoperability of one division of logic. When one division of logic (480 V load shed or common accident signal) is inoperable, CTS 3.9.B.9 for Units 1 and 2 (3.9.B.7 for Unit 3) allows continued operation for 7 days provided all of the CS and RHR (LPCI and containment cooling) systems are operable. The requirement for all CS and RHR (LPCI and containment cooling) systems to be operable when a division of logic is inoperable is overly conservative. This change is acceptable since the logic systems consist of two fully redundant divisions, either of which is capable of ensuring DG operability and neither logic operability impacts the operability of Core Spray or RHR. Loss of both divisions of logic would have to occur to impact DG operability, since each logic is 100% redundant to its companion logic. The inoperability of one division of logic is addressed by proposed Conditions C and D and loss of both logics is addressed by proposed Condition I of ITS section 3.8.1.

Relocated Specifications

R1 Current TS 4.9.A.1.d requires DG inspections in accordance with the manufacturer's recommendations once every 24 months. The proposed change relocates this specific inspection requirement to the Technical Requirements Manual. Although this type of surveillance is a good practice and does aid in improving long term reliability and performance of the DGs, this inspection does not verify or prove the DG will perform its required safety function. There is no credit taken for this inspection in the accident or transient analysis nor does the inspection verify proper DG response assumed in the accident or transient analysis. Performance of this inspection surveillance: 1) does not involve or affect instrumentation used to detect or indicate degradation of the reactor coolant pressure boundary, 2) is not a process variable, design feature, or operating restriction that is an initial condition of a DBA or transient analysis, 3) is not part of the primary success path that functions or actuates to mitigate a DBA or transient, and 4) is not credited with ensuring operability of a structure, system, or component which operating experience or PSA has shown to be significant to public health and safety. Therefore, the requirements specified in current Specification 4.9.A.1.d do not satisfy the NRC Final Policy Statement technical specification screening criteria and thus are not required by 10 CFR 50.36. Performance of this inspection will be relocated to the Technical Requirements Manual and controlled in accordance with 10 CFR 50.59.

JUSTIFICATION FOR CHANGES
BFN ISTS 3.8.3: DIESEL FUEL OIL, LUBE OIL, AND STARTING AIR

ADMINISTRATIVE

A1 All reformatting and renumbering is in accordance with the BWR/4 Standard Technical Specifications (STS), NUREG-1433. As a result, the Technical Specifications (TS) should be more readily readable, and therefore understandable, by plant operators as well as other users. The reformatting, renumbering, and rewording process involves no technical changes to existing Technical Specifications.

Editorial rewording (either adding or deleting) is made consistent with NUREG-1433. During ISTS development certain wording preferences or English language conventions were adopted which resulted in no technical changes (either actual or interpretational) to the Technical Specifications. Additional information has also been added to more fully describe each subsection. This wording is consistent with the BWR Standard Technical Specifications, NUREG-1433. Since the design is already approved by the NRC, adding more detail does not result in a technical change.

A2 The fuel oil, fuel transfer, and starting air requirements of current LCO 3/4.9.A and 3.9.A.6 have been moved to a new LCO 3.8.3. The Applicability of this new LCO is "when associated DG is required to be OPERABLE." This covers the current MODE 1, 2, 3, 4, and 5 requirements, and is actually more restrictive since the DG Applicability has been changed (in proposed LCO 3.8.2) to include certain MODE 4 and 5 conditions (see Justification for Changes for ITS 3.8.2 for further discussion). Proposed ACTIONS D and E direct that affected DG(s) be declared inoperable due to specific degradations in support systems. This declaration of inoperability is consistent with the presentation of the current requirements and is considered part of the editorial rewrite. These changes are considered administrative in nature. In addition, technical changes, both more and less restrictive have been made, as discussed in the "M" and "L" comments below.

A3 This requirement is being moved to Chapter 5.0 of the proposed Technical Specifications in accordance with the format of the BWR Standard Technical Specifications, NUREG 1433. A Surveillance Requirement is added (proposed SR 3.8.3.3) to clarify that the tests of the Diesel Fuel Oil Testing Program must also be completed and passed for determining OPERABILITY of the DGs. Since this is a presentation preference that maintains current requirements, this change is considered administrative.

A4 The phrase "staggered test basis" as applied in current technical specifications means that no more than one DG will be tested at a time and is not the same as the BFN ITS definition of STAGGERED TEST. The requirement to test only one DG at a time is maintained in BFN ITS by Note 4 of SR 3.8.1.2. Therefore, this change is considered administrative.

TECHNICAL CHANGE - MORE RESTRICTIVE

The items identified as More Restrictive (MR) are those which contain requirements that are more restrictive than Current Technical Specifications. These MR requirements are based on the Standard Technical Specifications for BWR/4, NUREG-1433, modified to reflect BFN specific design, and have been determined to be appropriate and safe for BFN based on a review of current design bases.

M1 Specific acceptance criteria for relating minimum air receiver pressure and minimum stored fuel oil volume to DG OPERABILITY are added. Current surveillances only require the parameter be checked, with no associated criteria specified. This imposes Technical Specification limitations that do not currently exist, and are therefore additional restrictions.

M2 A lube oil requirement has been added to LCO 3.8.3. This will ensure a 7 day supply of lube oil is available to all DGs. An appropriate ACTION (proposed ACTION B) and Surveillance Requirement (SR 3.8.3.2) have also been added. These changes are consistent with the BWR Standard Technical Specifications, NUREG 1433, and are additional restrictions on plant operation.

TECHNICAL CHANGE - LESS RESTRICTIVE

"Generic"

LA1 Current surveillance requirements for the DGs specify checking the starting air compressors for operation and ability to recharge the receivers. The proposed ITS retain the actual OPERABILITY related requirement of receiver air pressure (and add a more restrictive change by specifying the actual pressure limit - see M1 above). However, the method of maintaining the minimum required air pressure does not impact the operability of the DG as long as the starting air receivers have adequate pressure since the starting air system is only needed to initially start the DG. Removal from the Technical Specifications is acceptable since the details are not necessary in order to establish the surveillance testing requirement.

LA2 CTS 4.9.A.1.c requires DG fuel oil quantity to be logged. The proposed change removes this specific requirement from TS. This is acceptable since inclusion of the details of what data to record is not necessary to establish the requirement for surveillance testing. Thus removal of this Surveillance from the Technical Specifications will have no effect on DG OPERABILITY.

"Specific"

L1 The Surveillance Frequency for the starting air system checks has been changed from "frequency specified in Table 4.9.A (the DG test schedule table listed in the first part of the current Surveillance) to "31 days". The 31 day test interval is safe and appropriate for BFN since it provides assurance that DG air start pressure requirements will be maintained. This is because DG failures that result in a more frequent DG test frequency have no impact on these functions' ability to perform their intended function. Additionally, pressure alarms provide assurance that air start pressure is maintained within required limits.

L2 Not used.

L3 The proposed LCO 3.8.3, "Diesel Fuel Oil and Transfer, Lube Oil, and Starting Air," reformats some of the existing requirements by providing a separate LCO with requirements for each of the named parameters. Fuel oil and starting air requirements are currently presented as attributes of compliance with the DG LCO, via their presentation as Surveillances. These parameters, while supporting DG OPERABILITY, contain substantial margin in addition to the limits which would be absolutely necessary for DG OPERABILITY. Therefore, certain levels of degradation in these parameters are justified to extend the allowances for restoration (presented as proposed ACTIONS A and C). ACTION A allows 48 hours to restore fuel oil level in the storage tanks prior to declaring the DG inoperable, provided fuel oil level is sufficient for 6 days supply. ACTION C allows 7 days to restore fuel oil parameters to within limits prior to declaring the DG inoperable. This is acceptable for BFN since during the proposed extended periods for restoration of these parameters, the DG would still be capable of performing its intended function and the degradation is limited in both capacity and time to the degree that a substantial margin of safety exists.

JUSTIFICATION FOR CHANGES
BFN ISTS 3.8.4: DC SOURCES—OPERATING

ADMINISTRATIVE

A1 All reformatting and renumbering is in accordance with the BWR/4 Standard Technical Specifications (STS), NUREG-1433. As a result, the Technical Specifications (TS) should be more readily readable, and therefore understandable, by plant operators as well as other users. The reformatting, renumbering, and rewording process involves no technical changes to existing Technical Specifications. The proposed Technical Specifications place 250 Volt and 125 Volt DG battery hardware components (battery and charger) in the DC sources LCO (proposed LCO 3.8.4). The battery cell parameters and DC Distribution buses are in separate LCOs (proposed LCOs 3.8.6 and 3.8.7, respectively.)

Editorial rewording (either adding or deleting) is made consistent with NUREG-1433. During ISTS development certain wording preferences or English language conventions were adopted which resulted in no technical changes (either actual or interpretational) to the Technical Specifications. Additional information has also been added to more fully describe each subsection. This wording is consistent with the BWR Standard Technical Specifications, NUREG-1433. Since the design is already approved by the NRC, adding more detail does not result in a technical change.

A2 An explicit LCO statement is added for the DG 125 VDC subsystems. Current Surveillance 4.9.A requires surveillance of these subsystems, with an implied association with DG OPERABILITY. The ITS LCO clarifies this intent. Proposed ACTION C directs that affected DG(s) be declared inoperable due to specific degradations in the DG DC systems. This is an administrative change since it involves a change in presentation only.

TECHNICAL CHANGE - MORE RESTRICTIVE

The items identified as More Restrictive (MR) are those which contain requirements that are more restrictive than Current Technical Specifications. These MR requirements are based on the Standard Technical Specifications for BWR/4, NUREG-1433, modified to reflect BFN specific design, and have been determined to be appropriate and safe for BFN based on a review of current design bases.

M1 Proposed SRs 3.8.4.2 and 3.8.4.5 have been added for the unit, shutdown, and DG battery chargers for consistency with the BWR/4 Standard Technical Specifications. SR 3.8.4.2 verifies battery charger capability to recharge the batteries every 18 months, while SR 3.8.4.5 verifies battery charger capability to perform at maximum output every 60 months. The parameter values supplied in these SRs are based on the BFN battery design and are appropriate for the specific SRs in which

they are utilized. These new Surveillances are additional restrictions on plant operation.

M2 A new more restrictive requirement to be in MODE 3 (Hot Shutdown) within 12 hours of entry into the LCO has been added. This is more restrictive since before the only requirement was to be in mode 4 within 24 hours and now the operator must place the reactor in a shutdown condition within a shorter time period. This requirement is consistent with the BWR Standard Technical Specifications, NUREG-1433, and is appropriate for BFN since it adds an additional measure of control for safe shutdown of the reactor and can be achieved safely in the time allotted.

M3 Specific acceptance criteria for relating overall battery voltage and measured battery capacity to DC source subsystem OPERABILITY is added. Current surveillances only require the parameter be checked, with no associated criteria specified. This imposes Technical Specification limitations that do not currently exist, and are therefore additional restrictions.

M4 An explicit LCO statement (LCO 3.8.4.e) is added to require the unit shutdown board DC subsystems that support SGT and CREVS OPERABILITY to be OPERABLE. Proposed ACTION D specifically requires that the affected CREVS or SGT subsystem be declared inoperable when the required unit shutdown board DC subsystem is inoperable. This new restriction is intended to ensure appropriate action is taken for the system affected by an inoperable DC subsystem. This change is consistent with the intended presentation of the BWR Standard Technical Specifications, NUREG-1433.

M5 (Unit 1 and 2 only) Current Unit 1 and 2 Technical Specifications 3.9.B.7 & B.8 are written so that they allow one 250-V Unit Battery to be inoperable concurrent with one 250-V shutdown board battery. CTS 3.9.B.7 provides a 7 day LCO for the Unit Batteries and CTS 3.9.B.8 provides a 5 day LCO for the shutdown board batteries. However, this configuration (one Unit battery and one Shutdown Board battery inoperable) could result in a loss of ESF functions. The proposed Specifications have been modified to explicitly allow only one Unit Battery or Shutdown Board battery inoperable and as such is considered more restrictive. This is consistent with the CTS for Unit 3.

TECHNICAL CHANGE - LESS RESTRICTIVE

"Generic"

LA1 The details relating to system design and purpose have been relocated to the Bases. The design features and system operation are also described in the FSAR. Thus, the LCO has been written to require the 250 Volt DC battery and the 125 Volt DC DG battery subsystems, as described in comment A1 above. Relocating the specific system details to the Bases is acceptable since this information is not necessary in order to establish the LCO requirement. Changes to the Bases will be controlled by the provisions of the proposed Bases Control Program in Section 5 of the Technical Specifications. Changes to the FSAR will be controlled by the provisions of 10 CFR 50.59.

LA2 CTS 3.9.B.7 and B.8 for Units 1 and 2 (3.9.B.6 for Unit 3) require NRC notification when a DC power source is inoperable for any reason other than routine surveillance testing. This condition is not reportable to the NRC per 10 CFR 50.72, 50.73, or other 10 CFR requirements and as such is being removed from TS. This is acceptable since TS cannot supercede regulations.

LA3 The proposed change removes requirement to log overall battery voltage and various battery parameters from TS. This is acceptable since inclusion of the details of what data to record is not necessary to establish the requirement for surveillance testing. Thus removal of this requirement from the Technical Specifications will have no effect on battery OPERABILITY.

"Specific"

L1 The allowed outage time for the Unit 1 and 2 Shutdown Board DC batteries has been increased from 5 to 7 days consistent with the Unit 3 Technical Specifications for Shutdown Battery 3EB and Units 1, 2, and 3 CTS for a unit battery. At BFN, there is a safety related 250 VDC unit battery located in each unit. The unit battery systems provide power for unit control functions, unit DC motor loads and alternate control power to the 4.16 kV and 480 V AC shutdown boards. The primary control power supplies to the 3A, 3C, and 3D 4.16kV ac shutdown boards and the Unit 3 480 V shutdown boards are also provided by the unit batteries. There are five safety related 250 V DC battery systems assigned as primary control power supplies to 4.16 kV AC shutdown boards A, B, C, D, 3EB, and 480 V shutdown boards 1A, 1B, 2A, and 2B. Alternate control power for these shutdown boards are provided from the Unit Batteries. Therefore, the impact on Unit 1 and 2 for a 4-kv shutdown board battery being inoperable is no more severe than a unit battery being out of service on Unit 1, 2, or 3 or shutdown board 3EB battery being inoperable on Unit 3. For these reasons, a seven day out of service

time is appropriate for an inoperable 4-kv shutdown board battery on Units 1 and 2. This change is acceptable since the allowed outage time continues to ensure corrective action is taken to restore the inoperable battery with no significant reduction in margin of safety while allowing time for corrective action to be accomplished.

L2 The time to reach MODE 4, Cold Shutdown has been extended from 24 hours to 36 hours. This provides the necessary time to shut down and cool down the plant in a controlled and orderly manner that is within the capabilities of the unit, assuming the minimum required equipment is OPERABLE. This extra time reduces the potential for a unit upset that could challenge safety systems. This time is consistent with the BWR Standard Technical Specifications, NUREG 1433. The increased time allowed to reach MODE 4 is acceptable based on the small probability of an event during this time and the desire to minimize plant transients. The requested 12 hour extension will provide sufficient time for the unit to reach MODE 4 in an orderly manner. As a result, the potential for human error will be reduced. In addition, the unit is now required to be in MODE 3 within 12 hours (a shutdown condition). As such, any reduction in a margin of safety will be insignificant and offset by the benefit gained from providing sufficient time to reach MODE 4, thus avoiding potential plant transients from attempting to reach MODE 4 in the current time and the benefit of being subcritical (MODE 3) in a shorter required time.

L3 CTS 4.9.A.2.c requires a battery capacity test every 24 months. This battery capacity test is presented as proposed SR 3.8.4.4 at a Frequency of once per 60 months (12 months when battery shows degradation, and 24 months when battery has reached 85% of the expected life). However, a new Surveillance, proposed SR 3.8.4.3, introduces a battery service test every 18 months. The new service test will provide assurance that the battery remains capable of supporting the expected post-accident loads. The less frequent capacity test will continue to monitor overall battery capacity and allow trending of remaining capacity (with more frequent testing on signs of degradation or approaching end-of-life). These tests and their Frequencies are consistent with the recommendations of IEEE-450 for monitoring battery performance. This change is acceptable since the added service test ensures the battery will continue to be able to accomplish its required function.

JUSTIFICATION FOR CHANGES
BFN ISTS 3.8.6 - BATTERY CELL PARAMETERS

ADMINISTRATIVE

A1 All reformatting and renumbering is in accordance with the BWR/4 Standard Technical Specifications (STS), NUREG-1433. As a result, the Technical Specifications (TS) should be more readily readable, and therefore understandable, by plant operators as well as other users. The reformatting, renumbering, and rewording process involves no technical changes to existing Technical Specifications.

Editorial rewording (either adding or deleting) is made consistent with NUREG-1433. During ISTS development certain wording preferences or English language conventions were adopted which resulted in no technical changes (either actual or interpretational) to the Technical Specifications. Additional information has also been added to more fully describe each subsection. This wording is consistent with the BWR Standard Technical Specifications, NUREG-1433. Since the design is already approved by the NRC, adding more detail does not result in a technical change.

TECHNICAL CHANGE - MORE RESTRICTIVE

The items identified as More Restrictive (MR) are those which contain requirements that are more restrictive than Current Technical Specifications. These MR requirements are based on the Standard Technical Specifications for BWR/4, NUREG-1433, modified to reflect BFN specific design, and have been determined to be appropriate and safe for BFN based on a review of current design bases.

M1 CTS does not have any battery cell parameter limits that affect the OPERABILITY of the batteries. The proposed battery cell parameter limits have been provided and placed into one Table, (proposed Table 3.8.6-1), which lists the limits for each pilot cell (Category A) and for each connected cell (Category B). Category C limits have also been added, as described below. The proposed SRs (SR 3.8.6.1 and 3.8.6.2) are worded to verify the appropriate limits (Category A or B) are met. Currently no limits are specified in Technical Specifications. To go along with the new limits, a 31 day Completion Time for restoring battery cell parameters has been provided (Required Action A.3). This Completion Time is considered acceptable since sufficient battery capacity exists to perform the intended function and to allow time to fully restore battery cell parameters to normal limits. This change is consistent with IEEE Battery Working Group (BWG) recommendations in a letter from B. M. Radimer (IEEE BWG) to S. K. Aggarwal (NRC) dated August 2, 1988.

