3.7 ELECTRICAL POWER SYSTEMS

TS 3.7.0

Entry into operational conditions (e.g., HOT SHUTDOWN, COLD SHUTDOWN) specified in the Applicability shall not be made when the requirements of TS 3.7 are not met, unless the associated ACTIONS for the operational condition to be entered permit continued operation in the specified condition for an unlimited period of time.

This specification shall not prevent changes in the operational conditions specified in the Applicability which are required to comply with ACTIONS.

Other exceptions to this specification are stated in the individual specifications. These exceptions allow entry into operational conditions in the Applicability when the associated ACTIONS to be entered allow operation for only a limited period of time.

3.7 ELECTRICAL POWER SYSTEMS

3.7.1 AC Sources - Operating

TS 3.7.1 The following AC electrical power sources shall be OPERABLE:

1. One underground emergency power path from one Keowee Hydro Unit through the S breakers,
2. One overhead emergency power path from the other Keowee Hydro Unit through the E breakers, and
3. Two offsite sources on separate towers connected to the 230kV switchyard.

APPLICABILITY: Above COLD SHUTDOWN

-----------------------------NOTE-----------------------------
TS 3.7.0 does not apply when a Lee gas turbine is energizing the standby buses as required by Conditions E, F, or G.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Offsite sources and overhead emergency power path inoperable due to inoperable startup transformer.	A.1 Verify one Keowee Hydro Unit can energize two standby buses through the underground feeder.	---------NOTE------- May be performed during preceding 12 hour period. -------------------- 1 hour AND Once per 12 hours thereafter.
	AND A.2 Share another Unit's startup transformer.	12 hours
	AND	

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.3.1 Restore startup transformer to OPERABLE status. <u>OR</u> A.3.2 Designate shared startup transformer to one Unit.	36 hours 36 hours
B. Startup transformer designated to another Unit. <u>OR</u> Required Actions and associated Completion Times not met for Condition A.	B.1 Be in HOT SHUTDOWN <u>AND</u> B.2 Be in COLD SHUTDOWN	12 hours 36 hours
C. One emergency power path inoperable due to reasons other than an inoperable startup transformer (Condition A).	C.1 Verify the remaining emergency power path OPERABLE. <u>AND</u> C.2 Restore emergency power path to OPERABLE status. ------------------NOTE------------------ Required Actions G.1 and G.2 must be completed prior to exceeding 72 hours. --	-------NOTE------- May be performed during preceding 12 hour period. ------------------------- 1 hour <u>AND</u> Once per 12 hours thereafter unless two standby buses are energized by a Lee gas turbine. 72 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One inoperable E breaker and one inoperable S breaker on the same main feeder bus.	D.1 Declare associated main feeder bus inoperable.	Immediately
E. Both emergency power paths inoperable.	E.1 Energize two standby buses by a Lee gas turbine.	1 hour AND 1 hour from subsequent discovery of deenergized standby buses
	AND	
	E.2.1 Verify by administrative means the operability status of: Two offsite sources (TS 3.7.1), AC Distribution (TS 3.7.2), EPSL (TSs 3.7.3-5, and 3.7.7), Vital I&C DC (TS 3.7.9), Switchyard DC (TS 3.7.10), and AC Vital Distr. (TS 3.7.11).	1 hour
	AND	
	E.2.2 Restore inoperable components listed in E.2.1 to OPERABLE status.	4 hours from discovery of inoperable component.
	AND	
	E.3 Restore one emergency power path to OPERABLE status.	60 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Required offsite sources inoperable due to reasons other than an inoperable startup transformer (Condition A).	F.1 Energize two standby buses by a Lee gas turbine.	1 hour AND 1 hour from subsequent discovery of deenergized standby buses.
	AND	
	F.2.1 Verify by administrative means the operability status of: Two emergency power paths (TS 3.7.1), AC Distribution (TS 3.7.2), EPSL (TSs 3.7.3-3.7.7), Vital I&C DC (TS 3.7.9), Switchyard DC (TS 3.7.10), and AC Vital Distr. (TS 3.7.11).	1 hour
	AND	
	F.2.2 Restore inoperable components listed in F.2.1 to OPERABLE status.	4 hours from discovery of inoperable component.
	AND	
	F.3 Restore required offsite sources to OPERABLE status.	24 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
G. Keowee Hydro Unit or Keowee Main Step-up transformer inoperable > 72 hours.	------------------NOTES-------------- 1. Generation to the system grid prohibited except for test. 2. The OPERABLE Keowee Hydro Unit may be made inoperable for 12 hours if required to restore both Keowee Hydro Units to OPERABLE status. --	
	G.1 Energize two standby buses by a Lee gas turbine.	Prerequisite AND 1 hour from subsequent discovery of deenergized standby buses.
	AND	
	G.2.1 Verify by administrative means the operability status of: two offsite sources and underground emergency power path (TS 3.7.1), AC Distribution (TS 3.7.2), EPSL (TSs 3.7.3-3.7.7), Vital I&C DC (TS 3.7.9), Switchyard DC (TS 3.7.10), and AC Vital Distr. (TS 3.7.11). AND	Prerequisite
	G.2.2 Restore inoperable components required by G.2.1 to OPERABLE status.	4 hours from discovery of inoperable component
	AND	

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
G. (continued)	G.3 Verify the underground emergency power path is OPERABLE. AND G.4 Restore Keowee Main Step-up transformer to OPERABLE status. AND G.5 Restore Keowee Hydro Unit to OPERABLE status.	Once per 7 days 28 days 45 days in a 3 year period for each Keowee Hydro Unit.
H. Required Actions and associated Completion Times for Conditions C through G not met.	H.1 Be in HOT SHUTDOWN AND H.2 Be in COLD SHUTDOWN	12 hours 84 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.1.1	Perform SRs 3.7.9.1 (Float Voltage), 3.7.9.3 (Service Test), 3.7.9.4 (Structural Surveillance), and 3.7.9.5 (Connection Surveillance) for the Keowee batteries.	As specified in the applicable SRs.
SR 3.7.1.2	Verify the underground emergency power path is OPERABLE by: 1) Auto-starting the Keowee Hydro Unit pre-selected to the underground emergency power path; and 2) Energizing the underground emergency power path and both standby buses.	Monthly
SR 3.7.1.3	Verify the overhead emergency power path is OPERABLE by: 1) Auto-starting the Keowee Hydro Unit pre-selected to the overhead emergency power path; and 2) Synchronizing with the Yellow bus.	Monthly

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.7.1.4	Verify the S and E breakers are OPERABLE by full cycling.	Monthly
SR 3.7.1.5	Verify OPERABILITY of the Keowee underground feeder breaker interlock and the underground to overhead ACB interlock.	6 months
SR 3.7.1.6	Verify the dedicated 100kV line is OPERABLE by energizing both standby buses by a Lee gas turbine.	Annually
SR 3.7.1.7	Verify a Lee gas turbine can be started, placed on the system grid, and supply the equivalent of a single Unit's maximum safeguard loads and two Unit's HOT SHUTDOWN loads within one hour.	Annually
SR 3.7.1.8	Verify each Keowee Hydro Unit can: 1) Emergency start from each control room; 2) Attain rated speed and voltage within 23 seconds of an emergency start initiate; 3) Be synchronized to the grid and loaded at the maximum practical rate to a value equivalent to one Unit's safeguard loads plus two Unit's HOT SHUTDOWN loads.	Annually
SR 3.7.1.9	Perform an automatic transfer of the Main Feeder Buses to the Startup Transformer, Standby Buses, and retransfer to the Startup Transformers.	Refueling

3.7 ELECTRICAL POWER SYSTEMS

3.7.2 AC Distribution - Operating

TS 3.7.2 AC distribution shall be OPERABLE as follows:

1. Two energized main feeder buses each connected to two or more ES power system strings, and

2. Three energized ES power system strings.

APPLICABILITY: Above COLD SHUTDOWN

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One main feeder bus inoperable.	A.1 Restore main feeder bus to OPERABLE status.	24 hours
B. One ES Power System String inoperable.	B.1 Restore ES Power System String to OPERABLE status.	24 hours
C. Required Actions and associated Completion Times not met.	C.1 Be in HOT SHUTDOWN	12 hours
	AND	
	C.2 Be in COLD SHUTDOWN	84 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.7.2.1 Verify correct breaker alignment and indicated power availability.	7 days

3.7 ELECTRICAL POWER SYSTEMS

3.7.3 Emergency Power Switching Logic (EPSL) Automatic Transfer Functions

TS 3.7.3 The following EPSL automatic transfer functions shall be OPERABLE:

1. Channel A and B of Load Shed/Transfer to Standby;
2. Channel A and B of Retransfer to Startup.

APPLICABILITY: Above COLD SHUTDOWN

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each inoperable Automatic Transfer Function.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Channel A of one or both functions inoperable. OR Channel B of one or both functions inoperable.	A.1 Restore channel to OPERABLE status.	24 hours
B. Required Actions and associated Completion Times not met.	B.1 Be in HOT SHUTDOWN AND B.2 Be in COLD SHUTDOWN	12 hours 84 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.7.3.1 Perform SR 3.7.1.9 (EPSL automatic transfer)	As specified in applicable SR.

3.7 ELECTRICAL POWER SYSTEMS

3.7.4 Emergency Power Switching Logic (EPSL) Voltage Sensing Circuits

TS 3.7.4 Three channels of each of the following EPSL voltage sensing circuits shall be OPERABLE:

1. Startup Source;
2. Standby Bus 1;
3. Standby Bus 2;
4. Normal Source.

------------------------------NOTE------------------------------

If both N breakers are open, Normal Source voltage sensing is not required.

APPLICABILITY: Above COLD SHUTDOWN

ACTIONS

------------------------------NOTE------------------------------

Separate Condition entry is allowed for each inoperable Voltage Sensing Circuit.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One channel of one or more circuits inoperable.	A.1 Restore channel to OPERABLE status.	24 hours
B. Required Actions and associated Completion Times not met.	B.1 Be in HOT SHUTDOWN	12 hours
	<u>AND</u>	
	B.2 Be in COLD SHUTDOWN	84 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.7.4.1 Perform a CHANNEL TEST	Refueling

3.7 ELECTRICAL POWER SYSTEMS

3.7.5 Emergency Power Switching Logic (EPSL) N and SL Breakers

TS 3.7.5 Two trip coils for each N breaker and SL breaker shall be OPERABLE.

APPLICABILITY: Above COLD SHUTDOWN when breaker is closed.

ACTIONS

--NOTE--
Separate Condition entry is allowed for each inoperable breaker.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One trip coil inoperable on one or more breakers.	A.1 Restore trip coil to OPERABLE status.	24 hours
B. Required Actions and associated Completion Times not met.	B.1 Be in HOT SHUTDOWN AND B.2 Be in COLD SHUTDOWN	12 hours 84 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.7.5.1 Perform a breaker exercise.	Monthly

3.7 ELECTRICAL POWER SYSTEMS

3.7.6 Emergency Power Switching Logic (EPSL) Keowee Emergency Start Function

TS 3.7.6 Two channels of the EPSL Keowee Emergency Start Function shall be OPERABLE.

APPLICABILITY: Above COLD SHUTDOWN

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One channel inoperable.	A.1 Restore channel to OPERABLE status.	72 hours
B. Required Actions and associated Completion Times for Condition A not met.	B.1 Be in HOT SHUTDOWN AND B.2 Be in COLD SHUTDOWN	12 hours 84 hours
C. Two channels inoperable.	C.1 Declare both Keowee Hydro Units inoperable for the affected Oconee Unit(s).	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.7.6.1 Perform SR 3.7.1.8 (Keowee emergency start) and SR 3.7.1.9 (EPSL automatic transfer).	As specified in applicable SR.

3.7 ELECTRICAL POWER SYSTEMS

3.7.7 Emergency Power Switching Logic (EPSL) Degraded Grid Voltage Protection

TS 3.7.7 The following EPSL Degraded Grid Voltage Protection functions shall be OPERABLE:

1. Three Switchyard Degraded Grid Voltage Sensing Relays;
2. Two channels of Switchyard Degraded Grid Voltage Protection Actuation Logic.

APPLICABILITY: Above COLD SHUTDOWN

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One voltage sensing relay inoperable.	A.1 Restore voltage sensing relay to OPERABLE status.	7 days
B. One channel of actuation logic inoperable.	B.1 Restore channel to OPERABLE status.	7 days
C. Required Actions and associated Completion Times not met for Conditions A or B.	C.1 Verify 230kV switchyard voltage greater than or equal to the minimum voltage necessary to assure actuation of all ES loads.	Once per 2 hours
D. Two or more voltage sensing relays inoperable.	D.1 Verify 230kV switchyard voltage greater than or equal to the minimum voltage necessary to assure actuation of all ES loads. AND D.2 Verify one Keowee Hydro Unit can energize two standby buses through the underground feeder.	Once per 2 hours ---------NOTE-------- May be performed during preceding 12 hour period. ------------------------ 1 hour

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Two actuation logic channels inoperable.	E.1 Verify 230kV switchyard voltage greater than or equal to the minimum voltage necessary to assure actuation of all ES loads. AND E.2 Verify one Keowee Hydro Unit can energize two standby buses through the underground feeder.	Once per 2 hours ---------NOTE-------- May be performed during preceding 12 hour period. --------------------------- 1 hour
F. Required Actions and associated Completion Times not met for Conditions C, D, or E.	F.1 Be in HOT SHUTDOWN AND F.2 Be in COLD SHUTDOWN	12 hours 84 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.7.7.1 1) Verify any 2 of 3 undervoltage inputs will provide undervoltage permissive; 2) Verify associated time delays relays actuate as required; 3) Verify any single channel, single Unit ES signal will provide permissive to undervoltage logic for system actuation.	Refueling

3.7 ELECTRICAL POWER SYSTEMS

3.7.8 Emergency Power Switching Logic (EPSL) CT-5 Degraded Grid Voltage Protection

TS 3.7.8 The following EPSL CT-5 Degraded Grid Voltage Protection functions shall be OPERABLE:

1. Three CT-5 Degraded Grid Voltage Sensing Relays;
2. Two channels of CT-5 Degraded Grid Voltage Protection Actuation Logic.

APPLICABILITY: Above COLD SHUTDOWN when the Central switchyard is energizing the standby buses.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One voltage sensing relay inoperable.	A.1 Restore voltage sensing relay to OPERABLE status.	7 days
B. One channel of actuation logic inoperable.	B.1 Restore channel to OPERABLE status.	7 days
C. Two actuation logic channels inoperable.	C.1 Open SL breakers.	1 hour
	OR	
	C.2 Energize two standby buses by a Lee gas turbine.	1 hour

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.7.8.1 Perform a CHANNEL TEST.	Refueling

3.7 ELECTRICAL POWER SYSTEMS

3.7.9 Vital I&C DC Sources and Distribution - Operating

TS 3.7.9

1. Four 125VDC I&C panelboards (DIA, DIB, DIC, DID) shall be OPERABLE. No single source shall be the only source aligned to more than one panelboard.

2. For Unit 2 and for Unit 3 , 1DIC and 1DID shall be OPERABLE. No single source shall be the only source aligned to 1DIC and 1DID.

3. The following 125VDC Vital I&C Sources (battery, charger, distribution center) shall be OPERABLE:
   a. For two or three Units, five of six sources;
   b. For Unit 1, three of the following four sources 1CA, 1CB, 2CA, 2CB;
   c. For Unit 2, three of the following four sources 2CA, 2CB, 3CA, 3CB;
   d. For Unit 3, three of the following four sources 3CA, 3CB, 1CA, 1CB.

APPLICABILITY: Above COLD SHUTDOWN

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One panelboard inoperable.	A.1 Restore panelboard to OPERABLE status.	24 hours
B. Single source providing the only power source for two or more panelboards. OR Panelboards isolated from backup Unit.	B.1 Align panelboards such that no single source is providing the only power source for more than one panelboard.	24 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One required battery inoperable to perform equalizer charge following the performance test or SR 3.7.9.3 (service test).	C.1 Restore battery to OPERABLE status.	72 hours
D. One required DC source inoperable due to reasons other than Condition C.	D.1 Restore DC source to OPERABLE status.	24 hours
E. Required Actions and associated Completion Times not met for Conditions A through D.	E.1 Be in HOT SHUTDOWN <u>AND</u> E.2 Be in COLD SHUTDOWN	12 hours 84 hours
----------------NOTE---------------- This Condition applies concurrently to Units 2, and 3. Condition A applies to Unit 1. --- F. 1DIC or 1DID inoperable.	F.1 Restore panelboard to OPERABLE status.	24 hours
----------------NOTE---------------- This Condition applies concurrently to Units 2, and 3. Condition B applies to Unit 1. --- G. Single source providing the only power source for 1DIC and 1DID.	G.1 Align 1DIC and 1DID such that no single source is providing the only power source.	24 hours
----------------NOTE---------------- This Condition applies concurrently to Units 2, and 3. Condition E applies to Unit 1. --- H. Required Actions and associated Completion Times not met for Conditions F or G.	H.1 Be in HOT SHUTDOWN <u>AND</u> H.2 Be in COLD SHUTDOWN	12 hours 84 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.9.1	Verify battery float voltage $\geq$ 125VDC	Weekly
SR 3.7.9.2	Verify peak inverse voltage capability of each I&C auctioneering diode is within limits.	6 Months
SR 3.7.9.3	Verify battery capacity is adequate to supply and maintain in OPERABLE status the required emergency loads for the design duty cycle when the battery is subjected to a battery service test.	Annually
SR 3.7.9.4	Verify cells, end cell plates, and battery racks show no visual indication of structural damage or degradation.	Annually
SR 3.7.9.5	Verify cell to cell and terminal connections are clean, tight, and coated with anti-corrosion grease.	Annually

3.7 ELECTRICAL POWER SYSTEMS

3.7.10 230kV Switchyard DC Sources and Distribution

TS 3.7.10

1. Two DC distribution centers (SY-DC1, SY-DC2) and their associated DC panelboards (DYA, DYB, and DYC; DYE, DYF, and DYG) shall be OPERABLE.

2. Two DC Sources (battery, charger) shall be OPERABLE.

APPLICABILITY: Above COLD SHUTDOWN

ACTIONS

------------------------------NOTE------------------------------

Separate Condition entry is allowed for each inoperable panelboard.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One distribution center inoperable. OR Any required panelboard or combination of required panelboards inoperable except: DYA and DYE; DYB and DYF; or DYC and DYG.	A.1 Restore distribution center and associated panelboards to OPERABLE status.	24 hours
B. One required battery inoperable for equalizer charge following the performance test or SR 3.7.9.3 (service test).	B.1 Restore battery to OPERABLE status.	72 hours
C. One DC source inoperable due to reasons other than Condition B.	C.1 Restore DC source to OPERABLE status.	24 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Actions and associated Completion Times not met.	D.1 Be in HOT SHUTDOWN	12 hours
	AND	
	D.2 Be in COLD SHUTDOWN	84 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.10.1	Perform SRs 3.7.9.1 (Float Voltage), 3.7.9.3 (Service Test), 3.7.9.4 (Structural Surveillance), and 3.7.9.5 (Connection Surveillance) for 230kV switchyard batteries.	As specified in applicable SRs

3.7 ELECTRICAL POWER SYSTEMS

3.7.11 AC Vital Distribution - Operating

TS 3.7.11 Four 120VAC vital instrumentation power panelboards (KVIA, KVIB, KVIC, and KVID) and associated static inverters shall be OPERABLE.

APPLICABILITY: Above COLD SHUTDOWN

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. KVIA or KVIB inoperable due to inoperable inverter.	A.1 Connect panelboard to regulated panelboard KRA.	4 hours
	AND	
	A.2 Verify panelboard is energized.	Once per 24 hours
	AND	
	A.3 Restore panelboard to OPERABLE status.	7 days
B. KVIA or KVIB inoperable due to reasons other than Condition A.	B.1 Restore panelboard to OPERABLE status.	4 hours
C. KVIC or KVID inoperable due to inoperable inverter.	C.1 Connect panelboard to regulated panelboard KRA.	24 hours
	AND	
	C.2 Verify panelboard is energized.	Once per 24 hours
	AND	
	C.3 Restore panelboard to OPERABLE status.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. KVIC or KVID inoperable due to reasons other than Condition C.	D.1 Restore panelboard to OPERABLE status.	24 hours
E. Required Actions and associated Completion Times not met.	E.1 Be in HOT SHUTDOWN <u>AND</u> E.2 Be in COLD SHUTDOWN	12 hours 84 hours
F. Two or more panelboards inoperable.	F.1 Enter TS 3.0	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.11.1	Verify correct inverter voltage, AC line synchronization/frequency, and alignment.	Weekly

3.7 ELECTRICAL POWER SYSTEMS

3.7.12 Battery Cell Parameters

TS 3.7.12 Battery cell parameters shall be within specified limits.