To help support this new time, two additional requirements have been added. Required Action A.1 has been provided to verify pilot cell electrolyte level and float voltage are within allowable limits (Category C limits) within 1 hour when Category A or B parameters are not within limits. This change provides a quick indication of the status of the remainder of the battery cells. Required Action A.2 has been provided to verify battery cell parameters for all the cells are within Category C limits within 24 hours when Category A or B parameters are not within limits. This change provides assurance the battery is still capable of performing its intended function. If Category C limits are not met, or the Category A and B limits are not restored within 31 days, proposed ACTION B requires the affected battery to be declared inoperable (and the appropriate ACTIONS of proposed LCOs 3.8.4 or 3.8.5 taken).

In addition, a Note has been added to the ACTIONS to provide more explicit instructions for proper application of the Actions for Technical Specification compliance. In conjunction with the proposed Specification 1.3 - "Completion Times," the Note ("Separate Condition entry is allowed for each . . .") and "one or more" provides direction consistent with the intent of the proposed Action.

A Surveillance is being added, consistent with the BWR Standard Technical Specifications. Proposed SR 3.8.6.3 requires a verification that electrolyte temperature is ≥ a specified limit for each battery every 92 days. This helps to ensure battery OPERABILITY.

The Applicability of this new LCO has been made "when associated DC electrical power subsystem is required to be OPERABLE." This covers the current MODES 1, 2, and 3, as well as new requirements for MODES 4 and 5 and fuel handling.

TECHNICAL CHANGES - LESS RESTRICTIVE

LA1 This change proposes to relocate the specifics of the current requirement to verify the electrolyte temperature of every fifth cell every 92 days. The proposed change will require the average temperature of representative cells to be within limits every 92 days. The details of "representative cells" are relocated to the Bases. Removal of these details from the Technical Specifications is acceptable since the inclusion of this information is not necessary in order to establish the requirement. Changes to the Bases will be controlled by the provisions of the Bases Control Program in the Section 5 of the Technical Specifications.

LA2 The requirement to log the battery parameters has been replaced with a requirement to verify adequate battery parameters (SR 3.8.6.1 and SR 3.8.6.2). This is acceptable since inclusion of the details of what data to record is not necessary to establish the requirement for surveillance testing. Thus removal of this Surveillance from the Technical Specifications will have no effect on battery OPERABILITY.

LA3 Not used.

JUSTIFICATION FOR CHANGES
BFN ISTS 3.8.7: DISTRIBUTION SYSTEMS-OPERATING

ADMINISTRATIVE

A1 All reformatting and renumbering is in accordance with the BWR/4 Standard Technical Specifications (STS), NUREG-1433. As a result, the Technical Specifications (TS) should be more readily readable, and therefore understandable, by plant operators as well as other users. The reformatting, renumbering, and rewording process involves no technical changes to existing Technical Specifications.

Editorial rewording (either adding or deleting) is made consistent with NUREG-1433. During ISTS development certain wording preferences or English language conventions were adopted which resulted in no technical changes (either actual or interpretational) to the Technical Specifications. Additional information has also been added to more fully describe each subsection. This wording is consistent with the BWR Standard Technical Specifications, NUREG-1433. Since the design is already approved by the NRC, adding more detail does not result in a technical change.

A2 With a Shutdown Board deenergized, the associated DG would also have to be inoperable. With this inoperability, proposed Required Action B.2 of ITS LCO 3.8.1 will perform this confirmation of the OPERABILITY of redundant features. Refer to LCO 3.8.1 for justification for changes to this ACTION.

TECHNICAL CHANGE - MORE RESTRICTIVE

The items identified as More Restrictive (MR) are those which contain requirements that are more restrictive than Current Technical Specifications. These MR requirements are based on the Standard Technical Specifications for BWR/4, NUREG-1433, modified to reflect BFN specific design, and have been determined to be appropriate and safe for BFN based on a review of current design bases.

M1 The proposed Required Actions will be modified to include a limit on the maximum time allowed for any combination of required AC/DC distribution subsystems to be inoperable during any single continuous occurrence of failing to meet the LCO. This new restriction is intended to prevent excessive allowed out of service times for an AC/DC distribution subsystem as a result of sequential inoperabilities of different AC/DC distribution subsystems. This change is consistent with the intended presentation of the BWR Standard Technical Specifications, NUREG-1433.

M2 A new more restrictive requirement to be in MODE 3 (Hot Shutdown) within 12 hours of entry into the LCO has been added. This is more restrictive since before the only requirement was to be in mode 4 within 24 hours and now the operator must place the reactor in a shutdown condition within a shorter time period. In the case of CTS 3.9.B.12 for Units 1 and 2 (3.9.B.10 for Unit 3), the requirement to be in Hot Standby in 12 hours has been changed to a more restrictive requirement to be in Hot Shutdown in 12 hours. These requirements are consistent with the BWR Standard Technical Specifications, NUREG-1433, and are appropriate for BFN since they add an additional measure of control for safe shutdown of the reactor and can be achieved safely in the time allotted.

| M3 Proposed ACTION I requires entry into LCO 3.0.3 immediately when two or more electrical power distribution subsystems are inoperable. This condition corresponds to a level of degradation in the electrical power distribution subsystems that causes a required safety function to be lost. In this case no additional time is justified for continued operation and a controlled shutdown must commence.

Unit 1 and 2 only: Current Unit 1 and 2 Technical Specifications 3.9.B.7 & B.8 are written so that they allow one 250-V Unit Battery to be inoperable concurrent with one 250-V shutdown board battery. CTS 3.9.B.7 provides a 7 day LCO for the Unit Batteries and CTS 3.9.B.8 provides a 5 day LCO for the shutdown board batteries. However, this configuration (one Unit battery and one Shutdown Board battery inoperable) could result in a loss of ESF functions. The proposed Specifications have been modified to explicitly allow only one Unit Battery or Shutdown Board battery inoperable and as such is considered more restrictive. This is consistent with the CTS for Unit 3.

M4 CTS 4.9.A.4.d require the 4.16 kV Shutdown Board voltages to be recorded every 12 hours. However, no explicit periodic verification is required for the other required boards. A more restrictive change is made by providing an explicit periodic Surveillance Requirement that applies to all the AC and DC distribution subsystems. The surveillance verifies that the AC and DC electrical power distribution systems are functioning properly, with all required circuit breakers closed and buses energized to the proper voltage. This ensures that power is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into consideration the redundant capability of the AC and DC electrical power distribution subsystems, and other indications in the control room that alert the operator to system malfunctions. The removal of the requirement to record shutdown board voltage every 12 hours is addressed by justification LA3 below.

M5 An explicit LCO statement is added to require the applicable unit distribution boards needed to support SGT and CREVS to be OPERABLE. Proposed ACTION G specifically requires that the affected CREVS or SGT subsystem be declared inoperable when a required Unit 2 or 3 AC or DC Board is inoperable. This new restriction is intended to ensure appropriate action is taken for the system affected by an inoperable board. This change is consistent with the intended presentation of the BWR Standard Technical Specifications, NUREG-1433.

M6 The Condition F postulated worst case scenario is one division of 4.16 kV shutdown board without AC power. In this condition, the unit is more vulnerable to a complete loss of AC power. It is, therefore, imperative that the unit operators' attention be focused on minimizing the potential for loss of power to the remaining division by stabilizing the unit, and on restoring power to the affected division. The 8 hour time period before requiring a unit shutdown is acceptable because:

a. There is a potential for decreased safety if the unit operator's attention is diverted from the evaluations and actions necessary to restore power to the affected division to the actions associated with taking the unit to shutdown within this time limit.

b. The potential for an event in conjunction with a single failure of a redundant component in the division with AC power is minimal.

The second Completion Time (12 days) establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO. This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition F was entered. The 12 day Completion Time is an acceptable limitation on the potential of failing to meet the LCO indefinitely.

TECHNICAL CHANGE - LESS RESTRICTIVE

"Generic"

LA1 The details relating to system design and purpose and what "OPERABLE" means (i.e., "energized") have been relocated to the Bases. The design features and system operation are also described in the FSAR. This change is acceptable since inclusion of these details is not necessary in order to establish the LCO requirement. Changes to the Bases will be controlled by the provisions of the proposed Bases Control Program in Section 5 of the Technical Specifications. Changes to the FSAR will be controlled by the provisions of 10 CFR 50.59.

LA2 CTS 3.9.B.7 and B.8 for Units 1 and 2 (3.9.B.6 for Unit 3) require NRC notification when a battery board is inoperable for any reason other than routine surveillance testing. This condition is not reportable to the NRC per 10 CFR 50.72, 50.73, or other 10 CFR requirements and as such is being removed from TS. This is acceptable since TS cannot supercede regulations.

LA3 CTS 4.9.A.4.d require the 4.16 kV Shutdown Board voltages to be recorded every 12 hours. The proposed change removes this specific requirement from TS. This is acceptable since inclusion of the details of what data to record is not necessary to establish the requirement for surveillance testing. Thus removal of this Surveillance from the Technical Specifications will have no effect on shutdown board OPERABILITY.

LA4 CTS 3.9.A.3.h for Units 1 and 2 (3.9.A.3.g for Unit 3) specifies that RMOV boards D and E be energized and that motor generator sets DN, DA, EN, and EA be in service. These details are used to support the requirements for an OPERABLE D or E RMOV board. These boards supply power to the RHR loop injection valves and recirculation pump discharge valves and are designed to automatically transfer to their alternate power supply.

The requirement of the current TS to have an OPERABLE RMOV board D and E is captured by proposed ITS LCO 3.8.7.c. The details relating to system design, purpose, and what constitutes OPERABILITY for the RMOV boards D and E have been relocated to the Bases. The design features required for operability (auto transfer on undervoltage) are also located in the Bases. Relocation of these details to the Bases is acceptable since the details of what constitutes OPERABILITY are not necessary to establish the requirement for OPERABILITY. Changes to the Bases will be controlled by the provisions of the proposed Bases Control Program in Section 5 of the Technical Specifications.

LA5 CTS 3.9.A.3.h (for Unit 1 and 2) and 3.9.A.3.g (for Unit 3) require 480 V reactor motor operated valve (RMOV) boards to be energized with motor-generator (MG) sets in service. CTS 3.9.B.13 and 14 (for Unit 1 and 2) and 11 and 12 (for Unit 3) provide Required Actions for when one or any two 480 V MG board sets become inoperable.

480 V AC RMOV boards contain MG sets in their feeder lines. The 480 V AC RMOV boards D and E provide motive power to valves associated with the LPCI mode of the RHR system. The MG sets act as electrical isolators and provide an automatic transfer on loss of power. The ability to provide power to these valves from two independent 4-kv shutdown boards ensures that single failure of a DG will not result in the failure of both LPCI pumps in one subsystem. Therefore, the failure of the automatic transfer capability will result in the inoperability of the of the affected LPCI subsystem. Having an MG set out of service

removes the auto transfer feature, and reduces the assurance that full RHR (LPCI) capacity will be available when required.

The intent of the current TS 3.9.B.13 (Units 1 and 2) and 3.9.B.11 (Unit 3) to only allow operation for 7 days with one MG set inoperable is maintained by Required Action C which requires declaring the affected RHR subsystem inoperable. This causes entry into the LCO 3.5.1 for an inoperable RHR LPCI loop which results in the same 7 day LCO. Having both RMOV board D and E auto transfers out of service can considerably reduce equipment availability. The inability to provide power to the inboard injection valve and the recirculation pump discharge valve from either 4-kv board associated with an inoperable MG set would result in declaring the both LPCI subsystems inoperable and entering the Actions required for LPCI. Thus the intent of CTS 3.9.B.14 (Units 1 and 2) and 3.9.B.12 (Unit 3) is maintained. This is acceptable since the LCO and Actions for the affected equipment are the more appropriate place for control of the required actions to be taken in the event of an inoperable component.

The details relating to system design, purpose, and what constitutes OPERABILITY for the RMOV boards D and E have been relocated to the Bases. The design features required for operability (auto transfer on undervoltage) are also located in the Bases. Relocation of these details to the Bases is acceptable since the details of what constitutes OPERABILITY are not necessary to establish the requirement for OPERABILITY. Changes to the Bases will be controlled by the provisions of the proposed Bases Control Program in Section 5 of the Technical Specifications.

"Specific"

L1 The time to reach MODE 4, Cold Shutdown has been extended from 24 hours to 36 hours. This provides the necessary time to shut down and cool down the plant in a controlled and orderly manner that is within the capabilities of the unit, assuming the minimum required equipment is OPERABLE. This extra time reduces the potential for a unit upset that could challenge safety systems. This time is consistent with the BWR Standard Technical Specifications, NUREG 1433. The increased time allowed to reach MODE 4 is acceptable based on the small probability of an event during this time and the desire to minimize plant transients. The requested 12 hour extension will provide sufficient time for the unit to reach MODE 4 in an orderly manner. As a result, the potential for human error will be reduced. In addition, the unit is now required to be in MODE 3 within 12 hours (a shutdown condition). As such, any reduction in a margin of safety will be insignificant and offset by the benefit gained from providing sufficient time to reach MODE 4, thus avoiding potential plant transients from attempting to reach MODE 4 in

the current time and the benefit of being subcritical (MODE 3) in a shorter required time.

L2 Proposed LCO 3.8.7, Conditions A and C will not include the requirement of CTS 4.9.B.4 (Units 1,2,3), 4.9.B.6 (Units 1,2) and 4.9.B.5 (Unit 3) to demonstrate the OPERABILITY of the all DGs associated with the remaining distribution systems within 24 hours. This change acknowledges that inoperability of a distribution subsystem is not indicative of a similar condition in the DG. Additionally, the periodic frequencies specified to demonstrate DG OPERABILITY have been shown to be adequate to provide a high degree of assurance that the DGs are OPERABLE. Therefore, this change allows credit to be taken for the normal periodic DG Surveillance as a demonstration of DG OPERABILITY and reduces the challenges and wear to the DGs. Minimizing DG starts is recommended to avoid unnecessary DG wear, thereby enhancing overall DG reliability (refer to Generic Letter 84-15). This action is consistent with BWR STS, NUREG-1433, and the design of BFN.

L3 Proposed LCO 3.8.7, Required Action B.1 provides an 8 hour time period to restore an inoperable 480 V shutdown board prior to initiating a shutdown while CTS 3.9.B.12 for Units 1 and 2 (3.9.B.10 for Unit 3) does not allow any time. Proposed Condition B allows a short time period to restore the inoperable 480 V shutdown board. The remaining 480 V shutdown board is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 480 V shutdown board could result in the minimum required ESF functions not being supported. Therefore, the inoperable 480 V shutdown board must be restored to OPERABLE status within 8 hours. The 8 hour time period before requiring a unit shutdown is acceptable because 1) there is a potential for decreased safety if the unit operator's attention is diverted from the evaluations and actions necessary to restore power to the affected division to the actions associated with taking the unit to shutdown within this time limits, and 2) the potential for an event in conjunction with a single failure of a redundant component in the division with AC power. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).") The second Completion Time (12 days) for Required Action B.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO.

L4 The allowed outage time for the Unit 1 and 2 Shutdown Board DC batteries has been increased from 5 to 7 days consistent with the Unit 3 Technical Specifications for Shutdown Battery 3EB and Units 1, 2, and 3 CTS for a unit battery. At BFN, there is a safety related 250 VDC unit battery located in each unit. The unit battery systems provide power for unit

control functions, unit DC motor loads and alternate control power to the 4.16 kV and 480 V AC shutdown boards. The primary control power supplies to the 3A, 3C, and 3D 4.16kV ac shutdown boards and the Unit 3 480 V shutdown boards are also provided by the unit batteries. There are five safety related 250 V DC battery systems assigned as primary control power supplies to 4.16 kV AC shutdown boards A, B, C, D, 3EB, and 480 V shutdown boards 1A, 1B, 2A, and 2B. Alternate control power for these shutdown boards are provided from the Unit Batteries. Therefore, the impact on Unit 1 and 2 for a 4-kv shutdown board battery being inoperable is no more severe than a unit battery being out of service on Unit 1, 2, or 3 or shutdown board 3EB battery being inoperable on Unit 3. For these reasons, a seven day out of service time is appropriate for an inoperable 4-kv shutdown board battery on Units 1 and 2. This change is acceptable since the allowed outage time continues to ensure corrective action is taken to restore the inoperable battery with no significant reduction in margin of safety while allowing time for corrective action to be accomplished.

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ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
P20 F ~~B~~. B1 One ~~[required]~~ offsite circuit inoperable. AND One ~~[required]~~ unit 3 <unit 3> Unit 1 and 2 <unit 1+2> DG inoperable. P1 4.16 KV shutdown board	------------NOTE------------ Enter applicable Conditions and Required Actions of LCO 3.8.~~7~~ 7, "Distribution Systems - Operating," when Condition ~~B~~ F is entered with no AC power source to any ~~division.~~ 4.16 KV shutdown board P11 ------------------------------	
P52 INSERT 3.8-5B	F P20 ~~B~~.1 Restore ~~[required]~~ B1 offsite circuit to OPERABLE status.	12 hours
	OR	
	F P20 ~~B~~.2 P1 Restore ~~[required]~~ unit 3 <unit 3> Unit 1 and 2 <unit 1+2> DG to OPERABLE status.	12 hours
H ~~G~~ ~~E~~. P20 P1 Two ~~[or three]~~ or more ~~[required]~~ unit 3 <unit 3> Unit 1 and 2 <unit 1+2> DGs inoperable.	H ~~G~~ ~~E~~.1 P20 P1 Restore all but one ~~[required]~~ DG to OPERABLE status.	2 hours

(continued)

----- NOTE -----
Only applicable when more than one 4.16 kV shutdown board is affected
--------------- P1

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ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~[F. One [required] [automatic load sequencer] inoperable.~~ (P4) (B3)	~~-------REVIEWER'S NOTE------- This Condition may be deleted if the unit design is such that any sequencer failure mode will only affect the ability of the associated DG to power its respective safety loads following a loss of offsite power independent of, or coincident with, a Design Basis Event. ---------------------------~~	
	~~F.1 Restore [required] [automatic load sequencer] to OPERABLE status.~~	~~[12] hours]~~
I ~~H~~ ~~G~~. (P20) Required Action and Associated Completion Time of Condition A, B, C, D, ~~[or]~~ E, ~~or~~ F, or G, or H not met. (B1)	I ~~H~~ ~~G~~.1 (P20) Be in MODE 3.	12 hours
	AND	
	I ~~H~~ ~~G~~.2 (P20) Be in MODE 4.	36 hours
J ~~I~~ ~~H~~. (P20) One ~~Three~~ or more ~~[required]~~ offsite circuits ~~AC sources~~ inoperable ~~[for reasons other than Condition E]~~. (P1) And two or more Unit 1 and 2 DGs <unit 1+2> (3) <unit 3>	J ~~I~~ ~~H~~.1 (P20) Enter LCO 3.0.3.	Immediately
OR Two required offsite circuits and one or more Unit 1 and 2 DGs inoperable. (P1) <unit 1+2> <unit 3> unit 3		
OR Two divisions of 480 V load shed logic inoperable. (P1)		
OR Two divisions of common accident signal logic inoperable. (P42)		

INSERT 3.8-5A (P3)

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(P3)

Unit 1 and 2 <Unit 3>

Insert 3.8-5A

K ~~J~~.	One or more required Unit 3 DGs inoperable. <Unit 1 and 2>	K ~~J~~.1	Declare required feature(s), supported by the inoperable Unit 3 DG, inoperable when the redundant required feature(s) are inoperable.	4 hours from discovery of Condition ~~J~~ K concurrent with inoperability of redundant required feature(s)
		AND		
		K ~~J~~.2	Declare affected SGT and CREVs subsystem(s) inoperable.	30 days

Insert 3.8-5B (P52)

-----NOTE----- Only applicable when one 4.16 kV shutdown board is affected. --- G. One required offsite circuit inoperable. AND <Unit 1 and 2> Unit3 <Unit 3> One Unit 1 and 2 DG inoperable.	G.1	Declare the affected 4.16 kV shutdown board inoperable.	Immediately

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move note to position immediately preceeding Required Action 3.8.2.B.1 on next page

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required offsite circuit inoperable. P11 OR One required DG inoperable	P27 ------------NOTE------------ Enter applicable Condition and Required Actions of LCO 3.8.~~10~~ 8, ~~with one required division de-energized as a result of Condition A.~~ when Condition B is entered with no AC power source to any required 4.16 KV shutdown board ------------------------------	
	A.1 Declare affected required feature(s), ~~with no offsite power available,~~ supported by the inoperable AC source, inoperable. P6	30 days ~~Immediately~~ P6 AND Immediately from discovery of Condition A concurrent with inoperability of redundant required feature(s)
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of irradiated fuel assemblies in the [secondary] containment.	Immediately
	AND	
	A.2.3 Initiate action to suspend operations with a potential for draining the reactor vessel (OPDRVs).	Immediately
	AND	
	A.2.4 Initiate action to restore required offsite power circuit to OPERABLE status.	Immediately

(continued)

Insert note from previous page

REV. ~~1~~ 2

B.1 Declare ~~affected~~ required feature(s) inoperable | Immediately

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. ~~One~~ Two or more required ~~DG~~ AC sources inoperable.	OR		
	B.~~1~~ 2.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	B.2.2	Suspend movement of irradiated fuel assemblies in ~~[secondary]~~ containment. B1	Immediately
	AND		
	B.~~3~~ 2.3	Initiate action to suspend OPDRVs.	Immediately
	AND		
	B.~~4~~ 2.4	Initiate action to restore required DG to OPERABLE status.	Immediately

P6

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.2.1	-------------------NOTE------------------- Unit 1 and 2: The following SRs are not required to be performed: SR 3.8.1.~~3~~ 2, SR 3.8.1.~~9~~ 5 ~~through SR 3.8.1.11, SR 3.8.1.13 through SR 3.8.16, [SR 3.8.1.18], and~~ SR 3.8.1.7, SR 3.8.1.8, SR 3.8.1.~~19~~ ~~10~~ 9 and Unit 3: 7 --- For Unit 1 and 2 / Unit 3 AC sources required to be OPERABLE, the SRs of Specification 3.8.1~~, except SR 3.8.1.8, SR 3.8.1.17, and SR 3.8.1.20,~~ are applicable.	In accordance with applicable SRs

P5 ⟨Unit 1+2⟩ ⟨Unit 3⟩

INSERT 3.8-20A — P6

3.8 ELECTRICAL POWER SYSTEMS

3.8.~~8~~ 7 Distribution Systems - Operating

P11

LCO 3.8.~~8~~ 7 ~~[Division 1] and [Division 2]~~ The following AC, and DC, ~~[and AC vital bus]~~ electrical power distribution subsystems shall be OPERABLE: B1

P12 INSERT 3.8-38A

APPLICABILITY: MODES 1, 2, and 3.

P1 INSERT 3.8-38AA

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more AC electrical power distribution subsystems inoperable. <Unit 3> Unit 3 <Unit 1 and 2> Unit 1 and 2 Shutdown 4.16kV Board P12	A.1 Restore the AC electrical power distribution subsystems to OPERABLE status.	5 days ~~8 hours~~ P12 AND 12 days ~~16 hours~~ from discovery of failure to meet LCO
B. One ~~or more AC vital buses~~ inoperable. <Unit 3> Unit 3 B1 <Unit 1> Unit 1 <Unit 2> Unit 2 480 V Shutdown Board P15 INSERT 3.8-38B INSERT 3.8-38E P12	B.1 Restore ~~AC vital bus~~ distribution subsystems to OPERABLE status. P1 INSERT 3.8-38AB <Unit 3> 3EB P12 required Unit DC Board or Shutdown Board DC Distribution Panel to	8 ~~2~~ hours P12 AND 12 days ~~16 hours~~ from discovery of failure to meet LCO
E ~~B~~ C P11 B1 One ~~or more [station service]~~ DC ~~electrical power distribution subsystems~~ Board inoperable. P12 INSEET 3.8-38C	E ~~B~~ C.1 P11 P12 Restore ~~DC electrical power distribution subsystems to~~ OPERABLE status.	7 days ~~2 hours~~ P12 AND 12 days ~~16 hours~~ from discovery of failure to meet LCO

INSERT 3.8-38D P12 ~~INSERT 3.8-38E P12~~

(continued)

Insert 3.8-38AA

-------------NOTE-------------
Enter applicable conditions and required actions of Condition B, C, D, and G when Condition A results in no power to a required 480 volt board.

Insert 3.8-38AB

-------------NOTE-------------
Enter Condition C when Condition B results in no power to a required 480 volt board.

Insert 3.8-38F

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<Unit 1 & 2>

F. Unit 1 and 2 4.16 kV Shutdown Board A and B inoperable. <u>OR</u> Unit 1 and 2 4.16 kV shutdown board C and D inoperable	F.1 ---------NOTE--------- Enter applicable conditions and required actions of Condition B, C, D, and G when Condition F results in no power source to a required 480 volt board. ------------------------------ Restore one 4.16 kV Shutdown Board to OPERABLE status.	8 hours <u>AND</u> 12 days from discovery of failure to meet LCO

<Unit 3>

F. Unit 3 4.16 kV Shutdown Board 3EA and 3EB inoperable. <u>OR</u> Unit 3 4.16 kV shutdown board 3EC and 3ED inoperable	F.1 ---------NOTE--------- Enter applicable conditions and required actions of Condition B, C, D, and G when Condition F results in no power source to a required 480 volt board. ------------------------------ Restore one 4.16 kV Shutdown Board to OPERABLE status.	8 hours <u>AND</u> 12 days from discovery of failure to meet LCO

REV. X2

Insert 3.8-38A (Unit 1 and 2)

P12

a. Unit 1 and 2 4.16 kV Shutdown Boards;

b. Unit 2 480 V Shutdown Boards; ① <Unit 1> <Unit 2>

c. Unit 2 480V RMOV Boards 2D and 2E <Unit 1> ① <Unit 2> <Unit 1> ① ① <Unit 2>

d ~~e.~~ Unit 1 and 2 DG Auxiliary Boards;

e ~~d.~~ Unit DC Boards;

f ~~e.~~ Unit 1 and 2 Shutdown Board DC Distribution Panels; and (AC and DC Boards) (DC) and Shutdown Board Distribution Panel 3EB

g ~~f.~~ Unit ~~3~~ 1 and 3 <Unit 2> 2 and 3 <Unit 1> ~~4.16 kV Shutdown Boards~~ needed to support equipment required to be OPERABLE by LCO 3.6.4.3, "Standby Gas Treatment (SGT) System," and LCO 3.7.3, "Control Room Emergency Ventilation (CREV) System."

Insert 3.8-38A (Unit 3)

a. Unit 3 4.16 kV Shutdown Boards;

b. Unit 3 480 V Shutdown Boards;

c. Unit 3 480V RMOV Boards 3D and 3E;

d ~~e.~~ Unit 3 DG Auxiliary Boards;

e ~~d.~~ Unit DC Boards;

f ~~e.~~ Shutdown Board DC Distribution Panels 3EB; and

g ~~f.~~ Unit 1 and 2 (AC and DC Boards) (and Shutdown Board DC Distribution Panels) ~~4.16 kV Shutdown Boards~~ needed to support equipment required to be OPERABLE by LCO 3.6.4.3, "Standby Gas Treatment (SGT) System," and LCO 3.7.3, "Control Room Emergency Ventilation (CREV) System."

P15

Insert 3.8-38B

CONDITION	REQUIRED ACTION	COMPLETION TIME
D ~~E.~~ One Unit 3 / 1 and 2 DG Auxiliary Board inoperable.	<Unit 3> D ~~E~~.1 Restore Unit 3 / 1 and 2 DG Auxiliary Board to OPERABLE status.	5 days AND 12 days from discovery of failure to meet LCO

<Unit 1 and 2>

Insert 3.8-38C

P12

OR

One Unit 1 and 2 Shutdown Board DC Distribution Panel 3EB inoperable.

<Units 1 and 2>

<Unit 3>

INSERT 3.8-38D

<unit 3>

G. ~~F~~ ~~E~~. One or more Unit 1 and 2 3 4.16 kV Shutdown Boards inoperable. <Unit 1 and 2> ~~OR~~ ~~One or more Unit 1 and 2 Shutdown Board DC Distribution Panels 3EB inoperable.~~ <Unit 3> <Unit 1 and 2> One or more required Unit 2 and 3 <unit 1> 1 and 3 <unit 2> 1 and 2 <unit 3> AC or DC Boards inoperable	~~F~~ ~~E~~ G.1 Declare the affected SGT or CREV subsystem inoperable.	Immediately

INSERT 3.8-38E

C. Unit 3 2 1 480V Rmov Board 3 2 1 D inoperable. OR Unit 3 2 1 480 V Rmov Board 3 2 1 E inoperable.	C.1 Declare the affected RHR subsystem inoperable.	Immediately

<Unit 3>

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
H G. F. D. P20 Required Action and associated Completion Time of Condition A, B, ~~or~~ D, C not met. P12 , or D E	G H F. D.1 P20 Be in MODE 3.	12 hours
	AND G H F. D.2 P20 Be in MODE 4.	36 hours
B3 [E. One or more DG DC electrical power distribution subsystems inoperable.]	[E.1 Declare associated DG(s) inoperable.]	[Immediately]
K I G. F. P20 Two or more electrical power distribution subsystems inoperable that result in a loss of function.	K I G. F.1 P20 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.~~9~~ 7 P11 .1	Verify ~~correct breaker alignments and voltage to [required] AC, DC, [and AC vital bus] electrical power distribution subsystems.~~ P50 indicated power availability to required AC and DC electrical power distribution subsystems.	7 days

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B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources – Operating

BASES

P1 (except as marked)

BACKGROUND

The unit Class 1E AC Electrical Power Distribution System AC sources consist of the offsite power sources (preferred power sources, normal and alternates), and the onsite standby power sources (Unit 1 and 2 diesel generators (DGs) ~~2~~A, ~~2C,~~ B and ~~1B~~ D, and Unit 3 DGs 3A, 3B, 3C, and 3D). As required by 10 CFR 50, Appendix A, GDC 17 (Ref. 1), the design of the AC electrical power system provides independence and redundancy to ensure an available source of power to the Engineered Safety Feature (ESF) systems.

The Class 1E AC distribution system is divided into redundant ~~load groups~~ divisions, so loss of any one ~~group~~ division does not prevent the minimum safety functions from being performed. Each of four 4.16 kV shutdown boards ~~load group~~ has ~~connections to~~ two ~~preferred~~ available offsite power supplies ~~and a single DG~~. INSERT B3.8-1A

INSERT B3.8-1B

~~Offsite power is supplied to the 230 kV and 500 kV switchyards from the transmission network by eight transmission lines. From the 230 kV switchyards, two electrically and physically separated circuits provide AC power, through auxiliary transformers 2C and 2D, to 4.16 kV ESF buses 2E, 2F, and 2G.~~ A detailed description of the offsite power network and circuits to the onsite Class 1E ESF buses is found in the FSAR, ~~Section~~ Chapter ~~[8.2]~~ (Ref. 2).

~~An offsite circuit consists of all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network to the~~ ~~onsite Class 1E ESF bus or buses.~~ 4.16 kV shutdown boards

<Unit 1 and Unit 2> A and B (Division I) or C and D (Division II)

<UNIT 3> 3EA and 3EB (Division I) or 3EC and 3ED (Division II)

~~Startup auxiliary transformer (SAT) 2D provides the normal source of power to the ESF buses 2E, 2F, and 2G. If any 4.16 kV ESF bus loses power, an automatic transfer from SAT 2D to SAT 2C occurs. At this time, 4.16 kV buses 2A and 2B and supply breakers from SAT 2C also trip open, disconnecting all nonessential loads from SAT 2C to preclude overloading of the transformer.~~

<Unit 3> USST 3B, and the CSSTs

<Unit 1 and 2> USST 1B and 2B, and the CSSTs

~~SATs 2C and 2D~~ are sized to accommodate ~~the simultaneous starting of~~ all required ESF loads on receipt of an accident signal ~~without the need for load sequencing.~~

<Unit 2> on Unit 2, while also carrying all the required safety loads of Unit 1 operating at full power

<Unit 1> on Unit 1, while also carrying all the required safety loads of Unit 2 operating at full power

(continued)

Insert B3.8-1A

Only offsite power delivered through the normal feeder breakers can be credited since common accident signal (CAS) logic (CAS A/CAS B) will trip the alternate breaker. This prevents an overload condition if all shutdown boards had been aligned to the same shutdown bus, and thus to the same transformer winding.

Insert B3.8-1B <Units 1 and 2>

Offsite power is supplied to the 161 kV and 500 kV switchyards from the transmission network by ~~nine~~ seven transmission lines (two 161 kV lines and five ~~seven~~ 500 kV lines). Trinity I and II 500 kV lines are not included in the 500 kV line totals. Four basic circuits from the transmission network to the safety related on site distribution system (i.e., 4.16 kV shutdown boards), are as follows:

1. From the 500 kV switchyard, through unit station service transformer (USST) 1B to a 4.16 kV unit board. That unit board feeds 4.16 kV shutdown bus 1 or 2, which then feeds two of the Unit 1 and 2 4.16kV shutdown boards (A and B or C and D);

2. From the 500 kV switchyard, through USST 2B to a 4.16 kV unit board. That unit board feeds 4.16kV shutdown bus 1 or 2, which then feeds two of the Unit 1 and 2 4.16 kV shutdown boards (A and B or C and D);

3. From the Trinity 161 kV transmission system, through common station service transformer~~s~~ (CSST) A or B to start bus 1A or 1B, then to a 4.16 kV unit board. That unit board feeds 4.16 kV shutdown bus 1 or 2, which then feeds two of the Unit 1 and 2 4.16 kV shutdown boards (A and B or C and D); and

4. From the Athens 161 kV transmission system, through CSST A or B to start bus 1A or 1B, and then to a 4.16 kV unit board. That unit board feeds 4.16 kV shutdown bus 1 or 2, which then feeds two of the Unit 1 and 2 4.16 kV shutdown boards (A and B or C and D).

Shutdown bus 1 normally feeds 4.16 kV shutdown boards A and B and shutdown bus 2 normally feeds 4.16 kV shutdown boards C and D. The 4.16 kV shutdown boards are normally aligned to power associated divisional 480 V safety equipment (two divisions per unit). This results in one DG powering only one 480 V division of one unit, and some of that same division's 4.16 kV loads for both Units 1 and 2.

<Unit 3> shutdown boards 3EA, 3EB, 3EC, and 3ED

<Unit 1 and 2> shutdown boards A, B, C and D

four Unit 1 and 2 <Unit 1 and 2

four Unit 3 <Unit 3>

each dedicated to a shutdown board

BACKGROUND (continued)

The onsite standby power source for 4.16 kV ~~ESF buses 2E, 2F, and 2G~~ consists of ~~three~~ DGs. ~~DGs 2A and 2C are dedicated to ESF buses 2E and 2G, respectively. DG 1B is a shared power source and can supply either Unit 1 ESF bus 1F or Unit 2 ESF bus 2F. A~~ Each DG starts automatically on a loss of coolant accident (LOCA) signal (i.e., low reactor water level signal or high drywell pressure signal), or on ~~an ESF bus~~ its respective degraded voltage or undervoltage signal. After the DG has started, it automatically ties to its respective bus after offsite power is tripped as a consequence of ~~ESF bus~~ undervoltage or degraded voltage, independent of or coincident with a LOCA signal. The DGs also start and operate in the standby mode without tying to the ~~ESF bus~~ on a LOCA signal alone. Following the trip of offsite power, ~~a sequencer strips nonpermanent loads from the ESF bus.~~ When the DG is tied to the ~~ESF bus~~, loads are then sequentially connected to its respective ~~ESF bus~~ by ~~the automatic sequencer~~. The ~~sequencing logic~~ control~~s~~ the permissive and starting signals to motor breakers to prevent overloading the DG.