APPLICABILITY: When associated DC sources are required OPERABLE.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Electrolyte level below top of cell plates.	A.1 Declare associated DC source inoperable.	Immediately
B. Battery cell float voltage < 2.07 volts.	B.1 Declare associated DC source inoperable.	Immediately
C. Electrolyte temperature < 60°F.	C.1 Declare associated DC source inoperable.	Immediately
D. Electrolyte level < minimum or > maximum level indication marks.	D.1 Restore electrolyte level to within limits.	90 days
E. Battery cell float voltage < 2.13 volts and ≥ 2.07 volts.	E.1 Restore cell float voltage to within limits.	90 days
F. Electrolyte specific gravity < 1.200.	F.1 Restore specific gravity to within limits.	90 days
G. Electrolyte specific gravity > 0.010 below the average specific gravity of all cells measured.	G.1 Restore specific gravity to within limits.	90 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
H. More than two cells jumpered in one battery. <u>OR</u> Required Actions and associated Completion Times not met.	H.1 Declare associated DC source inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.12.1	Verify pilot cell float voltage ≥ 2.13 VDC	Weekly
SR 3.7.12.2	Verify pilot cell specific gravity ≥ 1.200 when corrected to 77°F and full electrolyte level.	Weekly
SR 3.7.12.3	Verify pilot cell electrolyte level within limits	Weekly
SR 3.7.12.4	Verify each cell float voltage ≥ 2.13 VDC.	Quarterly
SR 3.7.12.5	Verify each cell specific gravity ≥ 1.200 when corrected to 77°F and full electrolyte level.	Quarterly
SR 3.7.12.6	Verify each cell electrolyte level within limits.	Quarterly
SR 3.7.12.7	Verify temperature of every sixth connected cell within limits.	Quarterly
SR 3.7.12.8	Verify electrolyte specific gravity < 0.010 below average specific gravity of all cells measured.	Quarterly

3.7 ELECTRICAL POWER SYSTEMS

3.7.13 AC Sources - Shutdown/High Decay Heat/Reduced Inventory

TS 3.7.13 AC sources shall be OPERABLE as follows:

1. One energized transformer, supplying power to both main feeder buses; and

2. Two backup transformers, each capable of supplying power to both main feeder buses, within 15 minutes (either automatically or manually from the Control Room).

APPLICABILITY: COLD SHUTDOWN with decay heat level and RCS inventory such that there would be $\leq$ 2.5 hours to core uncovery after loss of power for decay heat removal.
REFUELING SHUTDOWN with decay heat level and RCS inventory such that there would be $\leq$ 2.5 hours to core uncovery after loss of power for decay heat removal.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Transformer supplying main feeder buses deenergized.	A.1 Initiate action to restore an energized transformer supplying both main feeder buses.	Immediately
B. One or more backup transformers inoperable.	B.1 Restore both backup transformers to OPERABLE status.	6 hours
C. Required Actions and associated Completion Times not met.	C.1 Initiate action to establish conditions such that there would be > 2.5 hours to core uncovery after loss of power for decay heat removal.	1 hour

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.13.1	Verify backup transformers available.	12 hours
SR 3.7.13.2	Verify correct breaker alignment and indicated power availability.	7 days

3.7 ELECTRICAL POWER SYSTEMS

3.7.14 AC Sources - Shutdown

TS 3.7.14 AC sources shall be OPERABLE as follows:

1. One energized transformer, supplying power to one main feeder bus; and

2. A second transformer,capable of supplying power to an OPERABLE main feeder bus, within 15 minutes (either automatically or manually from the Control Room).

APPLICABILITY: COLD SHUTDOWN with decay heat level and RCS inventory such that there would be > 2.5 hours to core uncovery after loss of power for decay heat removal
REFUELING SHUTDOWN with decay heat level and RCS inventory such that there would be > 2.5 hours to core uncovery after loss of power for decay heat removal.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Transformer supplying main feeder bus deenergized.	A.1 Suspend REFUELING OPERATIONS.	Immediately
	AND	
	A.2 Initiate action to restore an energized transformer supplying main feeder bus.	Immediately
B. Backup transformer inoperable.	B.1 Suspend REFUELING OPERATIONS.	Immediately
	AND	
	B.2 Restore backup transformer to OPERABLE status.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.14.1	Verify backup transformer available.	12 hours
SR 3.7.14.2	Verify correct breaker alignment and indicated power availability.	7 days

3.7 ELECTRICAL POWER SYSTEMS

3.7.15 AC Distribution - Shutdown/High Decay Heat/Reduced Inventory

TS 3.7.15 AC distribution shall be OPERABLE as follows:

1. Two main feeder buses energized and connected to two or more 4kV switchgear buses; and

2. Three 4160V switchgear buses (TC, TD, TE) energized.

APPLICABILITY: COLD SHUTDOWN with decay heat level and RCS inventory such that there would be $\leq$ 2.5 hours to core uncovery after loss of power for decay heat removal.
REFUELING SHUTDOWN with decay heat level and RCS inventory such that there would be $\leq$ 2.5 hours to core uncovery after loss of power for decay heat removal.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One main feeder bus inoperable.	A.1 Restore main feeder bus to OPERABLE status.	24 hours
B. One 4160V switchgear bus inoperable.	B.1 Restore 4160V switchgear to OPERABLE status.	24 hours
C. Required Actions and associated Completion Times for Conditions A or B not met.	C.1 Initiate action to establish conditions such that there would be > 2.5 hours to core uncovery after loss of power for decay heat removal.	1 hour
D. Two main feeder buses inoperable.	D.1 Initiate action to restore one main feeder bus to OPERABLE status.	Immediately
E. Two or more 4160V switchgear buses inoperable.	E.1 Initiate action to restore 4160V switchgears to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.15.1	Verify two main feeder buses are energized and connected to two or more 4160V buses.	12 hours
SR 3.7.15.2	Verify correct breaker alignment and indicated power availability.	7 days

3.7 ELECTRICAL POWER SYSTEMS

3.7.16 AC Distribution - Shutdown

TS 3.7.16 AC distribution shall be OPERABLE as follows:

1. One main feeder bus energized; and

2. Two of the three 4160V switchgear buses (TC, TD, TE) energized.

APPLICABILITY: COLD SHUTDOWN with decay heat level and RCS inventory such that there would be > 2.5 hours to core uncovery after loss of power for decay heat removal
REFUELING SHUTDOWN with decay heat level and RCS inventory such that there would be > 2.5 hours to core uncovery after loss of power for decay heat removal.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Two main feeder buses inoperable.	A.1 Suspend REFUELING OPERATIONS.	Immediately
	AND	
	A.2 Initiate action to restore one main feeder bus to OPERABLE status.	Immediately
B. One of the required 4160V switchgear buses inoperable.	B.1 Restore one 4160V switchgear to OPERABLE status.	24 hours
C. Both of the required 4160V switchgear buses inoperable.	C.1 Suspend REFUELING OPERATIONS.	Immediately
	AND	
	C.2 Initiate action to restore one 4160V switchgear to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.16.1	Verify one main feeder bus is energizing two or more 4160V buses.	12 hours
SR 3.7.16.2	Verify correct breaker alignment and indicated power availability.	7 days

3.7 ELECTRICAL POWER SYSTEMS

3.7.17 Vital I&C DC Sources and Distribution - Shutdown/High Decay Heat/Reduced Inventory

TS 3.7.17

1. Four 125VDC I&C panelboards (DIA, DIB, DIC, DID) shall be OPERABLE. No single source may be the only source aligned to more than one panelboard.

-----NOTE-----

For operating Units, 1DIC and 1DID must still meet the requirements of TS 3.7.9.

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2. The following 125 VDC Vital I&C Sources (battery, charger, distribution center) shall be OPERABLE:
   a. For Unit 1 three of the following four sources 1CA, 1CB, 2CA, 2CB;
   b. For Unit 2 three of the following four sources 2CA, 2CB, 3CA, 3CB;
   c. For Unit 3 three of the following four sources 3CA, 3CB, 1CA, 1CB.

APPLICABILITY: COLD SHUTDOWN with decay heat level and RCS inventory such that there would be ≤ 2.5 hours to core uncovery after loss of power for decay heat removal
REFUELING SHUTDOWN with decay heat level and RCS inventory such that there would be ≤ 2.5 hours to core uncovery after loss of power for decay heat removal.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One panelboard inoperable.	A.1 Restore panelboard to OPERABLE status.	24 hours
B. Single battery providing the only power source for two or more panelboards. OR Panelboards isolated from backup Unit.	B.1 Align panelboards such that no single battery is providing the only power source for more than one panelboard.	24 hours
C. One required DC source inoperable.	C.1 Restore DC source to OPERABLE status.	24 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Actions and associated Completion Times not met.	D.1 Initiate action to establish conditions such that there would be > 2.5 hours to core uncovery after loss of power for decay heat removal.	1 hour

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.17.1	Perform SRs 3.7.9.1 (Float Voltage), SR 3.7.9.2 (Diode Surveillance), 3.7.9.3 (Service Test), 3.7.9.4 (Structural Surveillance), and 3.7.9.5 (Connection Surveillance).	As required by applicable SRs.

3.7 ELECTRICAL POWER SYSTEMS

3.7.18 Vital I&C DC Sources and Distribution - Shutdown

TS 3.7.18 1. Three 125VDC I&C panelboards (DIA, DIB, DIC, DID) shall be OPERABLE.

--------------------NOTE--------------------

For operating Units, 1DIC and 1DID must still meet the requirements of TS 3.7.9.

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2. The following 125VDC Vital I&C Sources (battery, charger, distribution center) shall be OPERABLE:
   a. For Unit 1, one of the following two sources 1CA, 1CB;
   b. For Unit 2, one of the following two sources 2CA, 2CB;
   c. For Unit 3, one of the following two sources 3CA, 3CB.

APPLICABILITY: COLD SHUTDOWN with decay heat level and RCS inventory such that there would be > 2.5 hours to core uncovery after loss of power for decay heat removal.
REFUELING SHUTDOWN with decay heat level and RCS inventory such that there would be > 2.5 hours to core uncovery after loss of power for decay heat removal.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required panelboard inoperable.	A.1 Restore panelboard to OPERABLE status.	12 hours
B. One required DC source inoperable.	B.1 Suspend REFUELING OPERATIONS.	Immediately
	AND	
	B.2 Restore DC source to OPERABLE status.	24 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.18.1	Perform SRs 3.7.9.1 (Float Voltage), SR 3.7.9.2 (Diode Surveillance), 3.7.9.3 (Service Test), 3.7.9.4 (Structural Surveillance), and 3.7.9.5 (Connection Surveillance).	As required by applicable SRs

DUKE POWER COMPANY

OCONEE NUCLEAR STATION

ATTACHMENT 2

BASES

Remove Pages	Insert Pages
3.7-9 through -16	B 3.7-1 through B 3.7-88

B 3.7 ELECTRICAL POWER SYSTEMS

B 3.7.1 AC Sources - Operating

BASES

BACKGROUND

The AC Power System consists of the offsite power sources (preferred power) and the onsite standby power sources (Keowee Hydro Units). This system is designed to supply the required engineered safety features (ESF) loads of one unit and safe shutdown loads of the other two units and is so arranged that no single failure can disable enough loads to jeopardize plant safety. In accordance with the intent of proposed Atomic Energy Commission (AEC) general design criterion 39, the design of the AC Power System provides independence and redundancy to ensure an available source of power to the ESF systems (FSAR 3.1.39). The Keowee Hydro turbine generators are powered through a common penstock by water taken from Lake Keowee. The use of a common penstock is justified on the basis of past hydro plant experience of the Duke Power Company (since 1919) which indicates that the cumulative need to dewater the penstock can be expected to be limited to about one day a year, principally for inspection, plus perhaps four days every tenth year.

The preferred power source is provided from offsite power to the red or yellow bus in the 230kV switchyard to the units startup transformer and the E breakers. The 230kV switchyard is electrically connected to the 525kV switchyard via the autobank transformer. The standby buses may receive offsite power from the 100kV transmission system through CT-5 and the SL breakers. The two emergency power paths are the overhead path and the underground path. The underground emergency power path is from one Keowee Hydro Unit through the S breakers. The overhead emergency power path is from the other Keowee Hydro Unit through the E breakers. The standby buses can also receive power from a combustion turbine generator at the Lee Steam Station through a dedicated 100kV transmission line, transformer CT-5, and both SL breakers. The 100kV transmission line is electrically separated from the system grid and offsite loads. This source is required to be OPERABLE only when specified in TS 3.7.1 Conditions E, F, or G and is considered to be an onsite power source in this mode of operation.

The auxiliaries of two units in HOT SHUTDOWN plus the auxiliaries of the one unit with a LOCA require a total AC power capacity as shown in FSAR Table 8-1.

(continued)

BASES (continued)

BACKGROUND (continued)

The continuous AC power capacity available to the Oconee Units is:

Source	Capacity
Underground emergency power path (limited by transformer CT-4)	22.4MVA
Overhead emergency power path (limited by transformer CT-1, CT-2, or CT-3)	30MVA
Offsite sources from 230kV switchyard (limited by transformer CT-1, CT-2, or CT-3)	30MVA
Offsite source from the Central 100kV switchyard (limited by transformer CT-5)	22.4MVA
Backup 100kV transmission line from Lee Station Gas Turbine Generator (limited by transformer CT-5)	22.4MVA

Thus, the minimum available capacity from any one of the multiple sources of AC power, 22.4MVA, is adequate.

APPLICABLE SAFETY ANALYSES

The initial conditions of design basis transient and accident analyses in the FSAR Chapter 6 (Engineered Safeguards) and 15 (Accident Analyses) assume all ESF systems are OPERABLE. The AC power system is 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 other TS's.

Consistent with the accident analysis assumptions of a LOOP and a single failure of one onsite emergency power path, two of the onsite emergency power sources are required to be OPERABLE.

AC Sources - Operating is a system that is part of the primary success path and functions to mitigate a DBA or transient that presents a challenge to the integrity of a fission product barrier. As such, AC Sources - Operating satisfies the requirements of Selection Criterion 3 of the NRC Interim Policy Statement (Ref. 1).

(continued)

BASES (continued)

TS

The basic design criteria of the entire emergency electric power system of a nuclear unit, including the generating sources, distribution system and controls, is that a single failure of any component passive or active will not preclude the system from supplying emergency power when required (Ref 5).

Overhead Emergency Power Path

Either of the following combinations provide an acceptable overhead emergency power path. Other acceptable alignments are provided within the Design Basis Document (DBD) (Ref. 4).

1A)	Keowee Unit 1 generator,	1B)	Keowee Unit 2 generator,
2A)	Keowee ACB 1,*	2B)	Keowee ACB 2,*
3A)	Keowee auxiliary transformer 1X, Keowee ACB 5, Keowee Load Center 1X,	3B)	Keowee auxiliary transformer 2X, Keowee ACB 6, Keowee Load Center 2X,
4A)	Keowee MCC 1XA,	4B)	Keowee MCC 2XA,
5A)	Keowee Panelboard KA,	5B)	Keowee panelboard KB,
6A)	Keowee Battery #1, Charger #1, and Distribution center 1DA,	6B)	Keowee Battery #2, Charger #2, and Distribution Center 2DA,

7) Keowee reservoir level ≥775 feet above sea level,
8) Keowee main step-up transformer,
9) PCB 9,*
10) The 230kV switchyard yellow bus capable of being isolated by one channel of Switchyard Isolate,
11) A unit startup transformer and associated yellow bus PCB (CT-1 / PCB 18, CT-2 / PCB 27, CT-3 / PCB 30), and
12) Both E breakers.

* Enabled by one channel of Switchyard Isolate Complete.

(continued)

BASES (continued)

TS (continued)

Underground Emergency Power Path
Either of the following combinations provide an acceptable underground emergency power path. Other acceptable alignments are provided within the DBD (Ref. 4).

1A)	Keowee Unit 1 generator,	1B)	Keowee Unit 2 generator,
2A)	Keowee ACB 3,	2B)	Keowee ACB 4,
3A.1)	Keowee auxiliary transformer CX capable of feeding Keowee Load Center 1X through ACB 7,	3B.1)	Keowee auxiliary transformer CX capable of feeding Keowee Load Center 2X through ACB 8,
3A.2)	One Oconee Unit 1 S breaker capable of feeding switchgear 1TC,	3B.2)	One Oconee Unit 1 S breaker capable of feeding switchgear 1TC,
3A.3)	Switchgear 1TC capable of feeding Keowee auxiliary transformer CX,	3B.3)	Switchgear 1TC capable of feeding Keowee auxiliary transformer CX,
4A)	Keowee MCC 1XA,	4B)	Keowee MCC 2XA,
5A)	Keowee Panelboard KA,	5B)	Keowee Panelboard KB,
6A)	Keowee Battery #1, Charger #1, and Distribution Center 1DA,	6B)	Keowee Battery #2, Charger #2, and Distribution Center 2DA,

7) Keowee reservoir level $\geq$775 feet above sea level,
8) The underground feeder,
9) Transformer CT-4,
10) Both SK breakers,
11) Both standby buses, and
12) Both S breakers.

Offsite Sources
The two offsite sources are required to be "physically independent" (separate towers) prior to entering the 230kV switchyard. Once the 230kV lines enter the switchyard, an electrical pathway must exist through closed PCBs and disconnects such that both sources are connected to and energizing the Unit's startup transformer. Once within the boundary of the switchyard the electrical pathway may be the same for both independent offsite sources. In addition, at least one E breaker must be available to automatically supply power to the main feeder buses from the energized startup transformer. If both E breakers are inoperable, then neither the 230kV sources nor the overhead emergency power path can energize the main feeder buses, therefore, the startup transformer is considered to be inoperable. The voltage provided to the startup transformer by the two independent offsite sources must be sufficient to ensure

(continued)

BASES (continued)

TS

Offsite Sources (continued)

all engineered safeguard equipment will operate (Ref. 3). Two of the following offsite sources are required:

1) Jocassee (from Jocassee) Black or White,
2) Dacus (from North Greenville) Black or White,
3) Oconee (from Central) Black or White,
4) Calhoun (from Central) Black or White,
5) Autobank transformer fed from either the Asbury (from Newport), Norcross (from Georgia Power), or Katoma (from McGuire) 525kV line.

APPLICABILITY

The AC power sources for ESF systems are required to be OPERABLE above COLD SHUTDOWN to ensure that:

1. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of anticipated operational occurrences or abnormal transients, and

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

AC source requirements during COLD SHUTDOWN and REFUELING SHUTDOWN are addressed in the Bases for TS 3.7.13 (AC Sources - Shutdown/High Decay Heat/Reduced Inventory) and TS 3.7.14 (AC Sources - Shutdown).

The APPLICABILITY has been modified by a NOTE which provides an exception to TS 3.7.0 when a Lee gas turbine is energizing the standby buses as required by Conditions E, F, or G. This exception allows the Unit to heat up above COLD SHUTDOWN when both emergency power paths are inoperable, or a Keowee Hydro Unit or the Keowee Main Step-up transformer is inoperable > 72 hours provided a Lee gas turbine is energizing the standby buses.

ACTIONS

The Required Actions have been established based on the level of degradation of the power sources.

A.1, A.2, A.3.1, and A.3.2

In the event a startup transformer becomes inoperable, it effectively causes one of the emergency power paths (overhead path) and both of the offsite sources to be inoperable. One emergency power path remains available through the underground

(continued)

BASES (continued)

ACTIONS

A.1, A.2, A.3.1, and A.3.2 (continued)

feeder to ensure safe shutdown of the unit in the event of a transient or accident without a single failure.