INSERT B3.8-2A

4.16 KV shutdown board

INSERT B3.8-2B

individual pump timers

individual pump timers

In the event of a loss of ~~preferred~~ offsite power, the ESF electrical loads are automatically connected to the DGs in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a LOCA.

Certain required plant loads are returned to service in a predetermined sequence in order to prevent overloading of the DGs in the process. Within ~~16~~ 40 seconds after the initiating signal (DG breaker closure with accident signal) is received, all automatic and permanently connected loads needed to recover the unit or maintain it in a safe condition are returned to service.

Ratings for the DGs satisfy the ~~requirements~~ intent of ~~Regulatory~~ Safety Guide ~~1~~9 (Ref. 3). DGs ~~2A and 2C~~ have the following ratings: (Non-derated for intake temperature ≤ 90°F / Derated for ~~[illegible]~~ either intake air temperature >90°F or a combination of intake air temperature >90°F and engine cooling water outlet temperature >190°F) (Reference 12)

a. ~~2850~~ 2600/2550 kW — continuous,

b. ~~3100~~ 2860/2800 kW — ~~2000 hours,~~ 0 to 2 hours (Short Time Steady State),

c. ~~3250~~ 2850/2815 kW — ~~300 hours,~~ 0 to 3 minutes (Cold Engine Instantaneous),

d. ~~3500~~ 3050/~~3050~~3025 kW — ~~30 minutes.~~ >3 minutes (Hot Engine Instantaneous).

(continued)

REV X2

(P1) ~~An offsite circuit is considered inoperable if a qualified offsite source is not available to one or more required shutdown boards~~ 4.16 kV

BASES

LCO (continued) (B1) ~~[In addition, [one required automatic load sequencer per ESF bus] shall be OPERABLE.]~~

Each offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the ~~ESF buses.~~ 4.16 kV shutdown boards ~~Each offsite circuit consists of incoming breakers and disconnect to the respective 2C and 2D SATs, the 2C and 2D transformers, and the respective circuit path including feeder breakers to 4.16 kV ESF buses. Feeder breakers from each circuit are required to the 2F ESF bus; however, if 2C SAT is connected to ESF bus 2E (or 2G) and 2D SAT is connected to 2G (or 2E), the remaining breakers to 2E and 2G are not required.~~ INSERT B3.8-4C

(P1) INSERT B3.8-4A

Each DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ~~ESF bus~~ 4.16 kV shutdown board on detection of bus undervoltage. This sequence must be accomplished within (B2) 10 ~~12~~ seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and must continue to operate until offsite power can be restored to the ~~ESF buses~~ 4.16 kV shutdown boards. ~~These capabilities are required to be met from a variety of initial conditions, such as DG in standby with the engine hot and DG in standby with the engine at ambient condition. Additional DG capabilities must be demonstrated to meet required Surveillances, e.g., capability of the DG to revert to standby status on an ECCS signal while operating in parallel test mode.~~

(PA2) INSERT B3.8-4B

Proper sequencing of loads, including tripping of nonessential loads, is a required function for DG OPERABILITY.

The AC sources must be separate and independent (to the extent possible) of other AC sources. For the DGs, the separation and independence are complete. For the offsite AC sources, the separation and independence are to the extent practical. A qualified offsite circuit may be connected to more than one division of 4.16 kV shutdown boards ~~ESF bus, with fast transfer capability to the other circuit OPERABLE~~, and not violate separation criteria. A circuit that is not connected to the Division I or II 4.16 kV ~~ESF bus~~ is required to have ~~OPERABLE fast transfer interlock mechanisms to at least two ESF buses to support OPERABILITY of that circuit.~~ the capability to be connected to at least one division of 4.16 kV shutdown boards to be considered operable (P1) INSERT B3.8-4D

(continued)

REV. X2

P1

Insert B3.8-4A <Units 1 and 2>

bus and then to the 4.16 kV shutdown boards (A and B or C and D)

to ~~each~~ 4.16 kV shutdown ~~board from one shutdown bus~~. Each shutdown bus is independently supplied from separate unit boards, which are fed from transformers (via start buses as appropriate). Specific circuits and limitations for considering the offsite circuit qualified are described below. Qualified circuits are one or more of the following:

1. From the 500 kV switchyard (with no credit for the two 500 kV Trinity lines), through unit station service transformer (USST) 1B to 4.16 kV unit board 1A, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B; and/or ~~or alternately,~~ to 4.16 kV unit board 1B, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D. If USST 2B is credited as the second source, a minimum of two 500 kV lines must be available.

2. From the 500 kV switchyard (with no credit for the two 500 kV Trinity lines), through USST 2B to 4.16 kV unit board 2A, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D; ~~or~~ and/or ~~alternately,~~ to 4.16 kV unit board 2B, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B. If USST 1B is credited as the second source, a minimum of two 500 kV lines must be available.

3. From the Trinity 161 kV transmission system, through common station service transformer~~s~~ (CSST) A or B to start bus 1A or 1B, to 4.16 kV unit board 1A or 2B, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B; or alternately, to 4.16 kV unit board 1B or 2A, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D. ~~Credit for offsite power from the Trinity 161 kV line may be taken by two units at any one time.~~

4. From the Athens 161 kV transmission system, through CSST A or B to start bus 1A or 1B, to 4.16 kV unit board 1A or 2B, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B; or alternately, to 4.16 kV unit board 1B or 2A, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D. ~~Credit for offsite power from the Athens 161 kV line may be taken by only one unit at one time.~~

{Unit 1 and 2}

Insert B3.8-4AA from page 723b

~~5.~~

P42

Insert B3.8-4A <Unit 3>

to each 4.16 kV shutdown board from ~~one shutdown bus. Each shutdown bus is independently supplied from separate~~ unit boards, which are fed from transformers (via start buses as appropriate). Specific circuits and limitations for considering the offsite circuit qualified are described below. Qualified circuits are one or more of the following:

~~Provided that both CSST A and B are available. Credit for offsite power from Trinity 161 kV line may be taken by three units at any one time provided that both CSST A and B are available and Unit 3 claims USST 3B as the other offsite power source.~~

Insert B3.8-4A <Unit 3> (continued)

1. From the 500 kV switchyard (with no credit for the two 500 kV Trinity lines), through unit station service transformer (USST) 3B to ~~a~~ 4.16 kV unit board(s). ~~That~~ Each unit board feeds two of the Unit 3 4.16 kV shutdown boards (3A and/or 3B) (3EA and 3EB or 3EC and 3ED).

2. From the Trinity 161 kV transmission system, through common station service transformers (CSST) A or B to start bus 1A or 1B, then to ~~a~~ 4.16 kV unit board. That unit board feeds two of the Unit 3 4.16 kV shutdown boards (3EA and 3EB or 3EC and 3ED). Credit for offsite power from Trinity 161 kV line may be taken by two units at any one time, provided that both CSST A and B are available. Credit for offsite power from the Trinity 161 kV line may be taken by three units at any one time, provided that both CSST A and B are available and Unit 3 claims USST 3B as the other offsite power source.

3. From the Athens 161 kV transmission system, through CSST A or B to start bus 1A or 1B, and then to a 4.16 kV unit board. That unit board feeds two of the Unit 3 4.16 kV shutdown boards (3EA and 3EB or 3EC and 3ED). Credit for offsite power from ~~Trinity~~ Athens 161 kV line may be taken by ~~two~~ only one unit~~s~~ at any one time.

<unit 3> 4. Insert B3.8-4AA from page 7236

Insert B3.8-4B (Units 1 and 2)

The Unit 1 and 2 DGs are provided with a common 480 V load shed logic system with two redundant divisions. The common accident signal logic system, with two redundant divisions, is common to the Unit 1, 2, and 3 DGs. These logic systems must be OPERABLE to ensure the DGs will perform and alignments will occur as assumed during a DBA.

Insert B3.8-4B (Unit 3)

The Unit 3 DGs are provided with a 480 V load shed logic system with two redundant divisions. The common accident signal logic system, with two redundant divisions, is common to the Unit 1, 2, and 3 DGs. These logic systems must be OPERABLE to ensure the DGs will perform and alignments will occur as assumed during a DBA.

~~For 161 kV off-site power to be qualified, the following must also be met:~~

~~a. The 161 kV Capacitor Bank must be available for the Athens 161 kV line.~~

~~b. The 161 kV Capacitor Bank or the Trinity Inter-Tie transformer must be in service for the Trinity 161 kV line.~~ must be available

Rev. 2

Insert B 3.8-4C (Unit 1 and 2)

An offsite circuit is considered operable if the offsite source is available to A and B or C and D shutdown boards.

Insert B 3.8-4C (Unit 3)

An offsite circuit is considered operable if the offsite source is available to 3EA and 3EB or 3EC and 3ED shutdown boards.

Insert B 3.8-4D (Unit 1 and 2)

The inability to supply qualified offsite power to an individual 4.16 kV shutdown board from a 4.16 kV shutdown bus constitutes the failure of only one offsite circuit as long as offsite power is available to the other division's shutdown boards. Thus if one 4 kV shutdown board or complete division of shutdown boards (i.e., A and B or C and D) does not have a qualified offsite circuit available, then only one offsite circuit would be inoperable. If one or more shutdown boards in each division (i.e., A or B and C or D) or all four shutdown boards do not have a qualified offsite circuit available, then both (2)offsite circuits would be inoperable.

Insert B3.8-4D (Unit 3)

The inability to supply qualified offsite power to an individual 4.16 kV shutdown board from a 4.16 kV shutdown bus constitutes the failure of only one offsite circuit as long as offsite power is available to the other division's shutdown boards. Thus, if one 4 kV shutdown board or complete division of shutdown boards (i.e., 3EA and 3EB or 3EC and 3ED) does not have a qualified offsite circuit available, then only one offsite circuit would be inoperable. If one or more shutdown boards in each division (i.e., 3EA or 3EB and 3EC or 3ED) or all four shutdown boards do not have a qualified offsite circuit available, then both (2) offsite circuits would be inoperable.

Insert B3.8-4AA

For the Athens 161 kV offsite power to be considered as one of the qualified offsite power supplies, the following restrictions must also be met:

a. The 161 kV capacitor bank must be available for the Athens 161 kV line.

b. Credit for offsite power from the Athens 161 kV line may be taken by only one unit at one time. However, more than one unit may be aligned to the Athens line without invalidating the offsite power supply for the unit claiming it.

For the Trinity 161 kV offsite power to be considered as one of the qualified offsite power supplies, the following restrictions must also be met:

a. For the Trinity 161 kV line to be considered as one of the qualified offsite power supplies by only one unit, either the 161 kV capacitor bank must be available or the Trinity Inter-Tie transformer must be in service with 161 kV line nominal voltage ≥ 165 kV.

b. The Trinity 161 kV line may be considered as one of the qualified offsite power supplies by two separate units at any one time, provided that both CSST A and B are available and either the 161 kV capacitor bank is

BASES (continued)

APPLICABILITY

<Unit 1> Unit 1
<Unit 2> Unit 2
<Unit 3> Unit 3

B1 P1

The AC sources ~~{and sequencers}~~ are required to be OPERABLE with in MODES 1, 2, and 3 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of ~~AOOs or~~ abnormal operational transients; and

P1

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

P1 The AC power requirements for Unit 2 in MODES 4 and 5 are covered in LCO 3.8.2, "AC Sources – Shutdown."

ACTIONS

A.1

P26

P51

This action ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power.

To ensure a highly reliable power source remains with one required offsite circuit inoperable, it is necessary to verify the availability of the remaining required offsite circuit on a more frequent basis. ~~Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action not met. However,~~ ~~if~~ A a second required circuit ~~fails SR 3.8.1.1~~ is not available, the second offsite circuit is inoperable, and Condition ~~C~~ E, for two offsite circuits inoperable, is entered. P51 P20

A.2

P1

Required Action A.2, which in a division only applies if one or both 4.16 kV shutdown boards ~~the division~~ cannot be powered from ~~an~~ a qualified offsite source, and is intended to provide assurance that an event with a coincident single failure of a ~~the associated~~ DG does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related divisions (i.e., single division systems are not included). Redundant required features failures consist of inoperable features associated with a division redundant to the division that has no offsite power. INSERT B3.8-5A

The Completion Time for Required Action A.2 is intended to allow time for the operator to evaluate and repair any

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(continued)

Rev. 2

Insert B 3.8-5A (Unit 1 and 2)

For example, if no qualified offsite power source was available to 4.16 kV shutdown board A and RHR pump D was inoperable for maintenance, then RHR pump A would have to be declared inoperable.

Insert B 3.8-5A (Unit 3)

For example, if no qualified offsite power source was available to 4.16 kV shutdown board 3EA and RHR pump 3D was inoperable for maintenance, then RHR pump 3A would have to be declared inoperable.

BASES

ACTIONS

A.2 (continued)

discovered inoperabilities. This Completion Time also allows an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

or no qualified offsite power available

a. The ~~division~~ has no offsite power supplying its loads*; and

4.16 KV shutdown board

the opposite or other division's

P1

b. A required feature on ~~the other division~~ is inoperable.

, or supported by,

If, at any time during the existence of this Condition (one offsite circuit inoperable) a required feature subsequently becomes inoperable, this Completion Time would begin to be tracked.

P26 required

or both

in a redundant division

a division

Discovering no offsite power to one ~~4160 V ESF bus~~ of ~~the onsite Class 1E Power Distribution System~~ coincident with one or more inoperable required support or supported features, or both, that are associated with ~~any other ESF bus~~ that has offsite power, results in starting the Completion Times for the Required Action. Twenty-four hours is acceptable because it minimizes risk while allowing time for restoration before the unit is subjected to transients associated with shutdown.

P1

another division's

The remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection may have been lost for the required feature's function; however, function is not lost. The 24 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 24 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

A.3

Based on the diversity of AC electrical power sources, and the remaining redundancy and reliability,

P2

~~According to Regulatory Guide 1.93 (Ref. 6),~~ operation may continue in Condition A for a period that should not exceed ~~72 hours~~ 7 days. With one required offsite circuit inoperable, the

(continued)

P1 <entire page>

BASES

ACTIONS (continued)

P51

INSERT B3.8-8A

B.1

To ensure a highly reliable power source remains with one DG inoperable, it is necessary to verify the availability of the required offsite circuits on a more frequent basis. ~~Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action being not met. However, if a circuit fails to pass SR 3.8.1.1, it is inoperable. Upon offsite circuit inoperability,~~ additional Conditions must then be entered.

<Unit 3> Unit 3

<Unit 1 and 2> Unit 1 and 2

B.2

Required Action B.2 is intended to provide assurance that a loss of offsite power, during the period that a DG is inoperable, does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related divisions (i.e., single division systems are not included). Redundant required features failures consist of inoperable features associated with a division redundant to the division that has an inoperable DG. INSERT B3.8-8B

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

<Unit 3> Unit 3

<Unit 1 and 2> Unit 1 and 2

the opposite or other division's

a. An inoperable DG exists; and

, or supported by, another

b. A required feature on ~~the other division (Division 1 or 2)~~ is inoperable.

4.16 kV shutdown board

If, at any time during the existence of this Condition (one DG inoperable), a required feature subsequently becomes inoperable, this Completion Time begins to be tracked.

in a redundant division

Discovering one ~~required~~ DG inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the OPERABLE DG[s] results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing

other division's

(continued)

PAGE 727A OF 93

P51

Insert B3.8-8A

This action ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. However, if an offsite circuit is not available, the offsite circuit is inoperable, and

Insert B3.8-8B (Unit 1 and 2)

For example, if DG A was inoperable and RHR pump D was inoperable for maintenance, then RHR pump A would have to be declared inoperable.

Insert B3.8-8B (Unit 3)

For example, if DG 3A was inoperable and RHR pump 3D Was inoperable for maintenance, then RHR pump 3A would have to be declared inoperable.

BASES

ACTIONS

B.2 (continued)

concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

The remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and low probability of a DBA occurring during this period.

B.3.1 and B.3.2

<Unit 1 and 2> P1 Unit 1 and 2 Unit 3 <Unit 3> 1P H

Required Action B.3.1 provides an allowance to avoid unnecessary testing of OPERABLE DGs. If it can be determined that the cause of the ~~inoperable~~ DG does not exist on the OPERABLE DG(s), SR 3.8.1.2 does not have to be performed. If the cause of inoperability exists on other DG(s), they are declared inoperable upon discovery, and Condition ~~E~~ of LCO 3.8.1 is entered. Once the failure is repaired, and the common cause failure no longer exists, Required Action B.3.1 is satisfied. If the cause of the initial inoperable DG cannot be confirmed not ~~to~~ exist on the remaining DG(s), performance of SR 3.8.1.2 suffices to provide assurance of continued OPERABILITY ~~of those~~ DGs.

B1

In the event the inoperable DG is restored to OPERABLE status prior to completing either B.3.1 or B.3.2, the {plant corrective action program} will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in Condition B.

According to Generic Letter 84-15 (Ref. 7), {24} hours is a reasonable time to confirm that the OPERABLE DGs are not affected by the same problem as the inoperable DG. B1

(continued)

BASES

ACTIONS

E.1 and E.2 (continued) P20

required P26

concurrent with inoperability of two offsite circuits. Required Action E.1 reduces the vulnerability to a loss of function. The Completion Time for taking these actions is reduced to 12 hours from that allowed with one ~~division~~ or both without offsite power (Required Action A.2). The rationale for the reduction to 12 hours is that Regulatory Guide 1.93 (Ref. 6) allows a Completion Time of 24 hours for two required offsite circuits inoperable, based upon the assumption that two complete safety divisions are OPERABLE. When a concurrent redundant required feature failure exists, this assumption is not the case, and a shorter Completion Time of 12 hours is appropriate. These features are designed with redundant safety related divisions, (i.e., single division systems are not included in the list). Redundant required features failures consist of any of these features that are inoperable because any inoperability is on a division redundant to a division with inoperable offsite circuits.

P1 416 kV shutdown boards in a division

The Completion Time for Required Action E.1 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. All required offsite circuits are inoperable; and

b. A required feature is inoperable.

If, at any time during the existence of this Condition (two offsite circuits inoperable), a required feature subsequently becomes inoperable, this Completion Time begins to be tracked.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition E for a period that should not exceed 24 hours. This level of degradation means that the offsite electrical power system does not have the capability to effect a safe shutdown and to mitigate the effects of an accident; however, the onsite AC sources have not been degraded. This level of degradation generally corresponds

(continued)

ACTIONS ~~D~~ F.1 and ~~D~~ F.2 (continued) P20

resulting in de-energization. P20 Therefore, the Required Actions of Condition ~~D are~~ modified by a Note to indicate that when Condition ~~D is~~ entered with no AC source to any ~~ESF bus~~, ACTIONS for LCO 3.8.~~7~~ "Distribution Systems — Operating," must be immediately entered. P11 This allows Condition ~~D~~ to provide requirements for the loss of the offsite circuit and one DG without regard to whether a ~~division~~ is de-energized. LCO 3.8.~~7~~ provides the P11 appropriate restrictions for a de-energized ~~division~~.

P1 4.16 KV shutdown board

According to Regulatory Guide 1.93 (Ref. 6), operation may P20 continue in Condition ~~D~~ for a period that should not exceed 12 hours. In Condition ~~D~~ individual redundancy is lost in both the offsite electrical power system and the onsite AC electrical power system. Since power system redundancy is provided by two diverse sources of power, however, the reliability of the power systems in ~~this~~ Condition may appear higher than that in Condition ~~C~~ (loss of both required offsite circuits). This difference in reliability is offset by the susceptibility of this power system configuration to a single bus or switching failure. The 12 hour Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and the low probability of a DBA occurring during this period.

INSERT B3.8-13A
P52

H ~~E~~.1 P20

for more P26

With two or more DGs inoperable, ~~there is [one] remaining standby AC source. Thus, with~~ an assumed loss of offsite electrical power, insufficient standby AC sources ~~are~~ available to power the minimum required ESF functions. Since the offsite electrical power system ~~is~~ the only source of AC power for the majority of ESF equipment at this level of degradation, the risk associated with continued operation for a very short time could be less than that associated with an immediate controlled shutdown. (The immediate shutdown could cause grid instability, which could result in a total loss of AC power.) Since any inadvertent unit generator trip could also result in a total loss of offsite AC power, however, the time allowed for continued operation is severely restricted. The intent here is to avoid the risk

may result in
may be
P1

(continued)

Rev. 2

Insert B 3.8-13A

A note has been added to condition F to clarify that the Condition is only applicable when more than one shutdown board is affected. The situation where only one shutdown board is affected is covered by Condition G.

G.1

Condition G addresses the situation where both one required offsite circuit and one DG are inoperable and affect only one 4.16 kV shutdown board. The Note clarifies the applicability. The Required Action is to declare the affected 4.16 kV shutdown board inoperable immediately. This requires entry into the applicable Conditions and Required Actions of LCO 3.8.7, "Distribution Systems - Operating," which provides the appropriate restrictions for the affected 4.16 kV shutdown board. LCO 3.8.1 Conditions and Required Actions continue to apply until the required offsite circuit and DG made operable.

BASES

ACTIONS H P20 ~~E.1~~ (continued)

associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

According to Regulatory Guide 1.93 (Ref. 6), with all ~~both~~ DGs P26 inoperable, operation may continue for a period that should not exceed 2 hours.

P4

~~F.1~~

~~The sequencer(s) is an essential support system to [both the offsite circuit and the DG associated with a given ESF bus.] [Furthermore, the sequencer(s) is on the primary success path for most major AC electrically powered safety systems powered from the associated ESF bus.] Therefore, loss of an [ESF bus's sequencer] affects every major ESF System in the [division]. The [12] hour Completion Time provides a period of time to correct the problem commensurate with the importance of maintaining sequencer OPERABILITY. This time period also ensures that the probability of an accident requiring sequencer OPERABILITY occurring during periods when the sequencer is inoperable is minimal.~~

~~This Condition is preceded by a Note that allows the Condition to be deleted if the unit design is such that any sequencer failure mode only affects the ability of the associated DG to power its respective safety loads under any conditions. Implicit in this Note is the concept that the Condition must be retained if any sequencer failure mode results in the inability to start all or part of the safety loads when required regardless of power availability, or results in overloading the offsite power circuit to a safety bus during an event thereby causing its failure. Also implicit in the Note is that the Condition is not applicable to any division that does not have a sequencer.~~

I H K I P20 ~~G.1 and G.2~~

If the inoperable AC electrical power sources cannot be restored to OPERABLE status within the associated Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 12 hours and to MODE 4

(continued)

BASES

ACTIONS

I ~~H~~ I ~~H~~ P20
~~G~~.1 and ~~G~~.2 (continued)

within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

J ~~I~~ P20
~~H~~.1

Condition J ~~I~~ ~~H~~ corresponds to a level of degradation in which all redundancy in the AC electrical power supplies has been lost. At this severely degraded level, any further losses in the AC electrical power system will cause a loss of function. Therefore, no additional time is justified for continued operation. The unit is required by LCO 3.0.3 to commence a controlled shutdown.

P3
INSERT B 3.8-15A

SURVEILLANCE REQUIREMENTS

The AC sources are designed to permit inspection and testing of all important areas and features, especially those that have a standby function~~, in accordance with 10 CFR 50, GDC 18 (Ref. 8)~~. Periodic component tests are supplemented by extensive functional tests ~~during refueling outages~~ (under simulated accident conditions). The SRs for demonstrating the OPERABILITY of the DGs ~~are in accordance with the recommendations of Regulatory~~ meet the intent of Safety Guide ~~1.~~9 (Ref. 3), ~~Regulatory Guide 1.108 (Ref. 9), and Regulatory Guide 1.137 (Ref. 10).~~ as addressed ~~in the FSAR~~ by References 13 and 14. P24 P34

Where the SRs discussed herein specify voltage and frequency tolerances, the following summary is applicable. The minimum steady state output voltage of ~~[~~3740~~]~~ V is 90% of the nominal 4160 V output voltage. This value, which is specified in ANSI C84.1 (Ref. 9 ~~11~~), allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage is specified as 90% or 3600 V. It also allows for voltage drops to motors and other equipment down through the 120 V level where minimum operating voltage is also usually specified as 90% of name plate rating. The specified maximum steady state output voltage of ~~[4756]~~ 4580 V is equal to the maximum operating voltage specified for 4000 V motors. It ensures that for a lightly loaded distribution system, the voltage at the terminals of 4000 V motors is no more than the maximum rated operating voltages. The specified B2 P1 B2

(continued)

where Unit 3 is not in MODE 1, 2 or 3,

Insert B3.8-15A

P3

K~~3~~.1 (Units 1 and 2)

Required Action K~~3~~.1 where Unit 3 is not in MODE 1, 2 or 3, is intended to provide assurance that a loss of offsite power, during the period that a required Unit 3 DG is inoperable, does not result in a complete loss of safety function of critical systems (i.e., SGT or CREVS). These features consist of SGT or CREVS trains redundant to trains supported by the inoperable Unit 3 DG.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

a. An inoperable required Unit 3 DG exists; and

b. An SGT or CREVS train supported by another DG, is inoperable.

If, at any time during the existence of this Condition (~~one~~ a required Unit 3 DG inoperable), a required ~~feature~~ SGT or CREVS train subsequently becomes inoperable, this Completion Time begins to be tracked.

Discovering a ~~one~~ required Unit 3 DG inoperable coincident with an inoperable SGT or CREVS train ~~one or more inoperable required support or supported features~~, or both, that are associated with the OPERABLE DGs results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

The remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and low probability of a DBA occurring during this period.

(Insert continued)

Insert B3.8-15A (continued) (P3)

~~J~~ K.1 (Unit 3)

Required Action ~~J~~ K.1 where Unit 1 or 2 is not in MODE 1, 2 or 3, is intended to provide assurance that a loss of offsite power, during the period that a required Unit 1 and 2 DG is inoperable, does not result in a complete loss of safety function of critical systems (i.e., SGT or CREVS). These features consist of SGT or CREVS trains redundant to trains supported by the inoperable Unit 1 and 2 DG.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

a. An inoperable required Unit 1 or 2 DG exists; and

b. An SGT or CREVS train supported by another DG, is inoperable.

If, at any time during the existence of this Condition (~~one~~ a required Unit 1 and 2 DG inoperable), a required ~~feature~~ SGT or CREVS train subsequently becomes inoperable, this Completion Time begins to be tracked.

Discovering ~~one~~ a required Unit 1 and 2 DG inoperable coincident with ~~one~~ an inoperable SGT or CREVS train or more ~~inoperable required support or supported features~~, or both, that are associated with the OPERABLE DGs results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

The remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and low probability of a DBA occurring during this period.

(Insert continued)

P3

<u>Insert B3.8-15A</u> (continued)

K ~~J~~.2 (Units 1 and 2)

In Condition K ~~J~~, where Unit 3 is in MODES 4, 5, or defueled, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power ~~to~~ the onsite Class 1E Distribution System to support operation of Unit $\boxed{2}$. The 30 day Completion Time is commensurate with the importance of the affected system considering the low probability of a DBA in these conditions and the availability of the remaining power sources. If the inoperable Unit 3 DG cannot be restored to OPERABLE status within the associated Completion Time, the associated SGT or CREVS subsystem must be declared inoperable, and the ACTIONS in the appropriate system Specification taken.

<unit 1>

<unit 2>

K ~~J~~.2 (Unit 3)

In Condition K ~~J~~, where Unit 1 or 2 is in MODES 4, 5, or defueled, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System to support operation of Unit ~~1 and 2.~~ The 30 day Completion Time is commensurate with the importance of the affected system considering the low probability of a DBA in these conditions and the availability of the remaining power sources. If the inoperable Unit 1 and 2 DG cannot be restored to OPERABLE status within the associated Completion Time, the associated SGT or CREVS subsystem must be declared inoperable, and the ACTIONS in the appropriate system Specification taken.

BASES

LCO (continued)

power source is available for providing electrical power support assuming a loss of the offsite circuit. Together, OPERABILITY of the required offsite circuit and DG ensures the availability of sufficient AC sources to operate the plant in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents and reactor vessel draindown). (P1) (E)

The qualified offsite circuit(s) must be capable of maintaining rated frequency and voltage while connected to their respective 4.16 KV shutdown boards ~~ESF bus(es)~~, and of accepting required loads during an accident. Qualified offsite circuits are those that are described in the FSAR and are part of the licensing basis for the unit. ~~[The offsite circuit consists of incoming breaker and disconnect to the 2C or 2D startup auxiliary transformer (SAT), associated 2C or 2D SAT, and the respective circuit path including feeder breakers to all 4.16 kV ESF buses required by LCO 3.8.10.]~~ (P1) INSERT B 3.8-37A

The required DG ~~s~~ must be capable of starting, accelerating to rated speed and voltage, connecting to ~~its~~ respective 4.16 KV Shutdown boards ~~ESF bus~~ on detection of bus undervoltage, and accepting required loads. This sequence must be accomplished within 10 ~~[12]~~ seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and must continue to operate until offsite power can be restored to the 4.16 KV Shutdown boards ~~ESF buses~~. ~~These capabilities are required to be met from a variety of initial conditions such as DG in standby with engine hot and DG in standby with engine at ambient conditions. Additional DG capabilities must be demonstrated to meet required Surveillances, e.g., capability of the DG to revert to standby status on an ECCS signal while operating in parallel test mode.~~ (P1) (B2) (P1)

Proper sequencing of loads, including tripping of nonessential loads, is a required function for DG OPERABILITY. ~~[In addition, proper sequence operation is an integral part of offsite circuit OPERABILITY since its inoperability impacts the ability to start and maintain energized loads required OPERABLE by LCO 3.8.10.]~~ (P4)

~~It is acceptable for divisions to be cross tied during shutdown conditions, permitting a single offsite power circuit to supply all required divisions. No fast transfer capability is required for offsite circuits to be considered OPERABLE.~~ (P19)

PAGE 765 OF 939

(continued)

An offsite circuit is considered operable if the offsite source is available to one or more required 4.16 KV shutdown boards, through its normal supply breaker,

REV. 12

P1

Insert B3.8-37A <Units 1 and 2>

[~~An offsite circuit is considered inoperable if a qualified offsite source is not available to one or more required 4.16 kV shutdown boards.~~]

The offsite circuit consists of incoming breakers and then to the ~~from one~~ shutdown bus ~~to each~~ to a 4.16 kV 4.16 kV shutdown boards required by LCO 3.8.8. Each shutdown bus is independently supplied from separate unit boards, which are fed from transformers (via start buses as appropriate). Specific circuits and limitations for considering the offsite circuit qualified are described below. ~~Qualified circuits are one or more of the following:~~

1. From the 500 kV switchyard (with no credit for the two 500 kV Trinity lines), through unit station service transformer (USST) 1B to 4.16 kV unit board 1A, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B; ~~or alternately~~ and/or, to 4.16 kV unit board 1B, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D. ~~If USST 2B is credited as the second source, a minimum of two 500 kV lines must be available.~~

2. From the 500 kV switchyard (with no credit for the two 500 kV Trinity lines), through USST 2B to 4.16 kV unit board 2A, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D; ~~or~~ and/or ~~alternately~~, to 4.16 kV unit board 2B, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B. ~~If USST 1B is credited as the second source, a minimum of two 500 kV lines must be available.~~

3. From the Trinity 161 kV transmission system, through common station service transformer~~s~~ (CSST) A or B to start bus 1A or 1B, to 4.16 kV unit board 1A or 2B, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B; or alternately, to 4.16 kV unit board 1B or 2A, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D. Credit for offsite power from the Trinity 161 kV line may be taken by two units at any one time, provided that both CSST A and B are available. Credit for offsite power from the Trinity 161 kV line may be taken

4. From the Athens 161 kV transmission system, through CSST A or B to start bus 1A or 1B, to 4.16 kV unit board 1A or 2B, to 4.16 kV shutdown bus 1, to 4.16 kV shutdown boards A and B; or alternately, to 4.16 kV unit board 1B or 2A, to 4.16 kV shutdown bus 2, to 4.16 kV shutdown boards C and D. Credit for offsite power from the Athens 161 kV line may be taken by only one unit at one time.

Insert B3.8-4AA from pg. 723a

5.

Insert B3.8-37A <Unit 3>

[~~An offsite circuit is considered inoperable if a qualified offsite source is not available to one or more required 4.16 kV shutdown boards.~~]

by three Units at any one time provided that both CSST A and B are available and Unit 3 claims USST 3B as the other offsite power source

Insert B3.8-37A <Unit 3> (continued)

The offsite circuit consists of incoming breakers from one 4.16 kV unit board to each 4.16 kV shutdown board required by LCO 3.8.8. Each unit board is fed from transformers, via start buses as appropriate. Specific circuits and limitations for considering the offsite circuit qualified are described below. ~~Qualified circuits are one or more of the following:~~ (with no credit for the two 500 kV Trinity lines)

1. From the 500 kV switchyard, through unit station service transformer (USST) 3B to ~~a~~ 4.16 kV unit board (3A and/or 3B). ~~That~~ Each unit board feeds two of the Unit 3 4.16 kV shutdown boards (3EA and 3EB or 3EC and 3ED).

2. From the Trinity 161 kV transmission system, through common station service transformer~~s~~ (CSST) A or B to start bus 1A or 1B, then to a 4.16 kV unit board. That unit board feeds two of the Unit 3 4.16 kV shutdown boards (3EA and 3EB or 3EC and 3ED). In MODE 4 and 5, Credit for offsite power from Trinity 161 kV line may be taken by ~~two~~ three units at any one time, provided that both CSST A and B are available. ~~Credit for offsite power from the Trinity 161 kV line may be taken by three units at any one time, provided that both CSST A and B are available and Unit 3 claims USST 3B as the other offsite power source.~~

3. From the Athens 161 kV transmission system, through CSST A or B to start bus 1A or 1B, and then to a 4.16 kV unit board. That unit board feeds two of the Unit 3 4.16 kV shutdown boards (3EA and 3EB or 3EC and 3ED). Credit for offsite power from Athens 161 kV line may be taken by one unit at one time.

4. Insert B3.8-4AA from page 723a

(P6) <except as marked>

BASES (continued)

APPLICABILITY

The AC sources are required to be OPERABLE in MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment to provide assurance that:

a. Systems providing adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core in case of an inadvertent draindown of the reactor vessel;

b. Systems needed to mitigate a fuel handling accident are available;

c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

AC power requirements for MODES 1, 2, and 3 are covered in LCO 3.8.1.

ACTIONS

A.1

INSERT B3.8-38A

An offsite circuit is considered inoperable if it is not available to one required ESF division. If two or ~~more~~ ESF 4.16 KV buses are required per LCO 3.8.10, one division with offsite power available may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, and operations with a potential for draining the reactor vessel. By ~~the allowance of the~~ declaring ~~option to declare~~ required features inoperable ~~with no offsite power available~~ that are supported by the inoperable AC source, appropriate restrictions can be implemented in accordance with the affected required feature(s) LCOs' ACTIONS.

INSERT B3.8-38B

B.1

~~INSERT from B 3.8-39~~

~~A.2.1, A.2.2, A.2.3, A.2.4, B.1, B.2, B.3, and B.4~~ B ... and (P20)

INSERT B3.8-38C

~~With the offsite circuit not available to all required divisions~~, the option still exists to declare all required features inoperable. However, ~~S~~since this option may involve undesired administrative efforts, the allowance for

(continued)

PG except as marked

BASES

ACTIONS B.1, B.2.1, B.2.2, B.2.3, and B.2.4 ~~A.2.1, A.2.2, A.2.3, A.2.4, B.1, B.2, B.3, and B.4~~ (continued)

sufficiently conservative actions is made. With two or more ~~the~~ required AC sources ~~DG~~ inoperable, the minimum required diversity of AC power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies in the ~~{secondary}~~ containment, and activities that could result in inadvertent draining of the reactor vessel. B1

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC sources and to continue this action until restoration is accomplished in order to provide the necessary AC power to the plant safety systems.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required AC electrical power sources should be completed as quickly as possible in order to minimize the time during which the plant safety systems may be without sufficient power.