Operation may continue for 12 hours if the availability of the underground emergency power path is demonstrated within 1 hour. This Required Action provides assurance that no previously undetected failures have occurred in the underground emergency power path. If available, another Unit's startup transformer should be aligned to supply power to the affected Unit's auxiliaries so that offsite power sources and the overhead path will also be available if needed. Although this alignment restores the availability of the offsite sources and overhead emergency power path, the shared startup transformer's capacity and voltage adequacy could be challenged under certain DBA conditions. The shared alignment is acceptable because the preferred mode of Unit shutdown is with reactor coolant pumps providing forced circulation and due to the low likelihood of an event challenging the capacity of the shared transformer during a 72 hour period to bring a Unit to COLD SHUTDOWN. Required Actions A.3.1 and A.3.2 allow the option of restoring the affected Unit's startup transformer or designating an OPERABLE startup transformer from another Unit. For example, if Unit 1 and 2 are operating and CT-2 becomes inoperable, Unit 2 may align CT-1 to the Unit 2 main feeder buses and continue operating for up to 36 hours. At that time either CT-2 must be restored to OPERABLE status or CT-1 must be "designated" to one Unit. Once CT-1 has been designated to a Unit, the other Unit must begin shutting down per Condition B. Note that one Unit above COLD SHUTDOWN and a Unit in COLD SHUTDOWN may share a startup transformer indefinitely provided that the loads on the COLD SHUTDOWN Unit are maintained within acceptable limits (Ref. 2). For example, if Unit 1 is already in COLD SHUTDOWN and CT-2 becomes inoperable, Unit 2 may align CT-1 to the Unit 2 main feeder buses and continue operation indefinitely.

B.1 and B.2

In the event a startup transformer has been designated to another Unit per Required Action A.3.2, the Unit must be in HOT SHUTDOWN in 12 hours and COLD SHUTDOWN in another 24 hours since the shared startup transformer's capacity could be challenged under certain DBA conditions. In addition, if the Required Actions and associated Completion Times for Condition A cannot be met, the Unit must be in HOT SHUTDOWN in 12 hours and COLD SHUTDOWN in another 24 hours. These times allow for a controlled shutdown without placing undue stress on plant operators or plant systems.

C.1 and C.2

With one emergency power path inoperable due to reasons other than an inoperable startup transformer (Condition A) sufficient AC power sources remain available to ensure safe shutdown of the unit in the event of a transient or accident. Operation could safely continue for 72 hours if the operability of the remaining emergency

(continued)

ACTIONS

C.1 and C.2 (continued)

power path is demonstrated within 1 hour and every 12 hours thereafter. This demonstration is to assure that the remaining emergency power path is not inoperable due to a common cause or due to an undetected failure. When the standby buses are energized by a Lee gas turbine, the likelihood that the OPERABLE emergency power path will be required is decreased, thus testing on a 12 hour frequency is no longer necessary. Testing on a 7 day frequency will be commenced if Condition G is entered. If the inoperable emergency power path is not restored to OPERABLE status within 72 hours, a controlled shutdown must be initiated per Condition H or the Required Actions of Condition G must be completed for the inoperable Keowee Hydro Unit or Keowee Main Step-up transformer. A NOTE has been included to specify that Required Actions G.1 (Lee on the standby buses) and G.2 (verification of operability) must be completed prior to exceeding 72 hours.

D.1

With an E breaker and S breaker inoperable on the same main feeder bus the affected main feeder bus cannot receive power from either on-site emergency power source. In this case, the affected main feeder bus must be declared inoperable. Appropriate Required Actions are specified in TS 3.7.2 (AC Distribution - Operating). Both on-site emergency power paths are considered OPERABLE in this case since, without a single failure, both on-site emergency paths can provide power to the remaining main feeder bus.

E.1 through E.3

With both emergency on-site power paths inoperable, insufficient standby AC power sources are available to feed the minimum required ESF functions. The offsite power system is the only source of AC power available for this level of degradation. The risk associated with continued operation for one hour without an emergency power source is considered acceptable due to the low likelihood of a LOOP during this time period, and because of the potential for grid instability caused by the simultaneous shutdown of all three units. This instability would increase the probability of a total loss of AC power. Operation with both Keowee units inoperable is permitted for 60 hours provided that the actions detailed below are taken prior to exceeding one hour. Further, with the exception of Lee energizing the standby buses, in the event these actions are not met during the inoperability of both emergency power paths, a period of 4 hours is allowed by Required Action E.2.2 to restore the inoperable component. For example if both Keowee Units have been inoperable 24 hours and one channel of load shed (required by TS 3.7.3) is discovered to be inoperable, the channel must be restored to OPERABLE status within the next 4 hours.

(continued)

BASES (continued)

ACTIONS

E.1 through E.3 (Continued)

1. The standby buses are continuously energized by a Lee gas turbine through the 100kV transmission circuit. The 100kV transmission circuit would be electrically separated from the system grid and all offsite loads. This arrangement provides a high degree of reliability for the emergency power system. In this configuration, the Lee gas turbine is serving as an onsite emergency power source, however since the Oconee Units are vulnerable to single failure of the 100kV transmission circuit a time limit of 60 hours is imposed. Required Action E.1 permits the standby buses to be re-energized by a Lee gas turbine within 1 hour in the event this source is lost. For example if both Keowee Units have been inoperable 12 hours and the Lee gas turbine feeding the 100kV line trips, the 100kV line must be re-energized from a Lee gas turbine within the next hour.

2. Two offsite sources are verified and maintained OPERABLE by complying with TS 3.7.1. This Required Action provides additional assurance that offsite power will be available while both Keowee Units are inoperable.

3. AC Distribution is verified and maintained OPERABLE by complying with TS 3.7.2. This Required Action increases the probability that AC power will be available to ESF equipment even in the unlikely event of a single failure unrelated to the inoperability of both emergency power paths.

4. EPSL with the exception of the Keowee Emergency Start Function (TS 3.7.6) is verified and maintained OPERABLE by complying with TSs 3.7.3, 3.7.4, 3.7.5, and 3.7.7. This Required Action increases the probability that EPSL will function as required even in the unlikely event of a single failure unrelated to the inoperability of both emergency power paths.

5. Vital I&C DC Sources and distribution are verified and maintained OPERABLE by complying with TS 3.7.9. This Required Action increases the probability that the Vital I&C DC system will function as required to support EPSL even in the unlikely event of a single failure unrelated to inoperability of both emergency power paths.

6. Switchyard DC Sources and Distribution are verified and maintained OPERABLE by complying with TS 3.7.10. This Required Action increases the probability that the 230kV switchyard DC system will function as required to support EPSL even in the unlikely event of a single failure unrelated to the inoperability of both emergency power paths.

7. AC Vital Distribution is verified and maintained OPERABLE by complying with TS 3.7.11. This Required Action increases the probability that the vital instrumentation power panelboards will function as required to support EPSL even in the unlikely event of a single failure unrelated to the inoperability of both emergency power paths.

(continued)

BASES (continued)

ACTIONS

E.1 through E.3 (continued)

The term verify as used in these Required Actions allows for an administrative check by examining logs or other information to determine if the required equipment is inoperable for maintenance or other reasons. It does not require unique performance of Surveillance Requirements needed to demonstrate operability of the equipment.

If both Keowee units are restored, unrestricted operation may continue. If only one unit is restored within 60 hours, operation may continue per the Required Actions of Condition C or G.

F.1 through F.3

With all of the required offsite sources inoperable due to degraded grid, loss of voltage, or other causes, sufficient standby AC power sources are available to maintain the unit in a safe shutdown condition in the event of a DBA. However, since the AC power system is degraded below the TS requirements, a time limit on continued operation is imposed. With only one of the required offsite sources OPERABLE, the likelihood of LOOP is increased such that the same Required Actions for all required offsite sources inoperable are conservatively followed. The risk associated with continued operation for one hour without a Lee gas turbine energizing the standby buses is considered acceptable due to the low likelihood of a failure of both emergency power paths during this time period, and because of the potential for grid instability caused by the simultaneous shutdown of all three units. Operation with the available offsite sources less than required by the TS is permitted for 24 hours provided that the actions detailed below are taken prior to exceeding one hour. Further, with the exception of Lee energizing the standby buses, in the event these actions are not met during the inoperability of the required offsite sources, a period of 4 hours is allowed by Required Action F.2.2 to restore the inoperable component. For example if both required offsite sources have been inoperable 12 hours and one channel of load shed (required by TS 3.7.3) is discovered to be inoperable, the channel must be restored to OPERABLE status within the next 4 hours.

1. The standby buses are continuously energized by a Lee gas turbine through the 100kV transmission circuit. The 100kV transmission circuit would be electrically separated from the system grid and all offsite loads. This arrangement provides a high degree of reliability for the emergency power system. In this configuration, the Lee gas turbine is serving as an onsite emergency power source. Required Action F.1 permits the standby buses to be reenergized by Lee gas turbine within 1 hour in the event this source is lost. For example, if both required offsite sources have been inoperable 12 hours and the Lee gas turbine feeding the 100kV line trips, the 100kV line must be reenergized from Lee gas turbine within the next hour.

(continued)

BASES (continued)

ACTIONS

F.1 through F.3 (continued)

2. Two emergency power paths are verified and maintained OPERABLE by complying with TS 3.7.1. This Required Action provides additional assurance that the emergency power paths will be available if required while the required offsite sources are inoperable.

3. AC Distribution is verified and maintained OPERABLE by complying with TS 3.7.2. This Required Action increases the probability that AC power will be available to ESF equipment even in the unlikely event of a single failure unrelated to the inoperability of the required offsite sources.

4. EPSL is verified and maintained OPERABLE by complying with TSs 3.7.3, 3.7.4, 3.7.5, 3.7.6, and 3.7.7. This Required Action increases the probability that EPSL will function as required even in the unlikely event of a single failure unrelated to the inoperability of the required offsite sources.

5. Vital I&C DC Sources and distribution are verified and maintained OPERABLE by complying with TS 3.7.9. This Required Action increases the probability that the Vital I&C DC system will function as required to support EPSL even in the unlikely event of a single failure unrelated to inoperability of the required offsite sources.

6. Switchyard DC Sources and Distribution are verified and maintained OPERABLE by complying with TS 3.7.10. This Required Action increases the probability that the 230kV switchyard DC system will function as required to support EPSL even in the unlikely event of a single failure unrelated to the inoperability of the required offsite sources.

7. AC Vital Distribution is verified and maintained OPERABLE by complying with TS 3.7.11. This Required Action increases the probability that the vital instrumentation power panelboards will function as required to support EPSL even in the unlikely event of a single failure unrelated to the inoperability of the required offsite sources.

The term verify as used in these Required Actions allows for an administrative check by examining logs or other information to determine if the required equipment is inoperable for maintenance or other reasons. It does not require unique performance of Surveillance Requirements needed to demonstrate operability of the equipment.

If two offsite sources are restored within 24 hours, unrestricted operation may continue.

(continued)

BASES (continued)

ACTIONS

G.1 through G.5

Condition G has been established to allow maintenance and repair of a Keowee Hydro Unit and transformers which requires longer than 72 hours per Condition C. A "Keowee Hydro Unit" is considered to be all components between ACBs 1, 2, 3, and 4, as well as all components between auxiliary transformer CX and the Keowee Main step-up transformer. If both Keowee auxiliary transformers (1X and 2X) are inoperable the Keowee main step-up transformer is considered to be inoperable, because one of the functions of the main step-up transformer is supplying auxiliary loads for the overhead emergency power path. The primary long term maintenance items are expected to be hydro turbine runner and discharge ring welding repairs which are estimated to be necessary every six to eight years. Transformer replacement is rare but would be time extensive. Also, generator thrust and guide bearing replacements will be necessary. Other items which manifest as failures are expected to be extremely rare and could possibly be performed during the permitted maintenance periods. Times periods of up to 45 days for each Keowee Hydro unit are permitted every three years. A maximum period of 28 days is for Keowee main step-up transformer. This would allow a reasonable period of time for transformer replacement. The 28 day Completion Time for the Keowee main step-up transformer is not counted toward the 45 day Completion Time for each Keowee Hydro unit.

The Required Actions for the special inoperability period have been modified by two NOTES. NOTE 1 prohibits generation to the system grid except for testing. This restriction limits the number of possible failures which could cause loss of the underground emergency power path. NOTE 2 allows the OPERABLE Keowee Hydro Unit to be made inoperable for 12 hours if required to restore both Keowee Hydro Units to OPERABLE status. This note is necessary since certain actions such as dewatering the penstock may be necessary to restore the inoperable Keowee Hydro Unit although these actions would also cause both Keowee Hydro Units to be inoperable. The Required Actions detailed below are prerequisites for use of the special inoperability period. With the exception of Lee energizing the standby buses, in the event these Required Actions are not met during the special inoperability period, 4 hours is allowed by Required Action G.2.2 to restore the inoperable component. For example, if the Keowee Main Step-up transformer has been inoperable for 15 days and one ES power system string (required by TS 3.7.2) is discovered to be inoperable, the ES power system string must be restored to OPERABLE status within the next 4 hours.

1. The standby buses are continuously energized by a Lee gas turbine through the 100kV transmission circuit. The 100kV transmission circuit would be electrically separated from the system grid and all offsite loads. This arrangement provides a high degree of reliability for the emergency power system. In this configuration, the Lee gas turbine is serving as the second onsite emergency power source, however since the 100kV transmission circuit is vulnerable to severe weather a time limit is imposed. Required Action G.1 permits the standby buses to be reenergized by Lee gas turbine within 1 hour

(continued)

ACTIONS

G.1 through G.5 (continued)

in the event this source is lost. For example, if one Keowee Unit has been inoperable for 20 days and the Lee gas turbine feeding the 100kV line trips, the 100kV line must be reenergized from Lee gas turbine within the next hour.

2. Two offsite sources and the underground emergency power path are verified and maintained OPERABLE by complying with TS 3.7.1. This Required Action provides additional assurance that offsite power will be available during the special inoperability period. In addition this Required Action assures that underground emergency power path is available.

3. AC Distribution is verified and maintained OPERABLE by complying with TS 3.7.2. This Required Action increases the probability that AC power will not be lost to ESF equipment even in the unlikely event of single failures unrelated to the special inoperability period.

4. EPSL is verified and maintained OPERABLE by complying with TSs 3.7.3, 3.7.4, 3.7.5, 3.7.6, and 3.7.7. This Required Action increases the probability that EPSL will function as required even in the unlikely event of single failures unrelated to the special inoperability period.

5. Vital I&C DC Sources and Distribution are verified and maintained OPERABLE by complying with TS 3.7.9. This Required Action increases the probability that the Vital I&C DC System will function as required to support EPSL even in the unlikely event of single failures unrelated to the special inoperability period.

6. Switchyard DC Sources and Distribution is verified and maintained OPERABLE by complying with TS 3.7.10. This Required Action increases the probability that the 230kV switchyard DC system will function as required to support EPSL even in the unlikely event of single failures unrelated to the special inoperability period.

7. AC Vital Distribution is verified and maintained OPERABLE by complying with TS 3.7.11. This Required Action increases the probability that the vital instrumentation power panelboards will function as required to support EPSL even in the unlikely event of single failures unrelated to the special inoperability period.

The term verify as used in these Required Actions allows for an administrative check by examining logs or other information to determine if the required equipment is inoperable for maintenance or other reasons. It does not require unique performance of Surveillance Requirements needed to demonstrate operability of the equipment.

(continued)

BASES (continued)

ACTIONS

G.1 through G.5 (continued)

Following completion of the prerequisites for the special inoperability period, the underground emergency power path must be demonstrated to be OPERABLE. This demonstration is to assure that the underground emergency power path is not inoperable due to a common cause or due to an undetected failure. When the standby buses are energized by a Lee gas turbine, the likelihood that the OPERABLE emergency power path will be required is decreased, thus testing on a 7 day frequency is adequate. Credit can be taken for the operability of the SK and S breakers per the routine surveillance test (SR 3.7.1.2 and SR 3.7.1.4).

H.1 and H.2

If the Required Actions and associated Completion Times cannot be met, the unit must be in HOT SHUTDOWN in 12 hours and COLD SHUTDOWN in the following 72 hours. These times allow for a controlled shutdown of one or all three Units without placing undue stress on plant operators or plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.1.1

SRs 3.7.9.1, 3.7.9.3, 3.7.9.4, and 3.7.9.5 are performed to ensure Keowee battery OPERABILITY.

SR 3.7.1.2

This surveillance is to verify the availability of underground emergency power path. Utilization of the Auto-start sequence assures the control function operability by verifying proper speed control and voltage. Power path verification is included to demonstrate breaker operability from the Keowee Units onto the Standby Buses. This is accomplished by exercising the Keowee Feeder Breakers (SK) to energize both Standby Buses. The Monthly frequency for this Surveillance was determined to be adequate based on operating experience to provide reliability verification without excessive equipment cycling for testing.

SR 3.7.1.3

This surveillance is to verify the availability of overhead emergency power path. Utilization of the Auto-start sequence assures the control function operability by verifying proper speed control and voltage. The ability to supply the Overhead path is satisfied by demonstrating the ability to synchronize the Keowee Unit with the Grid system. The remaining path components are considered OPERABLE by the existence of adequate power to each of the Oconee Unit Startup Transformers. The Monthly frequency for this Surveillance was determined to be adequate based on operating experience to provide reliability verification without excessive equipment cycling for testing.

(continued)

BASES (continued)

SURVEILLANCE

SR 3.7.1.4

Infrequently used source breakers need to be cycled to ensure availability. The Standby breakers are to be cycled one breaker on one Unit at a time to prevent inadvertent interconnection of two Units through the Standby Bus Breakers. Cycling the Startup breakers verifies operability of the breakers and associated interlock circuitry between the Normal and Startup breakers. This circuitry provides an automatic, smooth, and safe transfer of Auxiliaries in both directions between sources. The Monthly frequency for this Surveillance was determined to be adequate based on operating experience to provide reliability verification without excessive equipment cycling for testing.

SR 3.7.1.5

The Keowee tie breakers to the Underground Path, ACB3 and ACB4, are interlocked to prevent cross-connection of the Keowee Generators. The safety analysis utilizes two independent power paths for accommodating single failures in applicable DBAs. Connection of both generators to the Underground path would compromise the redundancy of the emergency power paths. Test logic is installed to verify a circuit to the close coil on one Underground ACB does not exist with the other Underground ACB closed. Interlocks preventing the Keowee Unit which is aligned to the underground path from automatically closing to the overhead path are also verified OPERABLE. The 6 month frequency for this Surveillance was determined to be adequate based on operating experience to provide reliability verification without excessive equipment cycling for testing.

SR 3.7.1.6

The Lee Gas Turbines can be used as a reliable alternate "onsite" power source when connected through a 100kV line which is not connected to any other load or system. Since the use of this source is not frequent, the integrity and validity of the path must be verified by actually powering the Standby Buses with the Lee Gas Turbines. More frequent cycling of the Standby breakers is already performed per SR 3.7.1.4. The annual frequency for this surveillance is reasonable based on operating experience and the one hour time response required of the source.

SR 3.7.1.7

The Design Base response for the Lee Gas Turbines is to supply power to the Oconee Site equal to one Unit's maximum safeguards and two Unit's HOT SHUTDOWN loads within one hour. The Oconee Site cannot provide equivalent loads without establishing an unanalyzed electrical system alignment. Therefore, the load capability is established by requiring connection to the system grid and loading to the accident equivalent load within the required response time of one hour. The annual frequency for this surveillance is reasonable based on operating experience and the one hour time response required of the source.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.7.1.8

This surveillance verifies the Keowee Units' response time to an Emergency Start signal to ensure ES equipment will have adequate power for Design Accident mitigation. Two locations exist for Control Room manual initiation of Keowee Emergency Start logic. Oconee Units 1 & 2 or Unit 3 Control Room. Each Unit has individual logic which actuates the associated Emergency Start relays. This provides the ability to verify operability of each Control Room Logic independent of each Oconee Unit. A Refueling frequency surveillance, SR 3.7.1.9 (EPSL functional test), verifies the ES input. FSAR Section 6.3.3.3 establishes the 23 second time requirement for each Keowee Unit to obtain full speed and voltage. Since the only available loads of adequate magnitude for simulating a DBA is the Grid, subsequent loading on the Grid is required to verify the Unit's ability to assume rapid loading under accident conditions. Ideally, sequential block loads would be applied to fully test this function, but such loads are not available. This explains the requirement to load the Keowee Units at the maximum practical rate to the equivalent of a LOCA/LOOP situation. Current value for the maximum accident loads may be found in FSAR Table 8-1. The Annual frequency for this Surveillance was determined to be adequate based on operating experience to provide reliability verification without excessive equipment cycling for testing.