~~Move to B 3.8-38~~ <returns to original location.>

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition B ~~A~~ have been modified by a Note to indicate that when Condition B ~~A~~ is entered with no AC power to any required 4.16 KV shutdown board ~~ESF bus~~, ACTIONS for LCO 3.8.8 ~~10~~ must be immediately entered. This Note allows Condition B ~~A~~ to provide requirements for the loss of the offsite circuit whether or not a division is de-energized. LCO 3.8.8 ~~10~~ provides the appropriate restrictions for the situation involving a de-energized division. P11

SURVEILLANCE REQUIREMENTS

SR 3.8.2.1

P1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the Unit 1 and 2 <Unit 1 and 2:> Unit 3 <Unit 3> AC sources in other than MODES 1, 2, and 3. ~~SR 3.8.1.8 is not required to~~ P13

(continued)

The 480V shutdown boards and diesel auxiliary boards can be placed on their alternate feeder breakers and considered OPERABLE as long as the restrictions on the associated drawings are met.

BASES

LCO (continued) P1

battery or charger. ~~OPERABLE vital bus electrical power distribution subsystems require the associated buses to be energized to their proper voltage from the associated [inverter via inverted DC voltage, inverter using interval AC source, or Class 1E constant voltage transformer]~~

B3 INSERT B3.8-81B

In addition, tie breakers between redundant safety related ~~AC,~~ DC, ~~and AC vital bus~~ power distribution subsystems, if they exist, must be open. This prevents any electrical malfunction in any DC power distribution subsystem from propagating to the redundant subsystem, which could cause the failure of a redundant DC subsystem and a loss of essential safety function(s). If any DC tie breakers are closed, the affected redundant DC electrical power distribution subsystems are considered inoperable. This applies to the onsite, safety related, redundant DC electrical power distribution subsystems. It does not, however, preclude redundant Class 1E 4.16 kV ~~ESF buses~~ shutdown boards from being powered from the same offsite circuit. P1

P1 P2 INSERT B3.8-81A

APPLICABILITY

The electrical power distribution subsystems are required to be OPERABLE in MODES 1, 2, and 3 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of ~~AOOs or~~ abnormal operational transients; and P1

b. Adequate core cooling is provided, and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

Electrical power distribution subsystem requirements for MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment are covered in the Bases for LCO 3.8. ~~10~~ 8 "Distribution Systems — Shutdown." P2c P16

ACTIONS

<Unit 3> <Unit 1 and 2>

A.1

Unit 3 / Unit 1 and 2 4.16 KV shutdown board

With one ~~or more required AC buses, load centers, motor control centers, or distribution panels in one division~~ inoperable, the remaining ~~AC electrical power distribution subsystems~~ are capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it P1

Unit 1 and 2 4.16 KV shutdown boards <Unit 1 and 2>
Unit 3 4.16 kV shutdown boards <Unit 3>

(continued)

Insert B3.8-81A

The Unit DC Boards are sized to accommodate alternate loads normally supplied by the Shutdown DC Distribution Panels with no effect on OPERABILITY.

Insert B3.8-80A

In addition, for the D or E RMOV Boards to be OPERABLE, they must be able to auto-transfer on loss of voltage. This feature ensures that the failure of one Diesel Generator will not result in the loss of an RHR subsystem.

Insert B 3.8-81B (Unit 1)

The Unit 1 480 V RMOV boards 1A, 1B, and 1C are not specifically listed in Table B 3.8.7-1. Should one of these boards become inoperable due to failure not affecting the operability of a board listed in Table B 3.8.7-1, the individual loads on the board would be considered inoperable and the appropriate conditions and required actions of the LCOs governing the individual loads would be entered. If however, one or more of the 1A, 1B, or 1C RMOV boards are inoperable due to failure also affecting the operability of 1A or 1B shutdown board; conditions and required actions are not to be entered since LCO 3.0.6 allows this exception, and the required actions for the inoperable 480 V shutdown board are sufficient. In addition, the alternate supply breakers to 480 V RMOV boards 1A, 1B, and 1C must be open. This prevents a single malfunction causing a failure of a redundant subsystem and a loss of safety function. If any alternate breakers for the 1A, 1B, or 1C 480 V RMOV boards are closed, the affected systems/components which are not powered from its source are inoperable.

Insert B 3.8-81B (Unit 2)

The Unit 2 480 V RMOV boards 2A, 2B, and 2C are not specifically listed in Table B 3.8.7-1. Should one of these boards become inoperable due to failure not affecting the operability of a board listed in Table B 3.8.7-1, the individual loads on the board would be considered inoperable and the appropriate conditions and required actions of the LCOs governing the individual loads would be entered. If however, one or more of the 2A, 2B, or 2C RMOV boards are inoperable due to failure also affecting the operability of 2A or 2B shutdown board; the conditions and required actions are not to be entered since LCO 3.0.6 allows this exception, and the required actions for the inoperable 480 V shutdown board are sufficient. In addition, the alternate supply breakers to 480 V RMOV boards 2A, 2B, and 2C must be open. This prevents a single malfunction causing a failure of a redundant subsystem and a loss of safety function. If any alternate breakers for the 2A, 2B, or 2C 480 V RMOV boards are closed, the affected systems/components which are not powered from its source are inoperable.

Insert B 3.8-81B (Unit 3)

The Unit 3 480 V RMOV boards 3A, 3B, and 3C are not specifically listed in Table B 3.8.7-1. Should one of these boards become inoperable due to failure not affecting the operability of a board listed in Table B 3.8.7-1, the individual loads on the board would be considered inoperable and the appropriate conditions and required actions of the LCOs governing the individual loads would be entered. If however, one or more of the 3A, 3B, or 3C RMOV boards are inoperable due to failure also affecting the operability of 3A or 3B shutdown board; the conditions and required actions are not to be entered since LCO 3.0.6 allows this exception, and the required actions for the inoperable 480 V shutdown board are sufficient. In addition, the alternate supply breakers to 480 V RMOV boards 3A, 3B, and 3C must be open. This prevents a single malfunction causing a failure of a redundant subsystem and a loss of safety function. If any alternate breakers for the 3A, 3B, or 3C 480 V RMOV boards are closed, the affected systems/components which are not powered from its source are inoperable.

REV. 12

(P1)

Insert B3.8-82A (Units 1 and 2)

ESF capabilities are not at their maximum, however, they remain adequate. The four 4.16 kV shutdown boards have ESF loads for Units 1 and 2 distributed among them so that an additional single failure will not result in a loss of safety function (e.g., one RHR pump for Unit 1 and one for Unit 2 on each board). Therefore, loss of two shutdown boards still leaves two RHR pumps per Unit. The 5 day time limit before requiring a unit shutdown in this Condition is acceptable because:

a. The remaining 4.16 kV shutdown boards have AC power available. ~~from the two required offsite circuits and their dedicated DG~~.

Insert B3.8-82A (Unit 3)

ESF capabilities are not at their maximum, however, they remain adequate. The four 4.16 kV shutdown boards have ESF loads for Unit~~s 1 and 2~~ (3) distributed among them so that an additional single failure will not result in a loss of safety function (e.g., one RHR pump on each board). Therefore, loss of two shutdown boards still leaves two RHR pumps per Unit. The 5 day time limit before requiring a unit shutdown in this Condition is acceptable because:

a. The remaining 4.16 kV shutdown boards have AC power available. ~~from the two required offsite circuits and their dedicated DG.~~

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ACTIONS

A.1 (continued)

INSERT B3.8-83B AS LAST PARAGRAPH OF SECTION A.1

could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This results in establishing the "time zero" at the time this LCO was initially not met, instead of at the time Condition A was entered. The ~~16 hour~~ 12 day Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely. P13

P1 P15

INSERT B 3.8-83A

B3

B.1

With one AC vital bus inoperable, the remaining OPERABLE AC vital buses are capable of supporting the minimum safety functions necessary to shut down the unit and maintain it in the safe shutdown condition. Overall reliability is reduced, however, since an additional single failure could result in the minimum required ESF functions not being supported. Therefore, the required AC vital bus must be restored to OPERABLE status within 2 hours by powering the bus from the associated [inverter via inverted DC, inverter using internal AC source, or Class 1E constant voltage transformer].

Condition B represents one AC vital bus without power; potentially both the DC source and the associated AC source are nonfunctioning. In this situation the plant is significantly more vulnerable to a complete loss of all noninterruptible power. It is, therefore, imperative that the operator's attention focus on stabilizing the plant, minimizing the potential for loss of power to the remaining vital buses, and restoring power to the affected AC vital buses.

This 2 hour limit is more conservative than Completion Times allow for the majority of components that are without adequate vital AC power. Taking exception to LCO 3.0.2 for components without adequate vital AC power, that would have Required Action Completion Times shorter than 2 hours if declared inoperable, is acceptable because of:

(continued)

P1

REV. X2

Insert B3.8-83A UNIT 1 UNIT 2 UNIT 3
B.1 UNIT1 UNIT2 UNIT3

With one 480 V shutdown board inoperable, the remaining 480 V shutdown board is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 480 V shutdown board could result in the minimum required ESF functions not being supported. Therefore, the inoperable 480 V shutdown board must be restored to OPERABLE status within 8 hours.

The Condition B postulated worst case scenario is one division (480 V shutdown board) without AC power (i.e., no offsite power to the division and the associated DG inoperable). In this condition, the unit is more vulnerable to a complete loss of AC power. It is, therefore, imperative that the unit operators' attention be focused on minimizing the potential for loss of power to the remaining division by stabilizing the unit, and on restoring power to the affected division. The 8 hour time period before requiring a unit shutdown is acceptable because:

a. There is a potential for decreased safety if the unit operator's attention is diverted from the evaluations and actions necessary to restore power to the affected division to the actions associated with taking the unit to shutdown within this time limits.

b. The potential for an event in conjunction with a single failure of a redundant component in the division with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

The second Completion Time (12 days) for Required Action B.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO. If Condition B is entered while, for instance, a 4.16 kV shutdown board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 5 days and 8 hours, since initial failure of the LCO, to restore the 480 V shutdown board. At this time, a 4.16 kV shutdown board could again become inoperable, and the 480 V shutdown board could be restored OPERABLE. This could continue indefinitely.

INSERT B3.8-83C AS LAST PARAGRAPH OF SECTION B.1

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition B was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

P1 P15

Insert B3.8-83AA on pg. 833a

Insert B 3.8-83B

Pursuant to LCO 3.0.6, the Distribution System Actions B, C, D, or G would not be entered even if the 4.16 kV shutdown board was inoperable, resulting in de-energization of 480 V board. Therefore, the Required Actions of Condition A are modified by a Note to indicate that when Condition A is entered with no power source to a required 480 V board, Actions B, C, D, or G must be immediately entered. This allows Condition A to provide requirements for the loss of the 4.16 kV shutdown board without regard to whether a 480 V shutdown board is de-energized. Actions B, C, D, or G provide the appropriate restrictions for a de-energized 480V board.

Insert B 3.8-83C

Pursuant to LCO 3.0.6, the Distribution System Action C would not be entered even if the 480 V shutdown board was inoperable, resulting in de-energization of 480 V RMOV board. Therefore, the Required Actions of Condition B are modified by a Note to indicate that when Condition B is entered with no power source to a required 480 V RMOV board, Actions C must be immediately entered. This allows Condition B to provide requirements for the loss of the 480 V shutdown board without regard to whether a 480 V RMOV board is de-energized. Actions C provides the appropriate restrictions for a de-energized 480V RMOV board.

REV. ~~1~~2

Insert B3.8-83A (continued)

P15

D ~~E~~.1 (Units 1 and 2)

With one Units 1 and 2 480 V diesel auxiliary board inoperable, the remaining 480 V diesel auxiliary board is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 480 V diesel auxiliary board could result in the minimum required ESF functions not being supported. Therefore, the 480 V diesel auxiliary board must be restored to OPERABLE status within 5 days.

The Condition D ~~E~~ postulated worst scenario is one 480 V diesel auxiliary board without AC power (i.e., no offsite power to the diesel auxiliary board). In this Condition, the Unit 1 and 2 DGs and SGT trains A and B are more vulnerable to a complete loss of AC power. These boards are normally fed from Shutdown Boards A and D. However, both of these boards have an alternate source of power coming from 4.16 kV shutdown board B. Thus, each auxiliary board has access to two DGs. Therefore, the 5 day time limit before requiring a unit shutdown in this Condition is acceptable because:

a. The remaining diesel auxiliary board has an alternate source of AC power in addition to the normal source and their dedicated DG.

b. The potential for an event in conjunction with a single failure of a redundant component in the 480 V diesel auxiliary board with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

INSERT B3.8-83AB AS LAST TWO PARAGRAPHS OF SECTION D.1

D ~~E~~.1 (Unit 3)

With one Unit 3 480 V diesel auxiliary board inoperable, the remaining 480 V diesel auxiliary board is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 480 V diesel auxiliary board could result in the minimum required ESF functions not being supported. Therefore, the 480 V diesel auxiliary board must be restored to OPERABLE status within 5 days.

The Condition D ~~E~~ postulated worst scenario is one 480 V diesel auxiliary board without AC power (i.e., no offsite power to the diesel auxiliary board). In this Condition, the Unit 3 DGs are more vulnerable to a complete loss of AC power. These boards can be fed from either 480 V Shutdown board 3A or 3B. Thus, each auxiliary board has access to two DGs. Therefore, the 5 day time limit before requiring a unit shutdown in this Condition is acceptable because:

P15 Rev. X2

Insert B3.8-83A (continued)

a. The remaining diesel auxiliary board has an alternate source of AC power in addition to the normal source and their dedicated DG.

b. The potential for an event in conjunction with a single failure of a redundant component in the 480 V diesel auxiliary board with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

INSERT B3.8-83AB AS LAST TWO PARAGRAPHS OF SECTION D.1

Insert B3.8-83AA

C.1 With 480V RMOV Board D or E inoperable, the respective RHR subsystem supported by each affected board is inoperable for LPCI. The overall reliability is reduced because of the loss of one LPCI/RHR subsystem. In this condition, the remaining OPERABLE ECCS subsystems provide adequate core cooling during a LOCA. However, overall ECCS reliability is reduced, because a single failure in one of the remaining OPERABLE subsystems, concurrent with a LOCA, may result in the ECCS not being able to perform its intended safety function. Therefore, the associated RHR subsystem must be declared inoperable immediately, and the actions in the appropriate system specification taken.

Insert B 3.8-83AB

The second Completion Time (12 days) for Required Action D.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystem to be inoperable in any single contiguous occurrence of failing to meet the LCO. If Condition D is entered while, for instance, a 4.16 kV shutdown board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 10 days, since initial failure of the LCO, to restore the 480 V DG auxiliary board. At this time, a 4.16 kV shutdown board could again become inoperable, and the 480 V DG auxiliary board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock". This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition D was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

BASES

P1 except as marked

ACTIONS P20 ~~D~~ E.1 (continued)

~~The 2 hour Completion Time for DC buses is consistent with Regulatory Guide 1.93 (Ref. 3).~~

The second Completion Time for Required Action ~~D~~ E.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition ~~D~~ E is entered while, for instance, ~~an AC bus~~ a 4.16 kV shutdown board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to ~~8 hours.~~ 5 days P12. This situation could lead to a total duration of ~~10 hours~~ 12 days P8, since initial failure of the LCO, to restore the ~~DC distribution system.~~ Unit DC board or the shutdown board DC distribution panel P9. At this time, ~~an AC division~~ a 4.16 kV shutdown board could again become inoperable, and ~~DC distribution~~ the Unit DC board or the Shutdown board DC distribution panel could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition ~~D~~ E was entered. The ~~16 hour~~ 12 day P8 Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

INSERT B3.8-86A

P20 ~~E~~ ~~F~~ G & H ~~E~~ ~~F~~ G H.1 and ~~E~~ ~~F~~ G H.2

If the inoperable distribution subsystem cannot be restored to OPERABLE status within the associated Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

INSERT B3.8-86B AFTER SECTION E.1

P14 ~~E.1~~

~~With one or more DG DC buses inoperable, the associated DG(s) may be incapable of performing their intended functions. In this situation the DG(s) must be immediately~~

(continued)

REV. X2

Insert B3.8-86A

P9

G ~~F~~ ~~E~~.1 (Units 1 and 2)

Required Action ~~F~~ G ~~E~~.1 is intended to provide assurance that a loss of ~~a~~ one or more required Unit 3 ~~4.16 kV shutdown~~ AC or DC boards ~~or Shutdown Board DC Distribution Panel 3EB~~ does not result in a complete loss of safety function of critical systems (i.e., SGT or CREVS). With one or more of the required ~~Unit 3 4.16 kV shutdown~~ boards inoperable, the SGT or CREVS train supported by ~~that shutdown~~ each affected board is inoperable. Therefore, the associated SGT or CREVS subsystem must be declared inoperable immediately, and the ACTIONS in the appropriate system Specification taken.

G ~~F~~ ~~E~~.1 (Unit 3)

Required Action ~~F~~ G ~~E~~.1 is intended to provide assurance that a loss of ~~a~~ one or more required Unit 1 and 2 ~~4.16 kV shutdown~~ AC or DC boards ~~or one or more Unit 1 and 2 Shutdown Board DC Distribution Panels~~ does not result in a complete loss of safety function of critical systems (i.e., SGT or CREVS). With one or more of the required ~~Unit 1 and 2 4.16 kV shutdown~~ boards inoperable, the SGT or CREVS train supported by ~~that shutdown~~ each affected board is inoperable. Therefore, the associated SGT or CREVS subsystem must be declared inoperable immediately, and the ACTIONS in the appropriate system Specification taken.

F.1 ① <UNIT 1> ③ <UNIT 3> INSERT B 3.8-86B (Unit 2) REV 2

With one Unit 2 division of 4.16 kV shutdown boards inoperable, the remaining division of shutdown boards is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 4.16 kV shutdown boards could result in the minimum required ESF functions not being supported. Therefore, one of the inoperable 4.16 kV shutdown board must be restored to OPERABLE status within 8 hours.