SR 3.7.1.9

This surveillance performs functional verification for the source and Main Feeder Bus voltage sensing, Keowee Emergency start, Loadshed and Transfer-to-Standby, and Retransfer-to-Startup logic of the EPSL System. The method is designed to provide actual power failures remote from the Main Feeder Buses so that the logic may be monitored. For SR purposes, a "failed" source is defined as the complete loss of voltage. The ramp/rate/time responses for the voltage relays are verified independently as a prerequisite to this SR. Circuits actuated by the source undervoltage relays are verified per SR 3.7.4.1. To eliminate the human or computer error in timing events, critical time setpoints for Load shed, Transfer-to-Standby, Retransfer-to-Startup, and reactor coolant pump trip relays are verified independently during the refueling outage. This test verifies the integrated response of the circuits. Key circuits for verification include the Engineered Safeguards contacts to the Keowee Emergency Start, Loadshed and Transfer/Retransfer relays, and close permissive for Keowee Feeder Breakers (SK). Excessive cycling of equipment may be prevented by using a single action input, verification of the required end result by alarms or visual inspection, subsequent reset of the initiating logic, and then insertion of an alternate input for verification of the required circuits. The Refueling frequency for this Surveillance was determined to be adequate based on operating experience to provide reliability verification without excessive equipment cycling for testing.

(continued)

BASES (continued)

REFERENCES

1. 52FR3788, NRC Interim Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.
2. 4160V Auxiliary Power System DBD, OSS-0254.00-00-2000.
3. 230kV Switchyard Power System DBD, OSS-0254.00-00-2004.
4. Keowee Emergency Power System DBD, OSS-0254.00-00-2005.
5. Oconee FSAR Section 3.1.39, Criterion 39

B 3.7 ELECTRICAL POWER SYSTEMS

B 3.7.2 AC Distribution - Operating

BASES

BACKGROUND

The AC Distribution System is comprised of two main feeder buses and three Engineered Safeguards (ES) Power System strings. This system, which supplies the electrical power required to operate unit equipment during normal plant operation, is designed to provide power to the required Engineered safety features (ESF) loads or safe shutdown loads of each unit such that no single failure can disable enough loads to jeopardize plant safety. Only one main feeder bus and two ES power system strings are needed to provide power to the minimum required loads. In accordance with proposed AEC general design criterion 39, the design of the AC distribution system provides independence and redundancy to ensure an available source of power to the ESF systems (FSAR 3.1.39).

The system is arranged such that each ES power system string can receive power from either of the two main feeder buses. Each main feeder bus which is capable of supplying the entire unit power needs, can receive power from the unit normal auxiliary transformer, startup transformer and one of the standby buses.

APPLICABLE SAFETY ANALYSES

The initial conditions of design basis transient and accident analysis in the FSAR Chapter 6, (Engineered Safeguard), and 15, (Accident Analyses), assume all ESF systems are OPERABLE. The AC Power System is 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.

In general, the safety analysis considered power to be available to Engineered Safeguards equipment following event initiation and is based on maintaining at least two of the ES Power System strings OPERABLE during accident conditions.

AC Distribution System - Operating is a system that is part of the primary success path and functions to mitigate a Design Basis Accident (DBA) or transient that presents a challenge to the integrity of a fission product barrier. As such, AC Distribution - Operating satisfies the requirements of selection criterion 3 of the NRC interim policy statement (Ref.1).

TS

Two main feeder buses and three ES power system strings ensure the availability of power to the required loads to shutdown the reactor and maintain it in a safe shutdown condition after an anticipated operational occurrence or a postulated DBA.

(continued)

BASES (continued)

TS (continued)

Main Feeder Bus

A main feeder bus is considered OPERABLE if it meets all of the following conditions:

1. The bus is energized;

2. It is receiving power or capable of automatically receiving power from its associated E breaker or S breaker;

3. Connected to at least two ES power system switchgears (TC, TD & TE).

ES Power System String

The three ES Power System Strings are defined as follows:

1A) ES Switchgear TC	1B) ES Switchgear TD	1C) ES Switchgear TE
2A) Load Center X8	2B) Load Center X9	2C) Load Center X10
3A) 600V MCC XS1 and 1, 2, 3XSF	3B) 600V MCC XS2	3C) 600V MCC XS3
4A) 208V MCC XS1 and 1, 2, 3XSF	4B) 208V MCC XS2	4C) 208V MCC XS3

Each string is considered OPERABLE if it is energized by at least one main feeder bus.

When MCC 1, 2, or 3XSF is powered from load center OXSF, these MCCs would not be available during a DBA. Therefore, these MCCs shall be considered inoperable if it is powered from load center OXSF during non-SSF event periods.

(continued)

BASES (continued)

APPLICABILITY

The AC Distribution system for ESF systems is required to be OPERABLE above COLD SHUTDOWN to ensure that:

1. Acceptable fuel design limit and reactor coolant pressure boundary limits are not exceeded as a result of anticipated operational occurrences or abnormal transients, and

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

AC distribution requirements during COLD SHUTDOWN and REFUELING SHUTDOWN are addressed in the Bases for TS 3.7.15 AC Distribution - Shutdown/High Decay Heat/Reduced Inventory and TS 3.7.16 AC Distribution - Shutdown.

ACTIONS

The required actions have been established based on the level of degradation of the AC distribution.

A.1

With one of the main feeder buses inoperable, the remaining main feeder bus is fully capable of supporting the safety functions necessary to shutdown the unit and maintain it in a safe shutdown condition, assuming no single failure. However the overall reliability is reduced because a single failure in the remaining main feeder bus could result in the minimum required ESF functions not being supported. Therefore the inoperable main feeder bus must be restored to OPERABLE status within 24 hours. The completion time is based on engineering judgement taking into consideration the time required to reasonably complete the required action and the availability of the remaining main feeder bus.

B.1

With one of the ES power system strings inoperable, the remaining two ES power system strings are capable of supporting the minimum required safety function necessary to shutdown the unit and maintain it in a safe shutdown condition, assuming no single failure. However, the overall reliability is reduced because a single failure in the remaining ES power system strings could result in the minimum ESF functions not being supported. Therefore, the inoperable string must be restored to OPERABLE status within 24 hours. The completion time is based on engineering judgement taking into consideration the time required to reasonably complete the required action and availability of the two remaining ES power system strings.

(continued)

BASES (continued)

ACTIONS (continued)

C.1 and C.2

If the required actions and associated completion times cannot be met, the unit must be in HOT SHUTDOWN in 12 hours and COLD SHUTDOWN in the following 72 hours. These times allow for a controlled shutdown of the unit without placing undue stress on plant operators or plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.2.1

This surveillance verifies that the AC distribution system is functioning properly, with the required circuit breakers closed and the buses energized. The 7 day frequency takes into account the redundant capability of the AC distribution system and other indications available in the control room that will alert the operator to system malfunctions.

REFERENCES

1. 52FR3788, NRC Interim Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

2. 4160V Auxiliary Power System DBD,OSS-0254.00-00-2000.

3. 600V Power System DBD,OSS-0254.00-00-2008.

B 3.7 ELECTRICAL POWER SYSTEMS

B 3.7.3 Emergency Power Switching Logic (EPSL) Automatic Transfer Functions

BASES

BACKGROUND

The transfer circuits of the Emergency Power Switching Logic (EPSL) are designed with sufficient redundancy to assure that power is supplied to the unit Main Feeder Buses (MFBs) and, hence, to the unit's essential loads, under accident conditions. The logic system monitors the normal and emergency power sources and, upon loss of the normal power source (the unit auxiliary transformer), the logic will seek an alternate source of power.

The Load Shed and Transfer to Standby Circuits are designed to energize the MFBs from the Standby Buses powered from either Keowee or Lee. This would occur when voltage is lost or is insufficient from the Normal and Startup sources. The Load Shed signal is generated to separate nonessential breakers from the MFBs to ensure the CT-4 or CT-5 transformers supplying the Standby Buses are not overloaded.

The Retransfer to Startup logic provides the emergency power switching logic the capability to retransfer essential loads from the Standby Bus to the startup source, if available, should power to the Standby Bus be lost for more than 10 seconds.

APPLICABLE SAFETY ANALYSES

The Safety Analysis for Transfer functions of EPSL is contained in Chapter 8 and 15 of the FSAR. The initial conditions of the analysis assume all the circuits of EPSL are functional.

The most limiting design basis accident (DBA) for the EPSL transfer functions is a LOCA with a simultaneous loss of offsite power (LOOP). The LOOP is considered to occur coincident with engineering safeguards (ES) actuation. In this scenario, the Load Shed and Transfer to Standby function is expected to reenergize the affected unit's MFBs from the Standby Buses which are expected to be powered from Keowee or Lee. The Load Shed timers and Transfer to Standby timers are set such that, if no power is available from the startup source for 11 seconds, the startup source breakers are prohibited from closing and the standby bus to MFB breakers receive a permissive to close. Power should be available to the MFBs within 23 seconds with the Keowee start and accelerate time being the most limiting parameter.

The Retransfer to Startup function is provided to ensure that a single failure (associated with the standby source) does not cause the MFBs to remain deenergized. Should the standby source fail, then power will be supplied to the MFBs from the startup source when energized from the Keowee Unit aligned to the overhead. The Retransfer to Startup timers are set such that the maximum time the MFBs will be de-energize is 33 seconds. This time is derived from the maximum allowable Keowee "start and accelerate to speed" time (23 seconds) and the Retransfer to Startup timers (10 seconds).

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSIS (continued)

The EPSL transfer functions are designed to perform their function assuming a worst case credible single failure. There are two independent Load Shed and Transfer to Standby channels and two independent Retransfer to Startup channels. Each channel is capable of performing the entire transfer function.

EPSL automatic transfer functions are part of the primary success path and functions to mitigate a DBA or transient that presents a challenge to the integrity of a fission product barrier. As such, EPSL automatic transfer functions satisfy the requirements of selection criterion 3 of the NRC interim policy statement (Ref. 1).

TS

Two channels of both the Load Shed and Transfer to Standby function and Retransfer to Startup function are required to be OPERABLE. Implicit in this is all relays, contacts, power supplies, timers, etc., which are necessary for the circuit to perform its intended safety function, are OPERABLE. The single MFB undervoltage relay for each MFB is required to be OPERABLE or in the safe (dropped out) position for the associated Load Shed and Transfer to Standby channel to be OPERABLE. With one channel of either function inoperable, the remaining channel can still completely perform the intended safety function. However, a subsequent single failure could disable the remaining channel from performing its safety function.

APPLICABILITY

The transfer functions of EPSL are required to be OPERABLE above COLD SHUTDOWN to ensure that power is provided from AC Sources to the AC Distribution system within the time assumed in the accident analyses.

The EPSL transfer function requirements during COLD SHUTDOWN and REFUELING SHUTDOWN are addressed in the Bases for TS 3.7.13 (AC Sources - Shutdown/High Decay Heat/Reduced Inventory) and TS 3.7.14 (AC Sources - Shutdown).

ACTIONS

A NOTE has been included in the ACTIONS to allow separate Condition entry for each inoperable Automatic Transfer Function. Thus, Completion Times are tracked separately for the Load Shed and Transfer to Standby function and for the Retransfer to Startup function.

A.1

In the event channel A of one or both EPSL Transfer functions or channel B of one or both EPSL transfer functions become inoperable, then the remaining channel is fully capable of providing all necessary transfer functions to ensure power is provided to the MFBs. A single failure of the remaining channel could cause the main feeder buses to remain deenergized until operator action is taken to restore power. Therefore, a period of 24 hours is allowed for restoration of any inoperable channel. The completion time is based on engineering judgement, taking into consideration the

(continued)

BASES (continued)

ACTIONS

A.1 (continued)

time required to complete the required action and the availability of the remaining channel.

Channel A and B provide redundant transfer functions. The retransfer to startup function of each channel is actuated by its associated channel of transfer to standby function (through the RX relay).

Additionally, each channel of transfer functions provide a permissive in its associated SK breaker (through the RX relay) to allow its automatic closure (i.e., channel A with SK1 channel B with SK2). Also, an S breaker can close automatically only when its associated bus is energized. If a channel of transfer to standby is inoperable then the associated RX relay may not be OPERABLE (depending on what portion of transfer to standby function is inoperable). This could keep the associated SK breaker from automatically closing and cause the associated retransfer to startup function to be inoperable. The remaining channel of transfer to standby function and retransfer to startup function needs to be OPERABLE to restore power during LOCA/LOOP events. The S breaker associated with the OPERABLE transfer channel also needs to be OPERABLE, since the other S breaker may not be capable of automatically closing due to its standby bus being deenergized (SK breaker not closed).

For these reasons, transfer functions of the same channel are allowed to be inoperable only when both functions of the other channel are OPERABLE and the other channel's associated S breaker is OPERABLE (i.e., channel A with S1 and channel B with S2).

B.1 and B.2

If the Required Actions and associated Completion Times cannot be met, the unit must be in HOT SHUTDOWN in 12 hours and COLD SHUTDOWN in the following 72 hours. These times allow for a controlled shutdown of one or all three Units without placing undue stress on plant operators or plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.3.1

See Bases for SR 3.7.1.9 (EPSL automatic transfer).

REFERENCES

1. 52FR3788, NRC Interim Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

2. 4160V Auxiliary Power System DBD,OSS-0254.00-00-2000.

B 3.7 ELECTRICAL POWER SYSTEMS

B 3.7.4 Emergency Power Switching Logic (EPSL) Voltage Sensing Circuits

BASES

BACKGROUND

The Emergency Power Switching Logic (EPSL) Voltage Sensing Circuits consist of the voltage sensing circuits for the Startup Source, Standby Bus #1, Standby Bus #2, and the Normal Source. These voltage sensing circuits provide input to the EPSL power seeking logic to actuate breakers and initiate transfer logic sequences. Each phase of each source has an individual potential transformer feeding a 2 out of 3 logic for determining the status of the power source. The voltage sensing circuits also provide class 1E trip signals to the breaker control circuitry for the N, E, and SL breakers.

APPLICABLE SAFETY ANALYSES

The Safety Analysis for the voltage sensing circuits of EPSL is contained in Chapter 8 and 15 of the FSAR. The EPSL system is designed to ensure power is supplied to the main feedwater buses (MFBs) during a design basis accident (DBA). In order for it to perform this function, the voltage sensing circuits for the Startup Source, Normal Source, Standby Bus #1, and Standby Bus #2 must be OPERABLE. These voltage sensing circuits provide input to the EPSL transfer functions. The transfer functions utilize the voltage sensing circuits to initiate breaker operations to ensure the MFBs are connected to an energized source (startup or standby).

EPSL voltage sensing circuits are part of the primary success path and function to mitigate a DBA or transient that presents a challenge to the integrity of a fission product barrier. As such, EPSL voltage sensing circuits satisfy the requirements of selection criterion 3 of the NRC interim policy statement (Ref. 1).

APPLICABILITY

The EPSL voltage sensing circuits are required to be OPERABLE above COLD SHUTDOWN to ensure that power is provided from AC Sources to the AC Distribution system within the time assumed in the accident analyses.

EPSL voltage sensing circuit requirements during COLD SHUTDOWN and REFUELING SHUTDOWN are addressed in the Bases for TS 3.7.13 (AC Sources - Shutdown/High Decay Heat/Reduced Inventory) and TS 3.7.14 (AC Sources - Shutdown).

(continued)

BASES (continued)

TS

Three circuits (one per phase) for each power bus (Normal, Startup, Standby Bus #1, Standby Bus #2) must be OPERABLE. In addition, the relays and contacts that provide the input and output of the 2 out of 3 logic must be OPERABLE. These circuits and associated logic ensure that no credible single failure can cause a loss of any function required by the voltage sensing circuits.

The TS has been modified by a NOTE which removes Normal Source voltage sensing requirements when both N breakers are open. The safety function of the Normal Source Voltage Sensing circuits is to provide a safety related trip signal to the N breakers. When the N breakers are open, the Normal source voltage Sensing Circuits do not perform a safety function and, therefore, need not be OPERABLE.

ACTIONS

A NOTE has been included in the ACTIONS to allow separate Condition entry for each inoperable Voltage Sensing Circuit. Thus, Completion Times are tracked separately for each power bus (Normal, Startup, Standby Bus #1, Standby Bus #2).

A.1

In the event one channel (phase) of the voltage sensing circuit becomes inoperable, the circuit will still perform its intended function. However, with one channel inoperable, the voltage sensing function is reduced to 2 out of 2 logic. A single failure could make the voltage sensing function inoperable. With a voltage sensing function inoperable, EPSL transfer functions or breaker trip circuitry could be disabled such that Operator action would be required to reenergize the MFBs during accident conditions. For this reason 24 hours is allowed for repair of any inoperable channel of the voltage sensing function. The completion time is based on engineering judgement taking into consideration the time required to complete the required action and the availability of the remaining channels.

Note that one voltage sensing channel for each AC bus may be inoperable at the same time without loss of the voltage sensing function for any bus.

B.1 and B.2

If the Required Actions and associated Completion Times cannot be met, the unit must be in HOT SHUTDOWN in 12 hours and COLD SHUTDOWN in the following 72 hours. These times allow for a controlled shutdown of one or all three Units without placing undue stress on plant operators or plant systems.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.7.4.1

This surveillance verifies operability of each sensing circuit of each bus which can supply the MFBs. A circuit is defined as three channels, one for each phase. Each channel consists of all components from the sensing power transformer on the actual buswork through the circuit auxiliary relays which operate contacts in the EPSL logic and breaker trip circuits. Actual setpoint values for the undervoltage relays on the N and E breakers are verified independently as a prerequisite to this SR. Minimum requirements consist of individual channel relay operation causing appropriate contact responses within associated loadshed/breaker circuits, alarm activations, and proper indications for the sensing circuit control power status. The frequency for this SR is reasonable based on operating experience and the need to remove the bus from service to perform required testing.

REFERENCES

1. 52FR3788, NRC Interim Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

2. 4160V Auxiliary Power System DBD, OSS-0254.00-00-2000.

B 3.7 ELECTRICAL POWER SYSTEMS

B 3.7.5 Emergency Power Switching Logic (EPSL) N and SL Breakers

BASES

BACKGROUND

The N breakers provide auxiliary power to the Unit main feeder buses (MFBs) from the normal source. While the unit is operating, this is the preferred source of power. The N breakers may also provide auxiliary power to the MFBs while the unit is in a shutdown condition. If the normal source of power is lost, the N breakers are required to trip open. This will permit power from an alternate source (startup or standby) to be connected to the MFBs.

The SL breakers are used to connect transformer CT-5 to the standby buses. This is required during special inoperability periods outlined in TS 3.7.1. This alignment must be performed manually. If power is lost on CT-5 while it is energizing the standby buses, then the SL breakers are required to open to allow CT-4 to energize the standby buses.

The two trip coils for each breaker are required to ensure both breakers will open. If the breakers are open then the requirements of TS 3.7.5 do not apply for the open breaker. Additionally, the circuit for trip coil #2 functions to provide the breaker failure logic and, therefore, must be functional whenever the affected breaker is closed. There are coil monitor circuits installed to indicate the operability status for each trip coil.

APPLICABLE SAFETY ANALYSES

The safety analysis for the requirements of EPSL is contained in Chapter 8 and 15 of the FSAR. The most severe Design Basis Accident for the electrical system is a LOCA with a Loss of Offsite Power (LOOP). For this transient, the N breakers must open on undervoltage to allow the emergency power sources to reenergize the MFBs. The N breaker alignment and control circuitry is designed such that no credible single failure can prevent power from being restored to at least one MFB. With power restored to one MFB, all ES equipment should operate to mitigate the accident.

If a LOCA/LOOP were to occur while the standby buses were energized from CT-5, the affected unit's MFBs should receive power from CT-5. In the event the CT-5 source is lost, the SL breakers must be able to open to allow the underground emergency power source (CT-4) to reenergize the standby buses. The trip coils and circuitry of the SL breakers allows the standby source to withstand a credible single failure while in this alignment. During normal plant operations, the SL breakers are normally open and this specification does not apply.

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSIS (continued)

EPSL N and SL breakers are part of the primary success path and function to mitigate a DBA or transient that presents a challenge to the integrity of a fission product barrier. As such, EPSL N and SL breakers satisfy the requirements of selection criterion 3 of the NRC interim policy statement (Ref. 1).

TS

The trip coils (two per breaker) must be OPERABLE if the breaker is closed. Also, all of the associated circuitry (within the breaker) which actuates the trip coils must be OPERABLE. If the breaker is open then the functions of the trip coils are not required. There is no automatic breaker closing logic for the N and SL breakers; therefore, trip coil operability for an open breaker is not a concern. Additionally, the circuit for trip coil #2 functions to provide the breaker failure logic and, therefore, is required to be OPERABLE whenever the affected breaker is closed.

APPLICABILITY

The EPSL N and SL breakers are required to be OPERABLE above COLD SHUTDOWN when the breakers are closed to ensure that power is provided from AC Sources to the AC Distribution system within the time assumed in the accident analyses. If the breaker is open then the functions of the trip coils are not required. There is no automatic breaker closing logic for the N and SL breakers; therefore, trip coil operability for an open breaker is not a concern.

The EPSL N and SL breaker requirements during COLD SHUTDOWN and REFUELING SHUTDOWN are addressed in the Bases for TS 3.7.13 (AC Sources - Shutdown/High Decay Heat/Reduced Inventory) and TS 3.7.14 (AC Sources - Shutdown).

ACTIONS

A NOTE has been included in the ACTIONS to allow separate Condition entry for each inoperable breaker. Thus, Completion Times are tracked separately for the N1, N2, SL1, and SL2 breaker.

A.1

With one trip coil inoperable a single failure could cause an N or SL breaker to not open. This could prevent the transfer to other available sources. Therefore, 24 hours is allowed for to repair the trip coil or open the breaker. The completion time is based on engineering judgement taking into consideration the time required to complete the required action and the availability of the remaining trip coil.

(continued)

BASES (continued)

ACTIONS (Continued)

B.1 and B.2

If the Required Actions and associated Completion Times cannot be met, the unit must be in HOT SHUTDOWN in 12 hours and COLD SHUTDOWN in the following 72 hours. These times allow for a controlled shutdown of one or all three Units without placing undue stress on plant operators or plant systems.

SURVEILLANCE REQUIREMENTS

S.R. 3.7.5.1

This surveillance is to verify operability of the trip functions of the SL and N breakers. Neither of these breakers have any automatic close functions; therefore, only the trip coils require verification. Cycling of each breaker demonstrates functional operability and the coil monitor circuits verify coil integrity. A Preventive Maintenance program verifies each coil will independently respond to a trip signal. The monthly frequency is based on operating experience.

REFERENCES

1. 52FR3788, NRC Interim Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

2. 4160V Auxiliary Power System DBD, OSS-0254.00-00-2000.

B 3.7 ELECTRICAL POWER SYSTEMS

B 3.7.6 Emergency Power Switching Logic (EPSL) Keowee Emergency Start Function

BASES

BACKGROUND

The Keowee Emergency Start function of EPSL provides a start signal to the two on-site emergency power sources and sets up logic and relaying for their use in the emergency mode. There are two independent channels of the Emergency Start function. Each channel is capable of starting both Keowee units and activating the logic for operating in the emergency mode.

The Emergency Start channels 1 and 2 are actuated from Engineered Safeguards channels 1 and 2 respectively. The Emergency Start channels can also be activated manually from the Oconee Control rooms or cable spread rooms. There are two independent channels associated with each Oconee unit.

APPLICABLE SAFETY

The safety analysis for EPSL and the emergency power system is contained in Chapter 8 and 15 of the FSAR. The most severe Design Basis Accident (DBA) for the ANALYSES emergency power system is a LOCA with a Loss of Offsite Power (LOOP). For this transient the Keowee Emergency Start function of EPSL must send a start signal to both Keowee units. Logic is also actuated that ensures separation of both Keowee units from the system grid. Alignment of the Keowee Unit connected to the overhead power path is allowed only after a separate logic sequence ("Switchyard Isolate Complete" which is not associated with the Keowee Emergency Start function) verifies the switchyard alignment is separated from the grid.

The Keowee Emergency Start function also disables non critical protective interlocks and trips associated with the Keowee generators. This is to help ensure the generators will remain available for emergency power despite minor failures or malfunctions.

The Keowee Emergency Start circuitry is designed such that no credible single failure can prevent an Emergency Start signal from reaching the Keowee units. Each channel is completely independent of the other and only one channel is required to perform the entire safety function.

EPSL Keowee Emergency Start Function is part of the primary success path and functions to mitigate a DBA or transient that presents a challenge to the integrity of a fission product barrier. As such, the EPSL Keowee Emergency Start Function satisfies the requirements of selection criterion 3 of the NRC interim policy statement (Ref.1).

(continued)

BASES (continued)

TS

Two channels of the Keowee Emergency Start function are required to be OPERABLE. This includes all relays, contacts, and logic that are required to Emergency Start the Keowee units, bypass specific protective interlocks and trips, and circuitry that separates the Keowee units from the grid (trips ACBs 1 and 2). Portions of the two channels affect the Oconee Units individually.

APPLICABILITY

The Keowee Emergency Start function of EPSL is required to be OPERABLE above COLD SHUTDOWN to ensure that power is provided from AC Sources to the AC Distribution system within the time assumed in the accident analyses.

The EPSL Keowee Emergency Start Function requirements during COLD SHUTDOWN and REFUELING SHUTDOWN are addressed in the Bases for TS 3.7.12 (AC Sources - Shutdown/High Decay Heat/Reduced Inventory) and TS 3.7.14 (AC Sources - Shutdown).

ACTIONS

A.1

In the event one channel of the Keowee Emergency Start function becomes inoperable, then a single failure of the other channel could prevent starting the Keowee units. For most scenarios, the Keowee Unit would still be emergency started by Operator action or automatically from non-class 1E circuitry. For this reason, 72 hours is allowed for restoration of one inoperable channel. The Completion Time is based on engineering judgement taking into consideration the time required to complete the required action and the availability of the remaining channel. In addition, the Completion Time is consistent with TS 3.7.1 for one inoperable power path.

B.1 and B.2

If the Required Actions and associated Completion Times cannot be met, the unit must be in HOT SHUTDOWN in 12 hours and COLD SHUTDOWN in the following 72 hours. These times allow for a controlled shutdown of one or all three Units without placing undue stress on plant operators or plant systems.

C.1

If both channels of the Keowee Emergency Start function become inoperable then both Keowee Hydro Units must be declared inoperable for the affected Oconee Unit(s). Appropriate required actions are specified in TS 3.7.1 (AC Sources - Operating).

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.7.6.1

See Bases for SR 3.7.1.8 (Keowee Emergency Start) and SR 3.7.1.9 (EPSL automatic transfer).

REFERENCES

1. 52FR3788, NRC Interim Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

2. 4160V Auxiliary Power System DBD, OSS-0254.00-00-2000.

3. Keowee Emergency Power System DBD, OSS-0254.00-00-2005.

B 3.7 ELECTRICAL POWER SYSTEMS

B 3.7.7 Emergency Power Switching Logic (EPSL) Degraded Grid Voltage Protection

BASES

BACKGROUND

Two independent levels of protection are provided to assure the degradation of voltage from offsite sources does not adversely impact the function of safety-related systems and components. The first level of protection is provided by the EPSL Degraded Grid Protection System (DGPS). The second level of protection is provided by undervoltage relaying on the E and N breakers (reference TS 3.7.4, EPSL Voltage Sensing Circuits) which protects from loss of voltage.

The DGPS, upon indication of inadequate voltage, will provide an alarm to the Unit 1 & 2 Control room and the Spartanburg Dispatcher. If any single engineered safeguards (ES) Channel 1 or 2 signal from any Unit is sensed by the DGPS, while the voltage is below acceptable levels, the DGPS will initiate an isolation of the 230kV switchyard Yellow Bus to ensure the onsite overhead emergency power path is available. Each DGPS actuation logic channel is capable of isolating the overhead emergency power path by a set of 94V relays and the associated switchyard PCB trip coil. The sets of actuating (94V) relays are common to the DGPS and the undervoltage part of another system called the External Grid Trouble Protection System (EGTPS). The isolation of the yellow bus is accomplished by opening switchyard PCBs 8, 12, 15, 17, 21, 24, 26, 28, and 33. While the DGPS relaying could result in the unavailability of the overhead emergency power path, it does ensure that the startup transformers are not connected to a degraded source of power. In this event, ES loads are provided adequate voltage from the standby buses. The EGTPS serves to protect from grid collapse.

Based on historical data, it is anticipated any degradation of the voltage in the 230kV switchyard will not last for an extended period of time. Administrative procedures are in place to assure timely actions are taken to restore the voltage.

There are three undervoltage relays installed to monitor the switchyard voltage, one on the line side of each of the three startup transformers. Each of the undervoltage relays is supplied by a single phase coupling-capacitor voltage transformer. The undervoltage relay contacts are arranged in a 2-out-of-3 logic sequence which feeds two redundant time delay (drop) relays. The time delay relays were added to prevent spurious actuations, but still provide adequate response time to voltage transients. Either of the two redundant time-delay relays will cause either of the two sets of actuating relays to initiate switchyard isolation. The DGPS voltage sensing may be considered OPERABLE when in a tripped condition. Circuit control power is fed from the 230kV Switchyard 125VDC system.

BASES (continued)

APPLICABLE SAFETY ANALYSES

The purpose of the DGPS is to ensure adequate voltage is available during an ES actuation concurrent with a 230kV switchyard voltage of less than 219kV.

Based on design calculations, 219kV is the minimum switchyard voltage that will ensure proper operation of loads during ES actuation without being subject to damage or protective relay actuation.

EPSL Degraded Grid Voltage Protection is part of the primary success path and functions to mitigate a DBA or transient that presents a challenge to the integrity of a fission product barrier. As such, EPSL Degraded Grid Voltage Protection satisfies the requirements of selection criterion 3 of the NRC interim policy statement (Ref. 1).

TS

Three startup transformer sensing relays are required to be OPERABLE. The loss of power to any Unit startup transformer deenergizes the associated sensing relay and satisfies part of the logic for system actuation. This reduces the logic to a 1-out-of-2 function; however, the tripped channel is considered to be OPERABLE since the affect is in the conservative direction. Loss of a second sensing relay will still have no effect on actuation except to satisfy the Degraded Grid permissive and leave only a single ES Channel 1 or 2 signal remaining to cause system actuation. Therefore, OPERABLE is defined as energized or tripped.

Both channels of Degraded Grid Voltage Protection Actuation Logic are required to be OPERABLE to ensure single failure criteria can be met while maintaining system function. The actuating 94V relays, which are shared with the voltage channels of the EGTPS and the associated switchyard PCB trip coils, are also considered part of the DGPS and are required to be OPERABLE. Therefore, loss of either 94V relay for the undervoltage channels also constitutes loss of one channel of DGPS. Similarly, loss of one required switchyard PCB trip coil constitutes loss of one channel of DGPS.

APPLICABILITY

The DGPS is required to be OPERABLE above COLD SHUTDOWN to ensure a reliable and adequate power available to ES systems. The DGPS is not required to be OPERABLE in COLD SHUTDOWN and REFUELING SHUTDOWN because undervoltage setpoints of the E and N breakers provide protection of required equipment and are addressed in TS 3.7.13 (AC Sources - Shutdown/High Decay Heat/Reduced Inventory) and TS 3.7.14 (AC Sources - Shutdown).

(continued)

BASES (continued)

ACTIONS

The Required Actions have been established based on the level of degradation of the DGPS.

A.1

A single voltage sensing relay inoperable (unable to trip) means the affected Unit must rely on the other Unit's sensing relays. The logic is also degraded to 2-out-of-2 versus 2-out-of-3. Failure of a second sensing relay to trip when required will render both channels inoperable. The 7 day completion time is based on engineering judgement taking into consideration the infrequency of actual Grid system voltage degradation, the probability of a simultaneous ES actuation, and the availability of other Unit's sensing relays.

B.1

In the event one channel of actuation logic is inoperable (unable to trip) then a single failure of the other channel to trip when required would remove protection from a Degraded Grid condition concurrent with ES actuation. The 7 day completion time to restore the inoperable channel is based on engineering judgement taking into consideration the infrequency of actual grid system degradation, the probability of a simultaneous ES actuation, and the availability of the OPERABLE channel.

C.1

If the Required Actions and associated Completion Times cannot be met for Conditions A or B, then the 230kV switchyard voltage shall be verified to be greater than or equal to the minimum voltage necessary to assure actuation of all ES loads ($\geq$ 219kV). The 2 hour frequency for monitoring 230kV switchyard voltage is based on engineering judgement taking into consideration the infrequency of actual grid system degradation, the probability of a simultaneous ES actuation, and the availability of the OPERABLE voltage sensing relay or actuation logic channel.

D.1 and D.2

Two or more voltage sensing relays inoperable removes Degraded Grid Protection from being available to the Station during ES actuation. Continued operation is allowed provided that the 230kV switchyard voltage is verified to be greater than or equal to the minimum voltage necessary to assure actuation of all ES loads ($\geq$ 219kV) every two hours, and within one hour one Keowee Hydro Unit is verified to energize two standby buses through the underground feeder. The loss of protection exposes any Unit to an inadequate power supply during a degraded grid situation concurrent with a LOCA on that Unit. The Completion Times are based on engineering judgement taking into consideration the infrequency of actual grid system degradation, and the probability of a simultaneous ES actuation.

BASES (continued)

ACTIONS (continued)

E.1

Both actuation logic channels inoperable removes Degraded Grid Protection from being available to the Station during ES actuation. If both DGPS actuation logic channels are inoperable as a result of inoperability of both channels of Switchyard Isolate, this also results in inoperability of the overhead emergency power path Continued operation is allowed provided that the 230kV switchyard voltage is verified to be greater than or equal to the minimum voltage necessary to assure actuation of all ES loads ($\geq$ 219kV) every two hours, and within one hour one Keowee Hydro Unit is verified to energize two standby buses through the underground feeder. The loss of protection exposes any Unit to an inadequate power supply during a degraded grid situation concurrent with a LOCA on that Unit. The Completion Times are based on engineering judgement taking into consideration the infrequency of actual grid system degradation, and the probability of a simultaneous ES actuation.

F.1 and F.2

If the Required Actions and associated Completion Times cannot be met, the unit must be in HOT SHUTDOWN in 12 hours and COLD SHUTDOWN in 84 hours. These times allow for a controlled shutdown of one or all three Units without placing undue stress on plant operators or plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.7.1

This surveillance verifies the logic of the DGPS. Test circuitry is used to demonstrate that when any 2 of 3 Startup transformers indicate degraded source voltage with any Unit ES Channel 1 or 2 signal present, the actuation logic is satisfied. System continuity through the relays is verified by the installed monitoring circuitry. the Refueling frequency for this Surveillance was determined to be adequate based on operating experience to provide reliability verification without excessive equipment cycling for testing.

REFERENCES

1. 52FR3788, NRC Interim Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

2. 230kV Switchyard Power System DBD, OSS-0254.00-00-2004.

B 3.7 ELECTRICAL POWER SYSTEMS

B 3.7.8 Emergency Power Switching Logic (EPSL)
CT-5 Degraded Grid Voltage Protection

BASES

BACKGROUND

Two levels of protection are provided for the standby buses to assure that degradation of voltage from the 100kV transmission system through the Central Switchyard does not adversely impact the function of safety related systems and components. The first level of protection is provided by the EPSL CT-5 Degraded Grid Protection System. The second level of protection is provided by undervoltage relaying on the standby buses (reference TS 3.7.4, EPSL Voltage Sensing Circuits) which protects from loss of voltage.

APPLICABLE SAFETY ANALYSES

The purpose of the CT-5 Degraded Grid Protection System is to ensure adequate voltage is available during a ES actuation concurrent with a loss of offsite power (LOOP) or degraded voltage from the 230 kV switchyard.

Based on design calculations, 93.23% is the minimum switchyard voltage that will ensure proper operation of loads during ES actuation without being subject to damage or protective relay actuation.

This system is only required when any Oconee Unit is above COLD SHUTDOWN and the Standby Buses are supplied by Central Switchyard. System design is to provide protection for ES components caused by voltage droop due to inrush as the ES unit ties to the Standby Buses. The system is not a substitute for the dedicated line from Lee Gas Turbines used per TS 3.7.1 Conditions E, F, or G. The Lee Feeder breakers (SL) have no automatic close functions. However, this system does provide additional flexibility for the Station electrical system and operators in available power source options.

When the standby buses are powered from the 100kV transmission system through the Central Switchyard, the EPSL CT-5 Degraded Grid Voltage Protection is part of the primary success path and functions to mitigate a DBA or transient that presents a challenge to the integrity of a fission product barrier. As such, EPSL CT-5 Degraded Grid Voltage Protection satisfies the requirements of selection criterion 3 of the NRC interim policy statement (Reference 1).

TS

All three of the undervoltage sensing relays (27CT5/A, B, C) are required as a common input device to both channels of actuating logic. In addition to the three phase undervoltage sensing relays, each channel requires one time-delay relay, one auxiliary relay, and one associated single phase undervoltage sensing relay

(continued)

BASES (continued)

TS (continued)

(27SL1 or 2). Each channel trip signal passes through a selector switch, which either allows or inhibits the trip signal, to actuate one trip coil in each SL breaker. Inoperability of any voltage sensing relay is defined as unable to trip. This condition reduces the logic for the given channel to a 2 of 2 logic for the 27CT5/A, B, C configuration. Loss of the 27SL1 or 2 relay makes the affected channel inoperable. Loss of two or more voltage sensing relays results in inoperability of both channels of actuation logic.

APPLICABILITY

This system is required when the Standby Buses are energized by Central Switchyard and any Unit is above COLD SHUTDOWN. This ensures adequate voltage protection should an ES Unit be transferred to the Standby Bus during an event and coincides with requirements for ES and other support/protective systems used to ensure adequate power is available for core and containment protection.

ACTIONS

The Required Actions have been established based on the level of degradation of the Degraded Grid Protection System.

A.1

Any one phase A, B, or C undervoltage relay inoperable reduces the logic of both channels to 2/2 requirement, however both channels can still perform the intended function. The 7 day completion time is based on engineering judgement taking into consideration the remaining OPERABLE undervoltage relays, the availability of the 230kV switchyard, the infrequency of actual Grid system voltage degradation, and the probability of a simultaneous ES actuation and loss of the 230kV switchyard.

B.1

In the event one channel of actuation logic is inoperable then a single failure of the other channel would remove protection from a degraded grid condition at the Central Switchyard concurrent with ES actuation and loss of the 230kV switchyard. The 7 day completion time is based on engineering judgement taking into consideration the remaining OPERABLE channel of actuation logic, the availability of the 230kV switchyard, the infrequency of actual Grid system voltage degradation, and the probability of a simultaneous ES actuation and loss of the 230kV switchyard.

C.1

When both actuation logic channels are inoperable, there is no automatic protection from degraded grid voltage for the standby buses powered from the 100kV transmission system through the Central Switchyard. EPSL response from ES events could be inhibited by Standby Bus voltage being allowed low enough to cause

(continued)

BASES (continued)

ACTIONS

C.1 (continued)

equipment damage, but not low enough for the EPSL standby bus undervoltage relays to cause breaker operation. Therefore, the standby buses must be separated from the 100kV transmission system within 1 hour. This is accomplished by either opening both SL breakers, or by energizing both standby buses by a Lee gas turbine. If the standby buses are energized by a Lee gas turbine, the 100kV transmission circuit must be electrically separated from the system grid and all offsite loads. This arrangement provides a high degree of reliability for the emergency power system. The one hour Completion Time is based on engineering judgement taking into consideration the availability of the 230kV switchyard, the infrequency of actual grid system voltage degradation, the probability of simultaneous ES actuation and loss of the 230kV switchyard, and the time to complete the Required Action.