The Condition F postulated worst case scenario is one division of 4.16 kV shutdown board without AC power (i.e., no offsite power to the division and the associated DGs inoperable). In this condition, the unit is more vulnerable to a complete loss of AC power. It is, therefore, imperative that the unit operators' attention be focused on minimizing the potential for loss of power to the remaining division by stabilizing the unit, and on restoring power to the affected division. The 8 hour time period before requiring a unit shutdown is acceptable because:

a. There is a potential for decreased safety if the unit operator's attention is diverted from the evaluations and actions necessary to restore power to the affected division to the actions associated with taking the unit to shutdown within this time limit.

b. The potential for an event in conjunction with a single failure of a redundant component in the division with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

The second Completion Time (12 days) for Required Action F.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO. If Condition F is entered while, for instance, a 480 V DG auxiliary board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation cold lead t a total duration of 5 days and 8 hours, since initial failure of the LCO, to restore the 480 V shutdown board. At this time a 480 V DG auxiliary board could again become inoperable, and a 4.16 kV shutdown board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition F was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

Pursuant to LCO 3.0.6, the Distribution System ACTIONS B,C, D, or G would not be entered even if the 4 kV shutdown boards were inoperable, resulting in de-energization of a 480 V board. Therefore, the Required Actions of condition F are modified by a Note to indicate that when Condition F is entered with no AC source to the 4.16 kV shutdown boards, ACTIONS B, C, D, or G must be immediately entered. This allows Condition F to provide requirement for the loss of the 4.16 kV shutdown boards without regard to whether 480 V board is de-energized. ACTIONS B, C, D, or G provide the appropriate restrictions for a de-energized 480 V board.

P20

BASES

P1 except as marked

ACTIONS

~~E.1 (continued)~~

P14

~~declared inoperable. This action also requires entry into applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources – Operating."~~

I ~~H~~ ~~G~~ ~~F~~.1 P20

Condition ~~F~~ G H I corresponds to a level of degradation in the electrical distribution system that causes a required safety function to be lost. When more than one AC or DC electrical power distribution subsystem is lost, and this results in the loss of a required function, the plant is in a condition outside the accident analysis. Therefore, no additional time is justified for continued operation. LCO 3.0.3 must be entered immediately to commence a controlled shutdown.

SURVEILLANCE REQUIREMENTS

SR 3.8.~~9~~7.1 P20

P50

INSERT B 3.8-87A

~~This Surveillance verifies that the AC and DC, electrical power distribution systems are functioning properly, with the correct circuit breaker alignment. The correct breaker alignment ensures the appropriate separation and independence of the electrical buses are maintained, and the appropriate voltage is available to each required bus. The verification of proper voltage availability on the buses ensures that the required voltage is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the redundant capability of the AC, DC, and AC vital bus electrical power distribution subsystems, and other indications available in the control room that alert the operator to subsystem malfunctions.~~

REFERENCES

1. FSAR, Chapter ~~[~~6~~]~~.

B1

2. FSAR, Chapter ~~[15]~~ 14.

3. Regulatory Guide 1.93, December 1974.

P17

4. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

P1

Insert B3.8-90A (Unit 1)

In addition, some components that may be required by Unit 1 receive power through the Unit 3 electrical power distribution subsystems (e.g., Standby Gas Treatment (SGT) System, and Control Room Emergency Ventilation System (CREVS)). Therefore, the Unit 3 AC and DC electrical power distribution subsystems needed to support the required equipment must also be OPERABLE.

Insert B3.8-90A (Unit 2)

In addition, some components that may be required by Unit 2 receive power through the Unit 3 electical power distribution subsystems (e.g., Standby Gas Treatment (SGT) System, and Control Room Emergency Ventilation System (CREVS)). Therefore, the Unit 3 AC and DC electrical power distribution subsystems needed to support the required equipment must also be OPERABLE.

Insert B3.8-90A (Unit 3)

In addition, some components that may be required by Unit 3 receive power through the Unit 1 and 2 electrical power distribution subsystems (e.g., Standby Gas Treatment (SGT) System, and Control Room Emergency Ventilation System (CREVS)). Therefore, the Unit 1 and 2 AC and DC electrical power distribution subsystems needed to support the required equipment must also be OPERABLE.

For a unit in MODE 4 or 5, the AC and DC boards can be placed on their alternate feeder breakers and considered operable as long as the restrictions on the associated drawings are met.

BROWNS FERRY NUCLEAR PLANT - IMPROVED TECHNICAL SPECIFICATIONS
SECTION 3.8
LIST OF REVISED PAGES

JUSTIFICATION FOR CHANGES TO NUREG-1433

Replace page 1 of 10 through 10 of 10 Revision 1 with page 1 of 10 through 10 of 10 Revision 2

JUSTIFICATION FOR CHANGES TO NUREG-1433
SECTION 3.8 - ELECTRICAL POWER SYSTEMS

BRACKETED PLANT SPECIFIC INFORMATION

B1 Brackets removed and optional wording preferences revised as necessary to reflect appropriate plant specific requirements.

B2 Brackets removed and values revised as necessary to reflect plant specific design.

B3 Bracketed requirements removed and optional wording deleted since it is not applicable to BFN plant design.

NON-BRACKETED PLANT SPECIFIC CHANGES

P1 Appropriate plant-specific nomenclature, descriptions and values have been used to reflect BFN plant specific design. Editorial change that has no technical effect. Change incorporated to clarify the Specification or due to some other change that was made (such as a change to a bracketed item that results in the need for a non-bracketed wording change).

P2 This change increases the allowed outage time from 72 hours and 6 days from discovery of failure to meet the LCO, to 7 days and 14 days from discovery of failure to meet the LCO to restore the offsite circuit/diesel to operable status.

BFN current TS 3.9.B.1 allows reactor operation for 7 days with one required offsite power source available. BFN requires 2 of 4 offsite power sources be available during reactor operation for Units 1 and 2 and 2 of 3 offsite power sources be available during reactor operation for Unit 3. When one offsite circuit is inoperable, the remaining operable offsite circuit and the four DGs (A, B, C, and D for Units 1 and 2; 3EA, 3EB, 3EC and 3ED for Unit 3) are adequate to supply electrical power to the onsite Class 1E Distribution System. The 7 day completion time takes into consideration the additional redundancy, capacity, and capability of the remaining AC sources in the BFN design, reasonable time for repairs, and the low probability of a DBA occurring during this period and is consistent with the existing licensing basis. The 14 day Completion Time establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failure to meet the LCO. This is consistent with the NUREG-1433 "standard" allowance of the sum of two Completion Times which can be currently entered.

BFN current TS 3.9.B.3 (Units 1 and 2) and TS 3.9.B.2 (Unit 3) allow reactor operation for 7 days with one of the required unit's diesel generators inoperable provided 2 offsite power sources are available and all of the CS and RHR (LPCI and containment cooling) systems, and the remaining three unit's diesel generators are OPERABLE. BFN has eight DGs (i.e., four for Units 1 and 2 and four for Unit 3) that can be connected to any shutdown board. The remaining DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The 7 day completion time takes into consideration the additional redundancy, capacity, and capability of the remaining AC sources in the BFN design, reasonable time for repairs, and the low probability of a DBA occurring during this period and is consistent with the existing licensing basis. The 14 day Completion Time establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failure to meet the LCO. This is consistent with the NUREG-1433 "standard" allowance of the sum of two Completion Times which can be currently entered.

P3 Added ACTION K to address plant specific requirements related to DG operability.

P4 BFN design does not include a separate "sequencer." Individual components each have timing devices, which are associated with the OPERABILITY of the component and/or the AC source as appropriate.

P5 BFN TSs currently do not require these tests. Operability is adequately demonstrated by BFN's current licensing bases test requirement. Therefore, BFN will not include these tests in the proposed BFN ISTS.

P6 Specification 3.8.2, 3.8.4, and associated Bases have been revised to reflect plant specific design/equipment and associated current technical specification requirements.

P7 The words "in the secondary containment," were added for consistency with the LCO applicability statement and its Bases discussion.

P8 BFN current TS 3.9.B.7 allows reactor operation for 7 days with one of the three 250-V unit batteries/or its associated battery board inoperable. The ESS 250-V DC system is arranged, and the batteries sized, such that the loss of any one unit battery will not prevent the safe shutdown and cooldown of all three units in the event of the loss of offsite power and a design basis accident in any one unit. Loss of control power to any engineered safeguards control circuit is annunciated in the Main Control Room of the unit affected.

P9 BFN CTS 3.9.B.8 allows reactor operation for 5 days with one of the 250-V shutdown board (SD) batteries and/or its associated battery board inoperable. The loss of one battery affects normal control power for the 480-V and 4160-V SD which it supplies. Complete loss of the control power to these SD results in loss of only those engineered safeguards supplied by these boards, which is acceptable. BFN has extended the allowed outage time to 7 days based on Justification L1 of CTS markup for proposed Specification 3.8.4 and L4 of CTS markup for proposed Specification 3.8.7.

P10 SR wording changes to reflect the 250-V plant and control power supply batteries and the 125-V DG batteries.

P11 NUREG LCO 3.8.7 and LCO 3.8.8, their associated Bases, and all references to them have been deleted. Inverters, as utilized in the NUREG STS (i.e., inverters that power many required systems and that are required to be powered by the DC sources to meet accident analysis assumptions), do not exist at BFN. Renumbering and relettering as appropriate due to deletions.

P12 NUREG LCO 3.8.9 and associated ACTIONS have been written to address each BFN distribution subsystem separately to allow different completion times to be provided for each type of AC and DC electrical power distribution system based on current BFN TS requirements. Actions relettered as appropriate.

P13 Allowed outage time for one units 1 and 2 4.16 kV shutdown board inoperable of 5 days will be maintained. BFN current TS 3.9.B.4 allows reactor operation for 5 days with one unit 1 and 2 4.16 kV shutdown board inoperable.

P14 The Bases for NUREG LCO 3.8.9, Condition E have been deleted consistent with deletion of Condition E of Specification 3.8.9.

P15 Allowed outage time for one 480-V diesel auxiliary board inoperable of 5 days will be maintained. CTS 3.9.B.6 allows reactor operation for 5 days with one of the 480-V diesel auxiliary boards inoperable. The diesel auxiliary boards principally serve loads associated with the operation of the diesel generators and SGT trains A and B (Units 1 and 2 boards only). Other essential small loads are also served from these boards. Loss of only one of these boards will not negate the effectiveness of standby core cooling.

P16 Changes were made to provide additional information or clarity, or were made to use plant specific terminology.

P17 The proper final policy statement reference has been used. The current wording was developed prior to issuance of the final policy statement.

P18 Typographical/grammatical error or Writer's Guide convention corrected.

P19 BFN design is not truly divisionalized at the 4.16 kV shutdown board level. Other descriptions of the offsite circuit suffice to describe allowed connections.

P20 Renumbering and relettering as appropriate due to deletions or additions.

P21 This change has been made since Section 3.5, "ECCS and RCIC" provides the appropriate limits that are affected by the systems in this LCO.

P22 Corrected for the current BFN licensing basis. In addition, NUREG SR 3.8.1.5, 3.8.3.5, and 3.8.3.6 are preventive maintenance type SRs that are generally allowed to be plant controlled rather than controlled by Technical Specifications.

P23 BFN chooses to maintain the current licensing basis frequency (CTS 4.9.A.2.b) of three months (92 days).

P24 Applicable plant specific references have been added and non applicable NUREG-1433, Revision 1, references have been deleted based on BFN current licensing bases.

P25 Not Used.

P26 Bases wording revised for consistency with the Specification wording.

P27 The Note to proposed LCO 3.8.2, Required Action B.1 was revised to be consistent with the note to proposed LCO 3.8.1, Required Action F.1. The use of the word "de-energized" is incorrect and inconsistent with the Bases discussion. The intent of the note is to designate that the applicable Conditions and Required Actions of proposed LCO 3.8.8 are to be entered when any required board is inoperable. The board can be inoperable without being de-energized.

P28 Since NUREG SR 3.8.1.11 was deleted, the pertinent information from the Bases for that SR has been moved to the Bases for NUREG SR 3.8.1.19 (BFN proposed SR 3.8.1.9).

P29 It is an understood premise that provided Technical Specification requirements are met as stated, any test can be utilized for the performance. Even a single test performance can be used to satisfy multiple requirements as appropriate. These details are (consistent with the initial development philosophy) relocated to the Bases and plant procedures.

P30 Since the design of the BFN DGs incorporates continuous lubrication, and does not provide for a pre-start pre-lube procedure, this NUREG allowance is not necessary. The "standby" condition will allow the continuous pre-lube operation prior to any start, as described in the Bases. Deleted "from standby condition" from NUREG SR 3.8.1.2 since this wording is not needed.

P31 This specific allowance for "warmup period prior to loading" is more directly applicable to the Note for NUREG SR 3.8.1.3 which requires loading immediately follow a successful start by NUREG SR 3.8.1.2 or NUREG SR 3.8.1.7. Therefore the allowance is moved to Note 4 of NUREG SR 3.8.1.3 to better clarify "immediately follow."

P32 In accordance with Generic Letter 94-01, the accelerated test schedule is relocated to the Technical Requirements Manual.

P33 BFN TSs currently do not require verification of the engine tank level (NUREG SR 3.8.1.4). The fuel oil transfer system at BFN provides an automatic transfer to the engine tank prior to reaching the specified minimum level. This feature is tested by proposed SR 3.8.1.3. Provided the transfer system continued to function as designed, the specific level in the engine tank need not be surveilled.

P34 The BFN design is such that the DGs, offsite circuits, and DC systems are shared completely. Therefore, 18-month testing would typically be performed with one unit operating. Incorporation of this note would require a dual-unit outage to perform Surveillances. Furthermore, the current Technical Specifications do not impose this limitation. Therefore, this note is deleted and affected portions of the Bases have been revised accordingly. TSTF-8, R.2 incorporated.

P35 BFN design criteria does not require the starting air system to provide the capacity for five DG starts. At BFN, the starting air system consists of two redundant starting air systems, each with the capacity to start the diesel engine at least once. BFN only requires one of these systems to be OPERABLE to support the DG. The LCO and associated action (NUREG Action E) has been modified to require only one subsystem be operable. When the required starting air system is inoperable, the supported DG must be declared inoperable immediately. This is consistent with current BFN operational restrictions for the starting air system. The Bases description of the air starting system design has been modified to reflect the BFN design.

P36 The DG capability curve allows for operational limits of the DG relative to KW and kVARS.

P37 This test is encompassed by NUREG SR 3.8.1.19. At BFN the only difference in results would be that the actual loads would be less during performance of NUREG SR 3.8.1.11.

P38 Deleted part d of NUREG SR 3.8.1.12. At BFN, the DGs do not load shed on an accident signal alone. Deleted part e since ECCS equipment is energized through individual load sequence timers. The requirements for functionally testing these timers are included in Specification 3.3.5.1.

P39 Since proposed SR 3.8.1.4 verifies a DG start from the standby condition to similar requirements of NUREG SR 3.8.1.15, the proposed surveillance adequately satisfies the intent of the NUREG surveillance. In addition, the proposed surveillance is performed with greater frequency (i.e., 184 days versus 18 months). Whenever proposed SR 3.8.1.4 is performed, it is followed by a loading test (i.e., proposed SR 3.8.1.2) which verifies loading capability from a hot condition. Therefore, NUREG SR 3.8.1.15 has been deleted.

P40 Deleted since the requirements of this 18 month functional test are verified during monthly synchronization and loading (NUREG SR 3.8.1.3) and performance of NUREG SR 3.8.1.19 (proposed SR 3.8.1.9).

P41 Deleted NUREG SR 3.8.1.17 since there is no defined test mode at BFN. Test mode captured by common accident signal part of DG breaker isolation.

P42 A specific requirement for the 480 V load shedding and common accident signal logic systems to be operable and corresponding actions when one division is inoperable have been added. This is necessary since these logic systems are common to all four Unit 1 and 2 DGs. As a result, an inoperable division of logic affects all four DGs. The remaining division is fully redundant and continues to provide the required 480 V load shedding and common accident signal functions. However, a single failure in the remaining division could result in all four DGs not responding as assumed in the accident analysis. Therefore, the current technical specification requirement and associated actions (allowed outage time of 7 days) have been included.

P43 At BFN, the breaker alignment for qualified offsite circuits does not change at the 4.16 kV shutdown board level, only at the 4.16 kV unit board level (balance of plant (BOP) equipment). The transfer capability of this BOP equipment is demonstrated by preventive maintenance and during the 4.16 kV unit board functional tests. BFN does not currently have a TS requirement for demonstrating this transfer capability and considers it inappropriate for BOP equipment. Therefore, NUREG SR 3.8.1.8 has not been included in the proposed BFN ISTS. As a result, reference to this NUREG SR has been deleted from NUREG SR 3.8.2.1.

P44 Acceptance criteria contained in NUREG SR 3.8.1.12 has been deleted since this criteria is contained in NUREG SR 3.8.1.19 and these SRs are required at the same frequency. The ability to start the DG in 10 seconds and achieve required frequency and voltage is not dependent upon the initiation signal.

P45 The BFN DBA analysis assumes the batteries have sufficient capacity to handle the accident for 30 minutes. The SR has been modified to require that the ability to recharge after a DBA be demonstrated without regard to the duration of the recharge.

P46 Note (d) to Table 3.8.6-1 has been added to allow use of alternate values of specific gravity based on manufacturer recommendations. BFN's battery manufacturer provided an evaluation that justifies operability of the batteries based on a specified number of cells having a specific gravity of $\geq$ 1.180 provided the demonstrated battery capacity was $\geq$ 81.2% at the last discharge test.

P47 BFN's battery manufacturer (C&D Power Systems) does not recommend that the specific gravity of batteries at BFN be level corrected (as long as the level is between the high and low indicator marks) during normal surveillance inspections. Section 4.3 of IEEE Standard 450-1980 recommends that specific gravity readings should be taken in accordance with the manufacturer's instructions. The table has been adjusted accordingly.

P48 Corrected for current BFN licensing basis. Current Technical Specifications do not impose new fuel oil testing requirements. Current practice requires fuel oil testing when it is transferred into the DG 7-day tanks. As such, NUREG LCO 3.8.3, Condition D, has been deleted and NUREG SR 3.8.3.3 has been revised to apply only to stored fuel oil testing. Additional detail concerning the BFN diesel fuel oil testing program can be found in the "Programs and Manuals" section 5.5 of the proposed Technical Specifications.