SURVEILLANCE REQUIREMENTS

SR 3.7.8.1

This surveillance verifies the logic of the EPSL CT-5 Degraded Grid Protection system. Test circuitry is used to demonstrate when any 2 of 3 voltage sensing relays indicate degraded voltage, the actuation logic is satisfied. System continuity through the relays is verified by the installed monitoring circuitry. Timer set-points are also verified during this test. The Refueling frequency for this Surveillance was determined to be adequate based on operating experience to provide reliability verification without excessive equipment cycling for testing.

REFERENCES

1. 52FR3788, NRC Interim Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

2. Lee Emergency Power DBD, OSS-0254.00-00-2004

B 3.7 ELECTRICAL POWER SYSTEMS

3.7.9 Vital I&C DC Sources And Distribution-Operating

BASES

BACKGROUND

The 125VDC Vital Instrumentation and Control (I&C) System consists of 125VDC battery sources and a distribution system as described below. It provides control power for the Emergency Power System. It also provides both motive and control power to selected safety-related and non-safety equipment. It is designed to have sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure.

Sources:
For each unit, two independent and physically separated 125VDC batteries and buses are provided for the 125VDC Vital I&C System. The DC buses are two conductor metal-clad distribution center assemblies. Three battery chargers are supplied for each unit, with two serving as normal supplies to the bus sections with the associated 125VDC battery floating on the bus. The batteries supply the load without interruption should the battery chargers or the AC source fail. Each of the three battery chargers is supplied from a separate 600 volt AC engineered safeguards motor control center. One of these three battery chargers serves as a standby battery charger and is provided for servicing and to back up the normal chargers. A bus tie with normally open breakers is provided between each pair of DC bus sections to "back up" a battery when it is removed for servicing. When the distribution centers are cross tied, the batteries and chargers on that Unit are considered to be a single source. One battery can supply both distribution centers and their associated panelboard loads.

During normal operation, the vital I&C 125VDC loads are powered from the battery chargers with the batteries floating on the system. Upon loss of AC power to the chargers, each unit's DC system has adequate stored capacity (ampere-hour) to independently supply required Emergency Loads for at least one hour. One hour is considered adequate, due to the high probability of restoring power to the charger within this time. The loss of all AC power to the DC system is expected to occur very infrequently and for short periods of time. Each battery charger has adequate 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 to its fully charged state while supplying normal steady state loads.

Distribution:
Four separate 125VDC Vital I&C Panelboards (DIA, DIB, DIC, DID), are provided for each unit. Each panelboard receives its DC power through an auctioneering network of two isolating diode assemblies. One assembly is supplied from the unit's 125 volt distribution system, and the other assembly is supplied from another unit's (the backup unit) 125VDC Vital Distribution System. The diode assemblies permit the two distribution systems to supply current to the Vital I&C DC Panelboard

(continued)

BASES (continued)

BACKGROUND

Distribution: (continued)
connected to the output of the diode assemblies, and block the flow of current from one DC distribution system to the other.

In order to provide all safety functions required during an accident, power must be provided from any three of the four Vital I&C DC Panelboards. During normal operation, the auctioneering network described above provides multiple redundancy for assuring that power from the 125VDC Vital I&C Sources would be provided to the Vital I&C DC Panelboards. Therefore, power from any three of the four Vital I&C DC Sources for a particular unit (two for the unit considered, and two from the backup unit) continues to provide redundancy of power sources for safety functions performed by the Vital DC I&C Panelboards.

Ground Detection:
The ungrounded DC system has detectors and alarms to indicate when there is a ground existing on any leg of the system. A ground on one leg of the DC system will not cause any equipment to malfunction. In order to find and correct a DC ground on the 125VDC I&C System, each unit's DC system must be separated from the other two units. With the backup function disabled, the unit would be in a degraded mode, but would in fact have all of its own DC system available if needed. Each unit's batteries (either CA or CB) is capable of carrying all the 125VDC instrumentation and control loads on that unit.

Inter-unit Dependencies:
Unit 1 panelboards 1DIC and 1DID provide primary and backup power for SK and SL breakers control power, standby bus protective relaying control power, standby breakers control power for all three Units, and retransfer-to-startup source switching circuits for all three Oconee Unit's Emergency Power Switching Logic Systems. All other safety related functions supported by the Vital 125VDC Panelboard are unit specific.

APPLICABLE SAFETY ANALYSES

The initial conditions of design basis transient and accident analyses in FSAR Chapter 6 (Engineered Safeguards) and Chapter 15 (Accident Analyses) include the assumption that all Engineered Safety Features are OPERABLE. The operability requirements of the 125VDC Vital I&C System are consistent with these assumptions, and are based upon meeting the design basis of the plant.

For an accident concurrent with a loss of all offsite power assuming a worst case single failure, the 125VDC Vital I&C System provides power to components which

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES (continued)

function to maintain OPERABLE:

a. at least one of the onsite (or offsite power sources, if available),

b. two ES power system strings,

c. at least three inverters for the Vital AC Distribution System, described in TS 3.7.11.

The 125VDC Vital I&C System provides emergency DC electrical power for control and switching of the Emergency Power System, as well as DC power for other safety functions. It is part of the primary success path, functions to mitigate design basis accidents, and so meets selection criterion 3 of the NRC Interim Policy Statement (Reference 1).

TS

For unrestricted operation, the four 125VDC I&C Panelboards (DIA, DIB, DIC, & DID) shall be OPERABLE. A panelboard is considered OPERABLE when it is energized from an OPERABLE source. In addition, no single source may be the only OPERABLE source of power to more than one panelboard.

Because power from any three of the four panelboards DIA, DIB, DIC, or DID would support all safety functions associated with the panelboards, these requirements ensure that the supported safety functions are not vulnerable to a single failure.

Panelboards 1DIC and 1DID affect all three Units since these panelboards provide primary and backup power for SK and SL breakers control power, standby bus protective relaying control power, standby breaker control power for all three Units and retransfer to startup source for all three Units.

A DC source is generally considered OPERABLE when TS 3.7.12 does not require the battery to be declared inoperable, and the battery bank and charger are connected to their associated bus and operating. For unrestricted operation, the following Vital I&C DC Sources shall be OPERABLE:

For operation of two or three Units, a total of five 125 VDC Vital Batteries, with associated chargers and distribution centers. Four 125 VDC Vital batteries are adequate to ensure adequate capacity and voltage for the DC loads. Five batteries are required for single failure from a station DC loading perspective.

For a particular unit being considered, in association with its backup unit, a total of three of the four 125VDC Vital Batteries and associated chargers and distribution centers, including interconnections through their associated

(continued)

BASES (continued)

TS (continued)

auctioneering diodes, as follows:

Unit 1: 1CA, 1CB, 2CA, 2CB
Unit 2: 2CA, 2CB, 3CA, 3CB
Unit 3: 3CA, 3CB, 1CA, 1CB

In each case, one Vital I&C 125VDC Source associated with the unit being considered must be included. These requirements ensure that, for each operating unit, at least three Vital DC Panelboards will receive power, with adequate voltage, after sustaining any single failure in the Vital I&C DC Sources and Distribution System.

APPLICABILITY

The 125VDC Vital I&C System is required to be OPERABLE above COLD SHUTDOWN to support functions of the Engineered Safeguards System, the Reactor Protective System, the Emergency Power Switching Logic, and certain other safety functions.

Vital I&C DC Sources and Distribution requirements during COLD SHUTDOWN and REFUELING SHUTDOWN are addressed in the Bases for TS 3.7.17 (Vital I&C DC Sources and Distribution - Shutdown/High Decay Heat/Reduced Inventory) and TS 3.7.18 (Vital I&C DC Sources and Distribution - Shutdown).

ACTIONS

The required actions have been established and based on the extent of degradation of the 125VDC Vital I&C System.

A.1

With one panelboard inoperable, the three remaining panelboards will continue to provide power for all safety functions supported by Vital I&C DC. Failure of one of the three remaining panelboards could result in failure to support required ES functions or Unit trip.

An inoperable panelboard shall be restored to OPERABLE status within 24 hours. This conservative requirement assures continued redundancy in the 125VDC Vital I&C Distribution System, and recognizes the importance of the multiple functions supported by the panelboards.

B.1

Inoperability of some of the Auctioneering Diode Panels (ADA1, ADA2, ADB1, ADB2, ADC1, ADC2, ADD1, ADD2), or a combination of inoperability of 125VDC Vital I&C Sources and auctioneering diode panels, could cause a single source to become the only battery power supply for more than one 125VDC Vital I&C Panelboard. In this condition, a single failure of that battery (or its associated

(continued)

BASES (continued)

ACTIONS

B.1 (continued)

equipment) could cause loss of more than one panelboard during an accident, so that required safety functions might not be supported. Specifically, if a single source were providing the only power source for panelboards DIA and DIB, single failure of the source would result in failure of both ES digital channels. Vulnerability of the ES digital channels to single failure for 24 hours is considered acceptable due to the limited scope of potential failures. Similarly, if the panelboards are isolated from their backup Unit (e.g., the Unit's DC system is isolated from the other Units), a single failure could result in loss of two or more panelboards so that required safety functions may not be supported. If the panelboards are isolated from their backup Unit when one of that Unit's batteries are inoperable (and the DC buses are cross tied), the remaining battery has the capacity to support all required loads, however a single failure could result in loss of all four panelboards so that required safety functions may not be supported. Therefore, within 24 hours after such a condition arises, affected equipment shall be restored and aligned such that no single source is the only battery power supply for more than one 125VDC Vital I&C Panelboard for the unit under consideration. The 24 hour completion time is based on engineering judgement taking into consideration the time to complete the Required Action and the redundancy available in the Vital I&C DC System.

C.1 and D.1

Conditions C and D can apply to one Unit or to two Units simultaneously. Specifically, if the Unit specific DC source requirements are not met due to the inoperability of one required DC source, Condition C or D would apply to that Unit. In addition, this could result in failure to meet the "fifth" source requirement of TS 3.7.9 for the station, or failure to meet the Unit specific requirements for another Unit. For example, if all three Units are above COLD SHUTDOWN, battery 1CA is inoperable, and battery 3CB was on equalizing charge after the service test, two Units would be required to shutdown per Condition E if 3CB (or 1CA) was not restored within 72 hours. With one of the required 125VDC Vital I&C Sources inoperable, the remaining sources are fully capable of providing adequate voltage to all 12 plant DC panelboards. In addition with one of the required DC sources inoperable, the remaining sources will assure alignment of power to at least three panelboards for the affected Unit. Three panelboards are necessary to shut down the operating unit and maintain it in a safe shutdown condition, assuming no single failure. However, overall reliability is reduced because a single failure in the remaining DC sources or one of the operating 125VDC Vital I&C Panelboards could result in the minimum required ES functions not being supported. Therefore, the inoperable source must be restored to OPERABLE status within 24 hours. A required battery may be inoperable for a period of 72 hours to perform equalizer charge following the performance test or service test (SR 3.7.9.3).

The completion times for actions in this TS are based on engineering judgment, taking into consideration the extent of degradation involved, the likelihood of events or failures which could challenge the system, and the time required to complete the required actions.

(continued)

BASES (continued)

ACTIONS (continued)

E.1 and E.2

If the Required Actions and associated Completion Times cannot be met, the affected unit(s) must be in HOT SHUTDOWN in 12 hours and COLD SHUTDOWN in the following 72 hours. These times allow for a controlled shutdown of one or all three units without placing undue stress on plant operators or plant systems.

F.1

With 1DIC inoperable or 1DID inoperable, single failure of the remaining panelboard would result in failure of control power for the S, SK, and SL breakers, standby bus protective relaying, and retransfer to startup logic for all three Units. Therefore, within 24 hours after such a condition arises, the inoperable panelboard shall be restored. The completion time is based on engineering judgement taking into consideration the time to complete the required action and the redundancy available in the Vital I&C DC System.

A NOTE has been included to clarify that Condition F applies concurrently to Units 2, and 3. Condition A applies to Unit 1. It is acceptable for Units 2 and 3 to be in Conditions B and G simultaneously since the 1DIC and 1DID are not redundant to any Unit 2 or Unit 3 panelboards.

G.1

Inoperability of some of the auctioneering diode panels (1ADC1, 1ADC2, 1ADD1, and 1ADD2) or a combination of 125 VDC Vital I&C sources and auctioneering diode panels could cause a single source to become the only battery power supply for DC panelboards 1DIC and 1DID. This condition would impact all three Units since these panelboards provide primary and backup control power for the SK and SL breaker control power, standby bus protective relaying, standby breaker control power for all three Units, and retransfer to startup logic for all three Units. In this condition, a single failure of that battery (or its associated equipment) could cause loss of both panelboards, so that required automatic EPSL functions for all three units might not be supported. Therefore, within 24 hours after such a condition arises, affected equipment shall be restored and aligned such that no single source is the only battery power supply for both DC panelboards 1DIC and 1DID. The completion time is based on engineering judgement taking into consideration the time to complete the required action and the redundancy available in the Vital I&C DC System.

A NOTE has been included to clarify that Condition G applies concurrently to Units 2, and 3. Condition B applies to Unit 1. It is acceptable for Units 2 and 3 to be in Conditions B and G simultaneously since the 1DIC and 1DID are not redundant to any Unit 2 or Unit 3 panelboards.

(continued)

BASES (continued)

ACTIONS

H.1 and H.2

If the Required Actions and associated Completion Times for Conditions F or G cannot be met, all three Units must be in HOT SHUTDOWN in 12 hours and COLD SHUTDOWN in the following 72 hours. These times allow for a controlled shutdown of all three units without placing undue stress on plant operators or plant systems.

A NOTE has been included to clarify that Condition H applies concurrently to Units 2, and 3. Condition E applies to Unit 1. It is acceptable for Units 2 and 3 to be in Conditions E and H simultaneously since the 1DIC and 1DID are not redundant to any Unit 2 or Unit 3 panelboards.

SURVEILLANCE REQUIREMENTS

SR 3.7.9.1

Verifying battery voltage while on float charge helps ensure the effectiveness of the charging system and the ability of the battery to perform its intended function. Float charge is the condition where the charger is supplying continuous charge required to overcome the internal losses of the battery and maintain the battery in a fully charged state. The weekly frequency is consistent with manufacturers' recommendations and IEEE 450 (Ref. 2). The frequency is based on engineering judgement and industry-accepted practice considering the unit conditions required to perform the test, the ease of performing the test and the likelihood of a change in system or component status.

SR 3.7.9.2

Measuring peak inverse voltage capability of each auctioneering diode ensures the diodes are capable of isolating a fault on one source from the other source. The 6 month frequency is based on engineering judgement and operating experience.

SR 3.7.9.3

The battery service test, in accordance with IEEE-450 (Ref. 2), demonstrates the capability of the battery to meet the system analyzed response requirements. Reference 3 provides the load requirements for the 125VDC I&C Batteries. The annual frequency is based on engineering judgement and industry-accepted practice considering the unit conditions required to perform the test, the ease of performing the test and the likelihood of a change in system or component status.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.9.4

Visual inspection of battery cells, end cell plates, and battery racks provide an indication of physical damage or abnormal deterioration which could potentially degrade battery performance. The annual frequency is based on engineering judgement and operational experience and is sufficient to detect battery degradation on a long-term basis when it is properly coupled with other surveillances more frequently performed to detect abnormalities.

SR 3.7.9.5

Verification of cell to cell connection cleanliness, tightness, and proper coating with anti-corrosion grease provides an indication of any abnormal condition, and assures continued operability of the battery. The annual frequency is based on engineering judgement and operational experience and is sufficient to detect cell connection degradation when it is properly coupled with other surveillances more frequently performed to detect abnormalities.

REFERENCES

1. 52FR3788, NRC Interim Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors, February 6, 1987.

2. IEEE450-1980, IEEE Recommended Practice for Maintenance Testing and Replacement of Large Lead Storage Batteries for Generating Stations and Substations.

3. DBD,OSS-0254.00-00-2006 125VDC Vital I&C System.

B 3.7 ELECTRICAL POWER SYSTEMS

B 3.7.10 230kV Switchyard DC Sources and Distribution

BASES

BACKGROUND

The 230kV Switchyard (SY) 125VDC System consists of 125VDC battery sources and a distribution system as described below. It provides primary and backup DC power for protective relaying and actuation circuits associated with the 230kV SY, as well as DC control power for 230kV SY power circuit breaker (PCB) operation. It is designed to have sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure.

Safety functions provided by the 230kV SY 125VDC System include:

a) connection of on-site power from Keowee to Oconee via the emergency onsite overhead power path, and

b) isolation of Oconee (including Keowee) from degraded grid voltage through action of the Degraded Grid Protection System (DGPS).

With the exception of the functions of the DGPS, all functions of the 230kV Switchyard DC Sources and Distribution System can be considered redundant to those associated with the emergency onsite underground power path.

Sources:
There are two 125VDC batteries (SY-1; SY-2) in the 230kV SY Relay House, each with an associated battery charger. A spare charger, which can be connected to either battery, is also provided. These components, along with their interconnecting wiring and breakers, comprise the two 125VDC Sources for the 230kV SY.

Each 125VDC Source has stored capacity sufficient to supply required emergency loads for at least one hour. A one hour minimum capacity is considered adequate, due to the high probability of restoring power to the charger within this time. Each charger has power output capacity sufficient for steady-state operation of connected loads during normal operation, while simultaneously maintaining or restoring the associated battery bank to a fully charged condition.

Distribution:
The output of 230kV SY 125VDC Sources SY-1 and SY-2 are connected to Distribution Centers SY-DC-1 and SY-DC-2, respectively. The buses are metal-clad two conductor assemblies. A bus tie with normally open breakers is provided between the distribution centers to "backup" a battery when it is removed for

(continued)

BASES (continued)

BACKGROUND (continued)

servicing. SY-DC-1 supplies DC Panelboards DYA, DYB, DYC, and DYD; SY-DC-2 supplies DC Panelboards DYE, DYF, DYG, and DYH. DC Panelboards DYD and DYH provide power for non-safety functions, and are not directly subject to the Technical Specifications. Distribution Centers SY-DC-1 and SY-DC-2 with their associated safety-related DC panelboards and interconnecting wiring and breakers comprise the 230kV SY DC Distribution System.

The two distribution centers are redundant, each providing power to all components necessary for performing the safety functions of the 230kV SY DC System. DC Panelboard DYA is redundant to DYE; DYB is redundant to DYF, and DYC is redundant to DYG. Thus, the failure of any single component in the 230kV SY DC Distribution System, or in their associated 125VDC Sources, will not prevent any safety function from being performed. The redundant panelboards supply power to separate channels of the Degraded Grid Protection System (DGPS) circuits, separate channels of other protective relaying circuits, and separate feeds for each 230kV SY PCB's closing and tripping control. Separate dual trip coils are provided for each PCB. Isolating diodes are provided for redundant power feeds to each PCB's common closing coil circuit.

Ground Detection:
The ungrounded DC system has detectors and alarms to indicate when there is a ground existing on any leg of the system. A single ground will not cause any malfunction or prevent operation of any safety function.

APPLICABLE SAFETY ANALYSES

The initial conditions of design basis transient and accident analyses in FSAR Chapter 6 (Engineered Safeguards) and Chapter 15 (Accident Analyses) include the assumption that all Engineered Safety Features are OPERABLE, that two onsite emergency power paths are available, that offsite power is initially available, and that loss or degradation of offsite power will not prevent operation of safety systems. The operability requirements of the 230kV SY DC Sources and Distribution System are consistent with these assumptions, and are based upon meeting the design basis of the plant.

For an ES actuation concurrent with a loss or degradation of offsite AC power, assuming a worst case single failure, the 230kV DC SY Sources and Distribution System provides power to components and protective systems which function to:

a. maintain OPERABLE at least one of the onsite power sources, and

b. separate Oconee and the onsite power sources from the electrical system grid, should grid voltage be lost or degraded.

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES

The 230kV SY 125VDC Sources and Distribution System provides emergency DC electrical power for protection circuits, actuation circuits, and breaker operation associated with the onsite power sources. It is part of the primary success path, functions to mitigate design basis accidents, and so meets selection criterion 3 the NRC Interim Policy Statement (Ref.1).

TS

For unrestricted operation, the two 230kV SY DC Distribution Centers (SY-DC-1; SY-DC-2), and their associated safety related panelboards (DYA, DYB, DYC; DYE, DYF, DYG) shall be OPERABLE. For a distribution center and its associated safety related panelboards to be considered OPERABLE, they must be energized from an OPERABLE source.

For unrestricted operation, two 230kV SY 125VDC Sources shall be OPERABLE. A DC source is generally considered OPERABLE when TS 3.7.12 does not require the battery to be declared inoperable, and the battery bank and charger are connected to their associated bus and operating.

APPLICABILITY

The 230kV SY 125VDC System is required to be OPERABLE above COLD SHUTDOWN to ensure continued operability of the overhead power path, and to provide protection of the safety related portion of the 230kV SY from potential degradation of voltage on the electrical power grid.

During an accident, with or without loss of offsite power, unless an extended degradation of voltage from offsite power occurred, all requirements would be met without operation the 230kV SY DC Sources and Distribution System. With extended partial degradation of the offsite power voltage, operation of the DGPS, which is supported by the 230kV SY 125VDC System, would be required.

The 230kV SY 125VDC System is not required to be OPERABLE for degraded grid protection in COLD SHUTDOWN and REFUELING SHUTDOWN because the undervoltage setpoints of the E and N breakers provide protection of required equipment. Requirements for support of the overhead path and for E and N breaker undervoltage protection are addressed in TS 3.7.13 (AC Sources - Shutdown/High Decay Heat/Reduced Inventory) and TS 3.7.14 (AC Sources - Shutdown).

ACTIONS

The required actions have been established and based on the extent of degradation of the 230kV SY 125VDC System.

(continued)

BASES (continued)

ACTIONS (continued) A.1

If a 230kV SY DC Distribution Center (SY-DC-1; SY-DC-2) is inoperable, the inoperable distribution center shall be restored to OPERABLE status within 24 hours. This requirement assures continued redundancy in the 125VDC Vital I&C Distribution System. Loss of the remaining distribution center or a redundant panelboard could result in failure of the overhead emergency power path. In addition, in the event of grid degradation, the station and onsite emergency power sources could fail to separate from the grid.

Similarly, if any required panelboard or combination of panelboards which are not redundant to each other is inoperable, the required panelboard(s) shall be restored to OPERABLE status within 24 hours. This requirement assures continued redundancy in the 125VDC Vital I&C Distribution System. Loss of the remaining distribution center or a redundant panelboard could result in failure of the overhead emergency power path. In addition, in the event of grid degradation, the station and onsite emergency power sources could fail to separate from the grid.

The 24 hour completion time is based on engineering judgement taking into consideration the time to complete the required action, the redundancy available in the 230kV SY DC system, the redundancy available in the emergency power paths, and the infrequency of an actual grid system degradation.

B.1 and C.1

With one of the required 230kV SY DC Sources inoperable, the remaining source is fully capable of providing adequate voltage to all connected panelboards, assuming no single failure. In addition, with one of the required DC sources inoperable, the remaining source is fully capable of powering the necessary panelboards, assuming no single failure. However, overall reliability is reduced because of the potential for a single failure in the remaining DC source or in a redundant panelboard. Loss of the remaining DC source or redundant panelboard could result in failure of the overhead emergency power path. In addition, in the event of grid degradation the station and onsite emergency power sources could fail to separate from the grid. Therefore, the inoperable source must be restored to OPERABLE status within 24 hours. A required battery may be inoperable for a period of 72 hours to perform equalizer charge following the performance test or service test (SR 3.7.9.3).

The completion times for actions in this TS are based on engineering judgment, taking into consideration the extent of degradation involved, the likelihood of events or failures which could challenge the system, and the time required to complete the required actions.

(continued)

BASES (continued)

ACTIONS (continued)

D.1 and D.2

If the Required Actions and associated Completion Times cannot be met, the affected Oconee unit(s) must be in HOT SHUTDOWN in 12 hours and COLD SHUTDOWN in the following 72 hours. These times allow for a controlled shutdown of one or all three units without placing undue stress on plant operators or plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.10.1

SRs 3.7.9.1, 3.7.9.3, 3.7.9.4, and 3.7.9.5, which are specified for the Vital I&C Sources and Distribution System, are also performed for the 230kV SY 125VDC Sources and Distribution System. Omitted SRs from 3.7.9 are not applicable to the 230kV SY 125VDC Sources and Distribution System. Reference 3 provides the load requirements for the 230kV SY 125VDC Batteries.

REFERENCES

1. 52FR3788, NRC Interim Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors, February 6, 1987

2. IEEE450-1980, IEEE Recommended Practice for Maintenance, Testing and Replacement of Large Lead Storage Batteries for Generating Stations and Substations.

3. Duke Design Engineering Calculation OSC-661,230kV Switchyard Battery.

10. DBD,OSS-0254.00-00-2009, 230kV SY 125 VDC Power System.

B 3.7 ELECTRICAL POWER SYSTEMS

B 3.7.11 AC Vital Distribution - Operating

BASES

BACKGROUND	The AC Vital Distribution System is comprised of four redundant 120VAC vital instrument power panelboards for each unit which provide power to associated vital instrumentation and control loads under all operating conditions. Each panelboard is powered separately from a static inverter connected to one of the four 125VDC instrumentation and control panelboards. In order to accommodate maintenance on the inverters and supply backup power, a tie with breakers is provided to each of the 120VAC vital panelboards from the alternate 120VAC regulated bus. Each of the four redundant channels of Nuclear Instrumentation and Reactor Protective System (RPS) equipment on each unit is powered from a separate 120VAC vital panelboard. Separate 120VAC panelboards also supply each of the three redundant Engineered Safeguards (ES) system analog channels and each of the two redundant ES digital channels for each unit.
APPLICABLE SAFETY	The safety analysis for the 120VAC Vital Distribution system is contained in Chapters 8 and 15 of the FSAR. All Engineered Safety Features (ESF) systems, which are powered by ANALYSES panelboards KVIA, KVIB, KVIC, and KVID, are assumed to be OPERABLE in the initial conditions of FSAR Chapter 6, (Engineered Safeguards), and 15, (Accident Analyses). AC Vital Distribution is part of the primary success path and functions to mitigate a DBA or transient that presents a challenge to the integrity of a fission product barrier. As such, AC Vital Distribution satisfies the requirements of selection criterion 3 of the NRC interim policy statement (Ref.1).
TS	All four 120VAC vital instrumentation power panelboards (KVIA, KVIB, KVIC, and KVID) are required to be OPERABLE along with their associated static inverters. Implicit in this is that all breakers and connecting hardware that are necessary for the circuit to perform its intended function are OPERABLE.
APPLICABILITY	The 120VAC Vital Distribution system is required to be OPERABLE above COLD SHUTDOWN to assure that power is supplied to the ES and RPS systems. 120VAC Vital Distribution system requirements during COLD SHUTDOWN and REFUELING SHUTDOWN are addressed by the separate TS on nuclear instrumentation.

(continued)

BASES (continued)

ACTIONS

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

In the event that panelboard KVIA or KVIB is inoperable due to an inoperable inverter, a period of 4 hours is allowed to connect the panelboard to the KRA regulated panelboard. The digital ES channels are powered from KVIA and KVIB, and cannot actuate without power. The 4 hour completion time is based on engineering judgement taking into consideration the time to complete the required action, the operability of redundant panelboards, and the low likelihood of an event requiring ES actuation.

Powering KVIA or KVIB from KRA will ensure non-load shed power is available in the event of an accident. However, KRA is non-safety and not battery backed and could impact timing assumptions for ESF equipment during an accident since KRA must be reenergized following an assumed loss of offsite power (LOOP). Connecting to the KRA panelboard will restore power to the KVIA or KVIB panelboard, however KVIA or KVIB will still be considered inoperable in this condition and must be verified to be energized once each 24 hours. The 24 hour completion time is based on engineering judgement taking into consideration the operability of redundant panelboards, and the low likelihood of an event requiring ES with a concurrent LOOP.

KVIA or KVIB must be returned to its inverter supply within the next seven days. The completion time is based on engineering judgement taking into consideration the time to reasonably complete the required action, the operability of redundant panelboards, and the low likelihood of an event requiring ES with a concurrent LOOP.

B.1

If panelboard KVIA or KVIB becomes inoperable, for reasons other than inverter inoperability, a period of 4 hours is allowed to return the panelboard to OPERABLE status. The digital ES channels are powered from KVIA and KVIB, and cannot actuate without power. The 4 hour completion time is based on engineering judgement taking into consideration the time to complete the required action, the operability of redundant panelboards, and the low likelihood of an event requiring ES actuation.

C.1, C.2, and C.3

In the event that panelboard KVIC or KVID is inoperable due to an inoperable inverter, a period of 24 hours is allowed to connect the panelboard to the KRA regulated panelboard. This is based on the allowed inoperability period for a 125VDC instrument and control panelboard which is the normal power source to the vital inverters. Panelboards KVIC and KVID carry loads which do not necessarily become inoperable upon loss of power, for example: RPS channels and ES analog channels which go to a tripped state upon loss of power. The 24 hour completion time is based on engineering judgement taking into consideration the time to complete the required action, the operability of redundant panelboards, and the low likelihood of an event requiring loads powered by KVIC or KVID.

(continued)

BASES (continued)

ACTIONS

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

Powering KVIC or KVID from KRA will ensure non-load shed power is available in the event of an accident. However, KRA is non-safety and not battery backed and must be reenergized following an assumed LOOP. Connecting to the KRA panelboard will restore power to the KVIC or KVID panelboard; however, KVIC or KVID will still be considered inoperable in this condition and must be verified to be energized once each 24 hours. The 24 hour completion time is based on engineering judgement taking into consideration the operability of redundant panelboards, and the low likelihood of an event requiring loads powered by KVIC or KVID.

KVIC or KVID must be returned to its inverter supply within the next seven days. The completion time is based on engineering judgement taking into consideration the time to reasonably complete the required action, the operability of redundant panelboards, and the low likelihood of an event requiring loads powered by KVIC or KVID.

D.1

If panelboard KVIC or KVID is inoperable for reasons other than inverter inoperability, it must be returned to OPERABLE status within 24 hours. The 24 hour completion time is based on engineering judgement taking into consideration the time to complete the required action, the operability of redundant panelboards, and the low likelihood of an event requiring loads powered by KVIC or KVID.

E.1 and E.2

If the required actions and associated completion times cannot be met, the unit must be in HOT SHUTDOWN in 12 hours and COLD SHUTDOWN in the following 72 hours. These times allow for a controlled shutdown on one or all three of the units without placing undue stress on plant operators or plant systems.

F.1

The inoperability of two or more AC Vital panelboards could result in a loss of safety function. Therefore, the provisions of TS 3.0 apply.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.7.11.1

This SR verifies that the inverters are functioning properly with all required breakers closed and AC vital panelboards energized from the inverter. The verification of proper voltage and AC line synchronization/frequency ensures that the required power is readily available for the instrumentation connected to the panelboards. The weekly frequency takes into account the redundant capability of the panelboards and other indications available in the control room that will alert the operator to inverter malfunctions.

REFERENCES

1. 52FR3788, NRC Interim Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

B 3.7 ELECTRICAL POWER SYSTEMS

B 3.7.12 Battery Cell Parameters

BASES

BACKGROUND

TS 3.7.12 (Battery Cell Parameters) utilizes the limits on electrolyte level, float voltage, and specific gravity for the 230kV Switchyard batteries, the Vital I & C batteries, and the Keowee batteries. Float voltage is the voltage required to be continuously applied to the battery sufficient to maintain a constant state of charge. A discussion of these batteries and their OPERABILITY requirements is provided in the Bases for TS 3.7.1 (AC Source - Operating), TS 3.7.9 (Vital I&C DC Sources and Distribution - Operating), TS 3.7.10 (230kV Switchyard DC Sources and Distribution), TS 3.7.17 (Vital I&C DC Sources and Distribution - Shutdown/High Decay Heat/Reduced Inventory), and TS 3.7.18 (Vital I&C DC Sources and Distribution - Shutdown).

The limits for the designated pilot cell's float voltage and specific gravity (greater than or equal to 2.13 volts and greater than or equal to a specific gravity of 1.200) is characteristic of a charged cell with adequate capacity.

The limits for each connected cell's float voltage and specific gravity ensures the OPERABILITY and capability of the battery.

The specific gravity limits assume a manufacturer's recommended fully charged nominal specific gravity of 1.210 corrected for electrolyte temperature and level in accordance with Ref. 1.

APPLICABLE SAFETY ANALYSIS

The initial conditions of design basis transient and accident analyses in FSAR Chapter 6, (Engineered Safeguards), and 15 (Safety Analysis), assume all engineered safeguard systems are OPERABLE. The DC power systems provide normal and emergency DC power for emergency auxiliaries and for control and switching during all modes of operation. The OPERABILITY of the power sources is consistent with the initial assumptions of the accident analyses and are based upon (1) maintaining DC power sources and associated distribution systems OPERABLE during accident conditions, (2) an assumed loss of offsite power, and (3) a single failure of one of the standby AC sources.

By maintaining required DC sources OPERABLE, Battery Cell Parameters are part of the primary success path and function to mitigate a Design Basis Accident (DBA) or transient that presents a challenge to the integrity of a fission product barrier. As such, Battery Cell Parameters satisfy the requirements of selection criterion 3 of the NRC interim policy statement (Ref.3).

(continued)

BASES (continued)

TS

TS 3.7.12 (Battery Cell Parameters), specifies the limits for the 230kV switchyard batteries, Instrumentation & Control (I&C) batteries, and Keowee batteries. Verifying the battery cells to be within the limits for the designated pilot cell and each connected cell, respectively, define part of the OPERABILITY requirements for these batteries. Other requirements for OPERABILITY are discussed below and in the Bases for TS 3.7.1 (AC Sources - Operating) , TS 3.7.9 (Vital I&C DC Sources and Distribution - Operating), TS 3.7.10 (230kV Switchyard DC Sources and Distribution), TS 3.7.17 (Vital I&C DC Sources and Distribution - Shutdown/High Decay Heat/Reduced Inventory), and TS 3.7.18 (Vital I&C DC Sources and Distribution - Shutdown).

Each battery is capable of performing its intended function with two cells jumpered.

APPLICABILITY

Battery Cell Parameters are required to be within limits when the associated DC sources are required to be OPERABLE (Refer to APPLICABILITY discussion in the Bases for TS 3.7.1 (AC Sources - Operating), TS 3.7.9 (Vital I&C DC Sources and Distribution - Operating), TS 3.7.10 (230kV Switchyard DC Sources and Distribution), TS 3.7.17 (Vital I&C DC Sources and Distribution - Shutdown/High Decay Heat/Low Inventory), and TS 3.7.18 (Vital I&C DC Sources and Distribution - Shutdown).

ACTIONS

The pilot cells are monitored closely as a measure of battery performance. Because pilot cells lose more electrolyte than the other cells, the designation of the pilot cell should be rotated among all cells in the battery. The Completion Times are based on engineering judgment considering operating experience, and the time required to complete the Required Actions.

A.1

If the electrolyte level is below the top of the cell plates, the entire battery is conservatively assumed to be inoperable, because the cell's discharge capacity would be reduced, and the plates may suffer permanent damage. The battery may be restored to OPERABLE status by jumpering out the affected cell or by restoring the electrolyte level in accordance with the Required Actions of the associated DC Source.

(continued)

BASES (continued)

ACTIONS (continued)

B.1

If the float voltage of a battery cell is < 2.07 volts, the battery is assumed to be inoperable, because battery voltage may not be adequate to carry required loads during a DBA (Ref. 4). The battery may be restored to OPERABLE status by jumpering out the affected cell or by restoring the float voltage to $\geq$ 2.07 volts in accordance with the Required Actions of the associated DC Source.

C.1

If the electrolyte temperature of a connected cell is <60°F, the associated battery must be declared inoperable and the Required Actions of applicable specifications taken as appropriate. With temperature < 60°F, the battery's capability may not be sufficient to meet the design basis load demand.

D.1

The limits on electrolyte level ensures no physical damage to the plates occurs and adequate electron transfer capability is maintained.

E.1

A float voltage limit of greater than or equal to 2.13 volts will ensure the cell remains fully charged with adequate capacity.

F.1

The specific gravity limits ensure a recommended fully charged nominal specific gravity of 1.200. Specific gravity must be corrected for electrolyte temperature and level.

G.1

An individual cell's specific gravity that is more than 0.010 below the average of all cells is a possible indication of a deteriorating cell.

H.1

If more than 2 cells have been jumpered in a battery, the battery is assumed to be inoperable, because the battery may not meet required load demand. Appropriate Required Actions are specified in the associated DC source TS.

If the appropriate parameters cannot be restored in accordance with the Required Actions, the associated battery is assumed to be inoperable. Appropriate Required Actions are specified in the associated DC source TS.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.7.12.1

This Surveillance is consistent with the recommendations of paragraphs 3.3.1(2) of Reference 1, 20.2.1 of Reference 4, and 7.4.1 of Reference 2. The references indicate that the battery be demonstrated to meet limits on a regularly scheduled interval.

SR 3.7.12.2

The Surveillance is consistent with the recommendations of paragraphs 3.3.1(6) of Reference 1 and 5.3.1(8) of Reference 5. A minimum specific gravity is established, and checked on a regular basis, so that each battery cell will have adequate power reserves and voltage to perform it's intended function.

SR 3.7.12.3

This Surveillance is consistent with the recommendations of paragraph 3.3.1(6) of Reference 1. An adequate electrolyte level ensures that there will be a proper conductivity and capacity of the battery cell.

SR 3.7.12.4

This Surveillance is consistent with the recommendations of paragraphs 20.2.1 of Reference 4 and 3.3.2(4) of Reference 1. A minimum voltage is established to ensure adequate voltage is supplied to the respective DC loads.

SR 3.7.12.5

This Surveillance is consistent with the recommendations of paragraphs 3.3.2(1) of Reference 1 and 5.3.1(8) of Reference 5. A minimum specific gravity is established so that each battery cell will have adequate power reserves and voltage to perform it's intended duty.

SR 3.7.12.6

This Surveillance is consistent with the recommendations of paragraph 3.3.2(3) of Reference 1 and the battery manufacturers. An adequate electrolyte level ensures that there will be a proper conductivity path and capacity of the battery cell.

SR 3.7.12.7

This Surveillance is consistent with the recommendations of paragraph 3.3.2(5) of Reference 1. The electrolyte must be maintained above a minimum temperature for the battery to deliver designed power. On the other hand, the electrolyte temperature must be kept below a maximum temperature so that battery life is not unreasonably shortened.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.12.8

This Surveillance is consistent with the recommendations of paragraph 3.4(1) of Reference 1. A low out of average electrolyte specific gravity is an indication of a cell not maintaining proper charge.

REFERENCES

1. IEEE Standard 450-1975, Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations.

2. IEEE Standard 308-1978, IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations.

3. 52FR3788, NRC Interim Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

4. 125VDC Vital I&C System DBD, OSS-0254.00-00-2006 .

5. IEEE Standard 484-1975, Recommended Practice for Installation Design and Installation of Large Lead Storage Batteries for Generating Stations and Substations.

6. 230kV Switchyard 125VDC DBD, OSS-0254.00-00-2004.

B 3.7 ELECTRICAL POWER SYSTEMS

B 3.7.13 AC Sources - Shutdown/High Decay Heat/Reduced Inventory

BASES

BACKGROUND

During shutdown conditions, the AC Sources are required to supply power for equipment necessary to maintain core decay heat removal (DHR). Shutdown maintenance and testing activities should be performed in a manner that minimizes the risk of losing power to the DHR system. When core decay heat is high, the risk of core damage during a loss of DHR event is higher than if decay heat values were low. This is because less time is available to reestablish DHR. During this period, maintenance and testing activities should be carefully evaluated for the potential effects on the DHR system. Also, additional AC power sources and alignment capability to the main feeder buses (MFBs) should be maintained available. This additional redundancy provides "defense in depth" and help minimize the chance of a sustained (greater than 15 minutes) loss of DHR due to loss of electrical power.

APPLICABLE SAFETY ANALYSES

Loss of DHR scenarios are not addressed in the FSAR. In response to Generic Letter (GL) 88-17, Duke Power performed analyses for loss of DHR events. These analyses used bounding decay heat values to conservatively estimate the time to core boiling, core uncovery, and core damage as a function of initial (RCS) inventory values. Other assumptions were made which are consistent with conditions that would exist prior to entering a reduced inventory mode of operation (RCS vented to reactor building and RCS temperature less that 140°F). Additional analyses have been performed that provide the time to boil based on various temperatures $< 140°F$.