P49 BFN CTS do not require performance testing of battery chargers. The only time the batteries would be discharged to the point that the chargers would be required to perform at maximum output is during the battery discharge test required by proposed SR 3.8.4.4. TVA proposes to verify the chargers are capable of charging the batteries after their designed duty cycle, hence verifying performance of their design function, at the same frequency as the 18 month service test required by proposed SR 3.8.4.3 and after each battery discharge test required by proposed SR 3.8.4.4 at a 60 month frequency, which will verify charger capability to perform at maximum output.

P50 The Surveillance has been modified to not require a breaker alignment check since misalignments of any transfers involving the AC safety related boards listed in Table B 3.8.7-1 will be self revealing to the unit operators. The corresponding bases were also revised.

<u>4 kV Boards</u>

4 KV Shutdown Boards A and B are normally aligned to Shutdown Bus 1 with Shutdown Bus 2 as their alternate feeder. 4 kV Shutdown Boards C and D are normally aligned to Shutdown Bus 2 with Shutdown Bus 1 as their alternate feeder. All of the Unit 1 and 2 4 kV shutdown boards are normal power seeking, meaning they will automatically transfer back to the normal feeder, if the board is in auto and power is available to the breaker.

In the event of a 4 kV shutdown board auto transfer to its alternate source, an alarm is received at Panels 0-9-23 and 2-9-8 in the control room.

In the event a 4 kV shutdown board is manually transferred, annunciations will be received at Panel 0-9-23 in the main control room prior to the transfer. These annunciations are generated from positioning the local or control room auto/manual transfer switches to manual.

The annunciations noted above in conjunction with actual breaker position indication in the control room are adequate to ensure the control room operator is aware that a 4 kV Shutdown Board is being aligned to an alternate source.

480 V Shutdown Boards can only be manually transferred. Transfers can occur at either the unit control board or at the respective shutdown board. Transfers at the shutdown board can only occur after the local manual/auto switches have been placed in manual. Placing these switches in manual results in an annunciation at Panel 9-8-3, thereby notifying the unit operator of this action.

<u>480 V Standby Gas Treatment Board</u>

The 480 V Standby Gas Treatment Board has only one power source, the Unit 3D 4 kV Shutdown Board. Therefore it is not possible to misalign this board.

<u>480 V Diesel Auxiliary Board A and B</u>

The 480 V Diesel Auxiliary Boards can only be manually transferred. Transfers can occur at either the electrical control board in the main control room or at the respective board. Transfers at the board can only occur after the local manual/auto switches have been placed in manual. Placing these switches in manual results in an annunciation at Panel 9-23-8, thereby notifying the unit operator of this action.

P51 NUREG SR 3.8.1.1 has been deleted and the appropriate actions incorporated into revised Required Actions A.1 and B.1 of LCO 3.8.1. Upon discovery of an inoperable offsite circuit, the availability of the remaining required offsite circuit is periodically verified. This action ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. Additionally, appropriate independence of offsite circuits is verified to be maintained. Additional specific actions to verify breaker alignment are unnecessary since breaker position is not likely to change without the operator being aware of it and because breaker status is displayed and annunciated in the control room. Appropriate Bases changes have also been made. See Justification P50 (above) for additional information.

P52 This condition addresses the situation where both one required offsite circuit and one DG are inoperable and affect only one 4.16 kV shutdown board. The Note clarifies the applicability.

BROWNS FERRY NUCLEAR PLANT - IMPROVED TECHNICAL SPECIFICATIONS
SECTION 3.8
LIST OF REVISED PAGES

BFN UNIT 1, 2, and 3 CROSS-REFERENCE MATRIX

Replaced pages 1 of 5 through 5 of 5 Revision 0 with pages 1 of 5 through 5 of 5 Revision 2

BFN UNIT 1, 2, AND 3 CROSS-REFERENCE MATRIX
ITS Section 3.8

CTS NUMBER [*]	BFN ITS NUMBER	NUREG NUMBER	DELETED	RELOCATED TO BASES	RELOCATED TO TRM	RELOCATED TO PROC	RELOCATED CONTROL	REVISED (Rev. 2)
3.9.A.1	3.8.1 Applicability	3.8.1 Applicability						
3.9.A.1.a	3.8.1 LCO b	3.8.1 LCO b						
3.9.A.1.b	NONE	NONE						
3.9.A.1.c	3.8.1 LCO a	3.8.1 LCO a		YES			ITS 5.5.10	
3.9.A.2	NONE	NONE	YES					
3.9.A.3.a	NONE	NONE		YES			ITS 5.5.10	
3.9.A.3.b	NONE	NONE		YES			ITS 5.5.10	
3.9.A.3.c	3.8.7 LCO a	3.8.9 LCO		YES			ITS 5.5.10	
3.9.A.3.d	3.8.7 LCO b	3.8.9 LCO		YES			ITS 5.5.10	
3.9.A.3.e [3.9.A.3.f]	3.8.7 LCO d	3.8.9 LCO		YES			ITS 5.5.10	
3.9.A.3.f [3.9.A.3.e]	3.3.8.1 LCO	3.3.8.1 LCO						
3.9.A.3.g [U1 and U2 only]	NONE	NONE		YES			ITS 5.5.10	
3.9.A.3.h [3.9.A.3.g]	3.8.7 LCO c	3.8.9 LCO		YES			ITS 5.5.10	
3.9.A.4	3.8.4 LCO	3.8.4 LCO		YES			ITS 5.5.10	
3.9.A.4	3.8.7 LCO e	3.8.9 LCO		YES			ITS 5.5.10	
3.9.A.4	3.8.7 LCO f	3.8.9 LCO		YES			ITS 5.5.10	
3.9.A.5.a	3.8.1 LCO b	NONE						
3.9.A.5.b	3.8.1 LCO b	NONE						
3.9.A.6	3.8.3 ACTION A	3.8.3 ACTION A						
3.9.B	3.8.1 Applicability	3.8.1 Applicability						
3.9.B.1	3.8.1 ACTION A	3.8.1 ACTION A						
3.9.B.10 [U1 and U2 only]	NONE	NONE	YES					
3.9.B.11 [3.9.B.9]	SR 3.3.8.1	SR 3.3.8.1						
3.9.B.11.a [3.9.B.9.a]	3.3.8.1 ACTION B	NONE						
3.9.B.11.b [3.9.B.9.b]	3.3.8.1 ACTION C	NONE						
3.9.B.11.c [3.9.B.9.c]	3.3.8.1 ACTION A	NONE						
3.9.B.11.d [3.9.B.9.d]	3.3.8.1 ACTION D	NONE						
3.9.B.12 [3.9.B.10]	3.8.7 ACTION B	3.8.9 ACTION B						
3.9.B.12 [3.9.B.10]	3.8.7 ACTION H	3.8.9 ACTION D						X
3.9.B.13 [3.9.B.11]	3.8.7 ACTION C	NONE		YES			ITS 5.5.10	
3.9.B.14 [3.9.B.12]	3.8.7 ACTION I	NONE		YES			ITS 5.5.10	X
3.9.B.15 [3.9.B.13]	3.8.1 ACTION I	3.8.1 ACTION G						X
3.9.B.15 [3.9.B.13]	3.8.4 ACTION B	3.8.4 ACTION B						
3.9.B.15 [3.9.B.13]	3.8.7 ACTION H	3.8.9 ACTION D						X
3.9.B.2 [3.9.B.3]	NONE	NONE		YES			ITS 5.5.10	
3.9.B.3 [3.9.B.2]	3.8.1 ACTION B	3.8.1 ACTION B						
3.9.B.4	3.8.7 ACTION A	3.8.9 ACTION A						
3.9.B.4	3.8.7 ACTION H	3.8.9 ACTION D						X
3.9.B.4	3.8.7 ACTION I	3.8.9 ACTION F						X
3.9.B.5 [U1 and U2 only]	3.8.1 ACTION A	3.8.1 ACTION A						

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3.9.B.6 [3.9.B.5]	3.8.7 ACTION D	3.8.9 LCO						
3.9.B.7 [3.9.B.6 part]	3.8.4 ACTION A	3.8.4 ACTION A						
3.9.B.7 [3.9.B.6 part]	3.8.7 ACTION E	3.8.9 ACTION C						
3.9.B.8 [3.9.B.6 part]	3.8.4 ACTION A	3.8.4 ACTION A						
3.9.B.8 [3.9.B.6 part]	3.8.7 ACTION E	3.8.9 ACTION C						
3.9.B.9 [3.9.B.7]	3.8.1 ACTION C	NONE	YES					
3.9.B.9 [3.9.B.7]	3.8.1 ACTION D	NONE	YES					
3.9.C	3.8.2 Applicability	3.8.2 Applicability						
3.9.C	3.8.8 Applicability	3.8.10 Applicability						
3.9.C.1	3.8.2 LCO b	3.8.2 LCO b						
3.9.C.1	3.8.8 LCO	3.8.10 LCO						
3.9.C.2	3.8.2 LCO a	3.8.2 LCO a						
3.9.C.3	3.8.8 LCO	3.8.10 LCO						
3.9.C.4	3.8.8 LCO	3.8.10 LCO						
3.9.D.1	3.6.4.3 LCO	NONE		YES			ITS 5.5.10	
3.9.D.1	3.7.3 LCO	NONE		YES			ITS 5.5.10	
3.9.D.1	3.8.1 Applicability	NONE		YES			ITS 5.5.10	
3.9.D.1	3.8.1 LCO c	NONE		YES			ITS 5.5.10	
3.9.D.1	3.8.2 LCO c	NONE		YES			ITS 5.5.10	
3.9.D.2	3.8.1 ACTION K.1	NONE						X
3.9.D.2	3.8.1 ACTION K.2	NONE						X
3.9.D.2	3.8.1 LCO c	NONE						
3.9.D.2	3.8.2 ACTION A	3.8.2 ACTION A						
3.9.D.2	3.8.2 ACTION B	3.8.2 ACTION B						
3.9.D.3	3.8.1 ACTION K.2	NONE						X
3.9.D.3	3.8.2 ACTION A	3.8.2 ACTION A						
3.9.D.3	3.8.2 ACTION B.1	3.8.2 ACTION B						
3.9.D.3	3.8.2 ACTION B.2	3.8.2 ACTION B						
4.9.A - Table 4.9.A	NONE	NONE			YES		10 CFR 50.59	
4.9.A - Table 4.9.A.4.C	3.3.8.1	NONE						
4.9.A.1.a	SR 3.8.1.1	SR 3.8.1.2	YES		YES	YES	10 CFR 50.59 and LCP	
4.9.A.1.a	SR 3.8.1.2	SR 3.8.1.3	YES		YES	YES	10 CFR 50.59 and LCP	
4.9.A.1.a	SR 3.8.1.3	SR 3.8.1.6	YES		YES	YES	10 CFR 50.59 and LCP	
4.9.A.1.a	SR 3.8.1.4	SR 3.8.1.7	YES		YES	YES	10 CFR 50.59 and LCP	
4.9.A.1.a	SR 3.8.1.7	SR 3.8.1.14	YES		YES	YES	10 CFR 50.59 and LCP	
4.9.A.1.a	SR 3.8.3.4	SR 3.8.3.4	YES		YES	YES	10 CFR 50.59 and LCP	
4.9.A.1.b	SR 3.8.1.9	SR 3.8.1.19						
4.9.A.1.b(1)	SR 3.8.1.9.a	SR 3.8.1.19.a						
4.9.A.1.b(1)	SR 3.8.1.9.b	SR 3.8.1.19.b						
4.9.A.1.b(2)	SR 3.8.1.9.c	SR 3.8.1.19.c						
4.9.A.1.b(3)	SR 3.8.1.9.b	SR 3.8.1.19.b						

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4.9.A.1.b(3)	SR 3.8.1.9.c	SR 3.8.1.19.c						
4.9.A.1.c	SR 3.8.3.1	SR 3.8.3.1				YES	LCP	
4.9.A.1.d	NONE	NONE			YES		10 CFR 50.59	
4.9.A.1.e	SR 3.8.3.3	SR 3.8.3.3						
4.9.A.2.a	SR 3.8.4.1	SR 3.8.4.1				YES	LCP	
4.9.A.2.a	SR 3.8.6.1	SR 3.8.6.1				YES	LCP	
4.9.A.2.b	SR 3.8.6.2	SR 3.8.6.2		YES		YES	ITS 5.5.10 and LCP	
4.9.A.2.c	SR 3.8.4.4	SR 3.8.4.8				YES	LCP	
4.9.A.3.a	SR 3.3.5.1.6	SR 3.3.5.1.6						
4.9.A.3.a	SR 3.8.1.6	SR 3.8.1.12						
4.9.A.3.b	SR 3.8.1.9.b	SR 3.8.1.19.b		YES		YES	ITS 5.5.10 AND LCP	
4.9.A.4.a	NONE	NONE	YES					
4.9.A.4.b	SR 3.8.1.9	SR 3.8.1.19						
4.9.A.4.c	SR 3.3.8.1.1	SR 3.3.8.1.3						
4.9.A.4.c	SR 3.3.8.1.2	NONE						
4.9.A.4.d	SR 3.8.7.1	SR 3.8.9.1				YES	LCP	
4.9.A.5.a	SR 3.5.1.12	NONE						
4.9.B.1	3.8.1 ACTION A.1	3.8.1 ACTION A.1	YES					
4.9.B.2 [4.9.B.3]	3.8.1 ACTION A.1	3.8.1 ACTION A.1	YES	YES			IST 5.5.10	
4.9.B.3 [4.9.B.2]	3.8.1 ACTION B 3.2	3.8.1 ACTION B 3.2						
4.9.B.3 [4.9.B.2]	3.8.1 ACTION B.1	3.8.1 ACTION B.1						
4.9.B.4	NONE	NONE	YES					
4.9.B.5 [U1 and U2 only]	NONE	NONE	YES					
4.9.B.6 [4.9.B.5]	NONE	NONE	YES					
4.9.C.1	NONE	NONE	YES					
4.9.D.1	SR 3.8.2.1	SR 3.8.2.1						
4.9.D.2	NONE	NONE		YES			IST 5.5.10	
NONE	3.8.1 ACTION E	3.8.1 ACTION C						
NONE	3.8.1 ACTION F	3.8.1 ACTION D						
NONE	3.8.1 ACTION G	NONE						
NONE	3.8.1 ACTION H	3.8.1 ACTION E						
NONE	3.8.1 ACTION J	3.8.1 ACTION H	YES					X
NONE	3.8.1 ACTION J	3.8.1 ACTION H						X
NONE	3.8.2 ACTION A	3.8.2 ACTION A						
NONE	3.8.2 ACTION B	3.8.2 ACTION B						
NONE	3.8.3 ACTION B	3.8.3 ACTION B						
NONE	3.8.3 ACTION C	3.8.3 ACTION C						
NONE	3.8.3 ACTION D	3.8.3 ACTION E						
NONE	3.8.3 ACTION E	3.8.3 ACTION F						
NONE	3.8.3 Applicability	3.8.3 Applicability						
NONE	3.8.3 LCO	3.8.3 LCO						

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NONE	3.8.4 ACTION C	3.8.4 ACTION C						
NONE	3.8.4 ACTION D	NONE						
NONE	3.8.4 Applicability	3.8.4 Applicability						
NONE	3.8.5 ACTION A	3.8.5 ACTION A						
NONE	3.8.5 Applicability	3.8.5 Applicability						
NONE	3.8.5 LCO	3.8.5 LCO						
NONE	3.8.6 - TABLE 3.8.6-1	3.8.6 - TABLE 3.8.6-1						
NONE	3.8.6 ACTION A	3.8.6 ACTION A						
NONE	3.8.6 ACTION B	3.8.6 ACTION B						
NONE	3.8.6 Applicability	3.8.6 Applicability						
NONE	3.8.6 LCO	3.8.6 LCO						
NONE	3.8.7 ACTION F	NONE						X
NONE	3.8.7 ACTION G	NONE						X
NONE	3.8.7 Applicability	3.8.9 Applicability						
NONE	3.8.8 ACTION A	3.8.10 ACTION A						
NONE	3.8.8 ACTION A	3.8.10 LCO						
NONE	3.8.8 Applicability	3.8.10 Applicability						
NONE	NONE	3.8.1 ACTION F						
NONE	NONE	3.8.1 LCO c						
NONE	NONE	3.8.3 ACTION D						
NONE	NONE	3.8.7 ACTION A						
NONE	NONE	3.8.7 ACTION B						
NONE	NONE	3.8.7 Applicability						
NONE	NONE	3.8.7 LCO a						
NONE	NONE	3.8.7 LCO b						
NONE	NONE	3.8.8 ACTION A						
NONE	NONE	3.8.8 Applicability						
NONE	NONE	3.8.8 LCO						
NONE	NONE	3.8.9 ACTION E						
NONE	NONE	SR 3.8.1.1						
NONE	NONE	SR 3.8.1.10						
NONE	NONE	SR 3.8.1.11						
NONE	NONE	SR 3.8.1.13						
NONE	NONE	SR 3.8.1.15						
NONE	NONE	SR 3.8.1.16						
NONE	NONE	SR 3.8.1.17						
NONE	NONE	SR 3.8.1.20						
NONE	NONE	SR 3.8.1.4						
NONE	NONE	SR 3.8.1.5						
NONE	NONE	SR 3.8.1.8						
NONE	NONE	SR 3.8.3.5						

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NONE	NONE	SR 3.8.3.6						
NONE	NONE	SR 3.8.4.2						
NONE	NONE	SR 3.8.4.3						
NONE	NONE	SR 3.8.4.4						
NONE	NONE	SR 3.8.4.5						
NONE	NONE	SR 3.8.7.1						
NONE	NONE	SR 3.8.8.1						
NONE	NONE	TABLE 3.8.1-1						
NONE	SR 3.8.1.10	NONE						
NONE	SR 3.8.1.5	SR 3.8.1.9						
NONE	SR 3.8.1.8	SR 3.8.1.18						
NONE	SR 3.8.2.2	NONE						
NONE	SR 3.8.3.2	SR 3.8.3.2						
NONE	SR 3.8.4.3	SR 3.8.4.7						
NONE	SR 3.8.4.5	SR 3.8.4.6						
NONE	SR 3.8.5.1	SR 3.8.5.1						
NONE	SR 3.8.6.3	SR 3.8.6.3						
NONE	SR 3.8.8.1	SR 3.8.10.1						

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