The more restrictive requirements of the AC Sources - Shutdown/High Decay Heat/Reduced Inventory TS shall be met when in COLD SHUTDOWN or REFUELING SHUTDOWN and the RCS inventory and core decay heat values are such that the core would become uncovered in less than 2.5 hours for a loss of DHR event. This transition point is a calculated value which uses actual RCS inventory and time after shutdown as the invoking parameters.

The time of 2.5 hours to core uncovery has been chosen as the point where additional redundancy is or is not required of the Electrical Power System. For conditions where greater than 2.5 hours are available prior to core uncovery, adequate time is available for plant personnel to restore electrical power. Also, plant emergency response personnel would have sufficient time to support the normal shift operating personnel in restoring core cooling. For conditions where less than 2.5 hours are available to core uncovery, the requirements for additional redundancy should prevent any extended loss of DHR due to loss of the Electrical Power System.

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES (continued)

The 2.5 hour time is derived from NRC GL 88-17, which recommends this guideline for plants of Oconee's configuration, for establishing containment closure after a loss of DHR event. GL88-17 intends that closure be established prior to making a release associated with core damage. Duke's conservative prediction of the time to "core uncovery," in regard to these shutdown requirements, is such that additional margin/time exists until the time of actual core uncovery and the subsequent time at which core damage and the associated release of radioactive material would occur. Therefore, these shutdown requirements for the electrical systems provide the capability of establishing containment closure prior to any large release due to a loss of DHR caused by a loss of power, in a manner similar to that recommended in GL 88-17. The 2.5 hour time to core uncovery is also a logical point at which to apply additional restrictions which reduce the probability of a loss of power, analogous to the reduced inventory point at which additional restrictions are imposed through Duke's commitments to GL88-17.

A loss of inventory event is not expected to occur coincident with a loss of electrical power to the DHR systems. With no fuel in the core, this specification does not apply.

Although AC Sources - Shutdown/High Decay Heat/Reduced Inventory does not meet the selection criteria of Reference 1, it has been included to support the NRC interim policy statement requirement for DHR.

TS

One of the five available AC Sources shall be energized and supplying power to both MFBs. Also, two additional sources shall be available such that in the event the AC Source energizing the MFBs is lost, one of these additional sources can be used to re-energize the MFBs either automatically or by Operator action from the Control Room. This ensures redundant AC Sources to the MFBs and therefore the DHR trains. In addition, this ensures that at least one of the AC sources will be capable of receiving power from an emergency power path.

For the purposes of providing power to the (MFBs) during shutdown (SD) conditions there are five available transformers for each Oconee Unit. These are:

1) Backcharged through the Main Step-up Transformer (1T,2T,3T)
2) Startup Transformer powered from the 230kV switchyard (SY) and Keowee Overhead (CT-1,CT-2,CT-3)
3) Keowee Underground through CT-4 and the standby (STBY) Buses
4) Lee or Central Switchyard through CT-5 and the STBY Buses
5) Alternate Unit's Startup Transformer powered from the 230kV SY and Keowee Overhead (CT-1, CT-2, CT-3)

For the Main Step-up Transformer to be considered a source, it must be energized

(continued)

BASES (continued)

TS (continued)

and connected to the associated unit's MFBs through both N breakers. Since the Main Step-up Transformer is energized from the system grid, the three undervoltage sensing circuits (27N) must be OPERABLE for this source to be considered OPERABLE. This ensures equipment important to shutdown cooling is protected from undervoltage conditions. Note, that the Main Step-up Transformer cannot be considered an OPERABLE source unless it is connected to the MFBs because protective relaying will not allow closure of the N breakers for many postulated loss of power events.

For the Startup Transformer to be considered a source it must be energized or capable of being energized from the switchyard and from the overhead onsite emergency power path either automatically or by Operator action from the Control Room. Also, both E breakers must be OPERABLE and capable of supplying power from the Startup Transformer to both MFBs. This implies that no protective relay lockouts or inhibits are present to prevent the E breakers from closing from the Control Room. In most cases, the Startup Transformer will be energized from the system grid. For this reason, the three undervoltage sensing circuits (27E) must be OPERABLE for this source to be considered OPERABLE.

For the CT-4 transformer to be considered a source, a Keowee unit must be connected to the underground and be OPERABLE. Both SK breakers, both STBY Buses, and both S breakers must be either automatically OPERABLE or capable of being closed and energized by Operator action from the Control Room. Implied in this is that no protective relay lockouts or inhibits are present to prevent the connection of this source to the MFBs from the Control Room.

For the CT-5 transformer to be considered a source it must be energized from either Lee Steam Station or Central SY. Also, both SL breakers, both STBY Buses, and both S breakers must be OPERABLE to connect the source to both MFBs from the Control Room. Implied in this is that no protective relay lockouts or inhibits are present to prevent the connection of this source to the MFBs from the Control Room.

For the alternate Unit's Startup Transformer to be considered a source, it must be capable of receiving power from the grid and the overhead onsite power source aligned to the affected unit such that all operations necessary to connect to and energize the affected unit's MFB(s) can be performed from the Control Rooms. Also, both E breakers must be available to energize the MFBs. Implied in this is that no protective relay lockouts or inhibits are present to prevent the connection of this source to the MFBs from the Control Room.

APPLICABILITY

Entry into the conditions for which this specification applies is defined by those combinations of decay heat level, RCS inventory, and other parameters which would cause core uncovery to occur within 2.5 hours of a loss of power to the DHR system, assuming no operator action. These combinations of parameters are

(continued)

BASES (continued)

APPLICABILITY (continued)

conservatively described in the Selected Licensee Commitment Manual which implement the requirements of this specification. Because of the complex interrelationship of the defining parameters, and because a variety of operating conditions may arise which require reevaluation of the time to core uncovery, changes to the procedural guidelines for determining applicability may be performed in accordance with 10 CFR 50.59.

AC source requirements when above COLD SHUTDOWN are addressed in the Bases for TS 3.7.1 (AC Sources - Operating). AC source requirements when in COLD SHUTDOWN or REFUELING SHUTDOWN and > 2.5 hours are available prior to core uncovery are addressed in the Bases for TS 3.7.14(AC Sources - Shutdown).

ACTIONS

A.1

In the event the AC Source which had been energizing the MFB is lost, action should be initiated immediately to restore power to both MFBs. The Completion Time of "Immediately" implies that the Required Action should pursued without delay and in a controlled manner. For example, if the transformer supplying the MFBs is deenergized as part of pre-planned tests or maintenance, use of the procedures which permit waiting for the MFBs to be automatically re-energized is considered to satisfy the Completion Time. One of the two backup sources is expected to be able to re-energize the MFB(s) within 15 minutes. This ensures that there will be no extended loss of DHR.

B.1

In the event one or both of the backup sources were lost, activities should begin within a short period of time to restore both backup sources. Six hours provides adequate time to operate disconnects, remove links, etc., in order to establish a backup source in a timely but controlled manner using plant procedures. The Completion Time is acceptable since the primary source is energizing the MFBs and there is a low likelihood of additional failures.

C.1

If events occur where adequate sources of AC power cannot be restored, then the RCS should be filled such that 2.5 hours are available prior to core uncovery for a loss of DHR event. One hour provides the necessary time in order begin closing RCS openings, performing valve lineups, etc., in order to make RCS inventory additions in a controlled manner. Action must continue until at least 2.5 hours would be available in the event of a loss of power for DHR or equipment required by this TS is restored.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.7.13.1

This SR ensures two backup transformers are capable of manually (from the control room) or automatically supplying power to both MFBs within 15 minutes by checking voltage on required transformers and control power indications on required breakers. This SR does not require an actual physical test of the backup transformers. For backup transformers which are automatically available, credit may be taken for SRs 3.7.1.8 (EPSL automatic transfer), and SR 3.7.4.1 (EPSL Voltage Sensing CHANNEL TEST). The 12 hour frequency takes into account the redundant capability of the energized transformer and control room indications which will alert the operator to system malfunctions.

SR 3.7.13.2

This surveillance verifies that the AC source energizing the main feeder buses is functioning properly, with the required circuit breakers closed and the buses energized. The 7 day frequency takes into account the redundant capability of the AC sources and other indications available in the control room that will alert the operator to system malfunctions.

REFERENCES

1. 52FR3788, NRC Interim Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

B 3.7 ELECTRICAL POWER SYSTEMS

B 3.7.14 AC Sources - Shutdown

BASES

BACKGROUND

During shutdown conditions the AC Sources are required to supply power for equipment necessary to maintain core decay heat removal. Shutdown maintenance and testing activities should be performed in a manner that minimizes the risk of losing power to shutdown cooling systems. When core decay heat is low, the risk of core damage during a loss of DHR event is reduced because more time is available for plant personnel to restore core cooling. It is during this period that major maintenance of the electrical systems should be performed. An AC Source to the shutdown cooling equipment should always be maintained, but excessive redundancy is not required.

APPLICABLE SAFETY ANALYSES

Loss of DHR scenarios are not addressed in the FSAR. In response to Generic Letter (GL) 88-17, Duke Power performed analyses for loss of DHR events. These analyses used bounding decay heat values to conservatively estimate the time to core boiling, core uncovery, and core damage as a function of initial (RCS) inventory values. Other assumptions were made which are consistent with conditions that would exist prior to entering a reduced inventory mode of operation (RCS vented to reactor building and RCS temperature less that 140°F).

The more restrictive requirements of TS 3.7.13 (AC Sources - Shutdown/High Decay Heat/Reduced Inventory) shall be met when in COLD SHUTDOWN or REFUELING SHUTDOWN and the RCS inventory and core decay heat values are such that the core would become uncovered in less than 2.5 hours for a loss of DHR event. This transition point is a calculated value which uses actual RCS inventory and time after shutdown as the invoking parameters.

The time of 2.5 hours to core uncovery has been chosen as the point where additional redundancy is or is not required of the Electrical Power System. For conditions where greater than 2.5 hours are available prior to core uncovery, adequate time is available for plant personnel to restore electrical power. Also, plant emergency response personnel would have sufficient time to support the normal shift operating personnel in restoring core cooling. For conditions where less than 2.5 hours are available to core uncovery, the requirements for additional redundancy should prevent any extended loss of DHR due to loss of the Electrical Power System.

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES (continued)

The 2.5 hour time is derived from NRC GL 88-17, which recommends this guideline for plants of Oconee's configuration, for establishing containment closure after a loss of DHR event. GL88-17 intends that closure be established prior to making a release associated with core damage. Duke's conservative prediction of the time to "core uncovery," in regard to these shutdown requirements, is such that additional margin and time exists until the time of actual core uncovery and the subsequent time at which core damage and the associated release of radioactive material would occur. Therefore, these shutdown requirements for the electrical systems provide the capability of establishing containment closure prior to any large release due to a loss of DHR caused by a loss of power, in a manner similar to that recommended in GL 88-17. The 2.5 hour time to core uncovery is also a logical point at which to apply additional restrictions which reduce the probability of a loss of power, analogous to the reduced inventory point at which additional restrictions are imposed through Duke's commitments to GL88-17.

A loss of inventory event is not expected to occur coincident with a loss of electrical power to the DHR systems. With no fuel in the core, this specification does not apply.

Although AC Sources - Shutdown does not meet the selection criteria of Reference 1, it has been included to support the NRC interim policy statement requirement for DHR.

TS

One of the five available AC Sources shall be energized and supplying power to at least one main feeder bus (MFB). In addition, at least one additional source shall be available such that in the event the source energizing the MFB(s) is lost, this additional source can be used to reenergize at least one MFB either automatically or by Operator action within 15 minutes from the Control Room. This ensures a redundant AC source to the operating DHR train.

For the purposes of providing power to the MFBs during shutdown (S/D) conditions there are five available transformers for each Oconee Unit. These are:

1) Backcharged through the Main Step-up Transformer (1T, 2T, 3T)
2) Startup Transformer powered from the 230kV switchyard (SY) or Keowee Overhead (CT-1, CT-2, CT-3)
3) Keowee Underground through CT-4 and the standby (STBY) Buses
4) Lee or Central SY through CT-5 and the STBY Buses
5) Alternate Unit's Startup Transformer

For the Main Step-up Transformer to be considered a source, it must be energized

(continued)

BASES (continued)

TS (continued)

and connected to at least one OPERABLE MFB through an OPERABLE N breaker. Since the Main Step-up Transformer is energized from the system grid, the three undervoltage sensing circuits (27N) must be OPERABLE for this source to be considered OPERABLE. This ensures equipment important to shutdown cooling is protected from undervoltage conditions. Note that the Main Step-up Transformer cannot be considered an OPERABLE source unless it is connected and energizing at least one MFB because protective relaying will not allow closure of the N breakers for many postulated loss of power events.

For the Startup Transformer to be considered a source it must be energized or capable of being energized from the SY or a Keowee Unit either automatically or by Operator action from the Control Room. Also, at least one E breaker must be OPERABLE capable of supplying power from the startup transformer to at least one MFB. This implies that no protective relay lockouts or inhibits are present to prevent the E breaker(s) from being closed from the Control Room. In most cases, the Startup Transformer will be energized from the system grid. For this reason, the three undervoltage sensing circuits (27E) must be OPERABLE for this source to be considered OPERABLE.

For the CT-4 transformer to be considered a source, a Keowee unit must be connected to the underground and be OPERABLE. At least one SK breaker, STBY Bus, and S breaker must be either automatically OPERABLE or capable of being closed and/or energized by Operator action from the Control Room. The minimum required S breaker must be capable of being aligned to an OPERABLE MFB. Implied in this is that no protective relay lockouts or inhibits are present to prevent the connection of this source to at least one MFB from the Control Room.

For CT-5 transformer to be considered a source it must be energized from either Lee Steam Station or Central SY. Also, at least one SL breaker, STBY Bus, and S breaker must be OPERABLE to connect the source to an OPERABLE MFB from the Control Room. Implied in this is that no protective relay lockouts or inhibits are present to prevent the connection of this source to at least one MFB from the Control Room.

For the alternate Unit's Startup Transformer to be considered a source, it must be aligned to the affected unit such that all operations necessary to connect to and energize the affected unit's MFB(s) can be performed from the Control Rooms. Also, at least one E breaker is available to energize a MFB. Implied in this is that no protective relay lockouts or inhibits are present to prevent the connection of this source to at least one MFB from the Control Room.

Due to the availability of more time to respond to a loss of power event, the EPSL specifications (TS 3.7.4, TS 3.7.5, TS 3.7.6, and TS 3.7.7) are not applicable at COLD SHUTDOWN. However, as mentioned above, the automatic circuits of EPSL cannot be allowed to prevent (inhibit) a source from energizing a MFB. If an inhibit or lockout is present then the source shall be considered inoperable.

(continued)

BASES (continued)

APPLICABILITY

Entry into the conditions for which this specification applies is defined by those combinations of decay heat level, RCS inventory, and other parameters which would assure that core uncovery would not occur within 2.5 hours of a loss of power to the DHR system, assuming no operator action. These combinations of parameters are conservatively described in operating procedures which implement the requirements of this specification. Because of the complex interrelationship of the defining parameters, and because a variety of operating conditions may arise which require reevaluation of the time to core uncovery, changes to the procedural guidelines for determining applicability may be performed in accordance with 10 CFR 50.59.

AC source requirements when above COLD SHUTDOWN are addressed in the Bases for TS 3.7.1 (AC Sources - Operating). AC source requirements when in COLD SHUTDOWN or REFUELING SHUTDOWN and ≤ 2.5 hours are available prior to core uncovery are addressed in the Bases for TS 3.7.13 (AC Sources - Shutdown/High Decay Heat/Reduced Inventory).

ACTIONS

A.1

In the event the AC source which had been energizing the MFB is lost, REFUELING OPERATIONS must be suspended since subsequent loss of the backup source could prevent response to postulated events. Suspension of REFUELING OPERATIONS shall not preclude completion of actions to establish a safe conservative condition.

A.2

In the event the AC Source which had been energizing the MFB is lost, action should be initiated immediately to restore power to both MFBs. The Completion Time of "Immediately" implies that the Required Action should pursued without delay and in a controlled manner. For example, if the transformer supplying the MFBs is deenergized as part of pre-planned tests or maintenance, use of the procedures which permit waiting for the MFBs to be automatically re-energized is considered to satisfy the Completion Time. The backup source is expected to be able to reenergize the MFB(s) within 15 minutes. This ensures that there will be no extended loss of DHR. The deenergizing of the MFBs may be a planned test or evolution.

B.1

In the event the backup source is lost, REFUELING OPERATIONS must be suspended since subsequent loss of the source energizing the MFB could prevent response to postulated events. Suspension of REFUELING OPERATIONS shall not preclude completion of actions to establish a safe conservative condition.

(continued)

BASES (continued)

ACTIONS (continued)

B.2

In the event the backup source was lost, activities should begin within a short period of time to restore the backup source. Twelve hours provides adequate time to operate disconnects, remove links, etc., in order to establish a backup source in a timely but controlled manner using plant procedures. The Completion Time is acceptable since the primary source is energizing the MFBs and there is a low likelihood of additional failures.

SURVEILLANCE REQUIREMENTS

SR 3.7.14.1

This SR ensures one backup transformer is capable of manually (from the control room) or automatically supplying power to one MFB within 15 minutes. This SR does not require an actual physical test of the backup transformer. For backup transformers which are automatically available, credit may be taken for SRs 3.7.1.8 (EPSL automatic transfer), and 3.7.4.1 (EPSL Voltage Sensing CHANNEL TEST). The 12 hour frequency takes into account the redundant capability of the energized transformer and control room indications which will alert the operator to system malfunctions.

SR 3.7.14.2

This surveillance verifies that the AC source energizing the MFB is functioning properly, with the required circuit breakers closed and the buses energized. The 7 day frequency takes into account the redundant capability of the AC sources and other indications available in the control room that will alert the operator to system malfunctions.

REFERENCES

1. 52FR3788, NRC Interim Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

B 3.7 ELECTRICAL POWER SYSTEMS

B 3.7.15 AC Distribution - Shutdown/High Decay Heat/Reduced Inventory

BASES

BACKGROUND

The AC Distribution System is comprised of two Main Feeder Buses (MFBs) and the three 4kV Switchgear Buses (TC, TD, TE). The system is arranged such that each 4kV Switchgear Bus can receive power from either of the two MFBs. Each MFB, which is capable of supplying the entire unit power needs, can receive power from the unit normal auxiliary transformer, startup transformer and one of the standby buses.

During COLD SHUTDOWN conditions, the main function of the distribution system is to supply power to the Decay Heat Removal (DHR) System. Also, battery chargers which supply instrumentation and control buses needed to monitor core cooling and reactivity need to be energized. Only one MFB and 4kV Switchgear Bus is necessary to operate one train of DHR. However, during periods of high decay heat and reduced inventory an additional DHR pump is required. This requires two Switchgear Buses to be energized. Even though one MFB can power both Switchgear Buses, both are required for redundancy. During periods of high decay heat, testing or maintenance on the AC Distribution System should be minimized. This specification ensures diverse power paths to the DHR pumps are available.

APPLICABLE SAFETY ANALYSES

Loss of DHR scenarios are not addressed in the FSAR. In response to Generic Letter (GL) 88-17, Duke Power performed analyses for loss of DHR events. These analyses used bounding decay heat values to conservatively estimate the time to core boiling, core uncovery, and core damage as a function of initial (RCS) inventory values. Other assumptions were made which are consistent with conditions that would exist prior to entering a reduced inventory mode of operation (RCS vented to reactor building and RCS temperature less that 140°F).

The more restrictive requirements of the AC Distribution - Shutdown/High Decay Heat/Reduced Inventory TS shall be met when in COLD SHUTDOWN or REFUELING SHUTDOWN and the RCS inventory and core decay heat values are such that the core would become uncovered in less than 2.5 hours for a loss of DHR event. This transition point is a calculated value which uses actual RCS inventory and time after shutdown as the invoking parameters.

The time of 2.5 hours to core uncovery has been chosen as the point where additional redundancy is or is not required of the Electrical Power System. For conditions where greater than 2.5 hours are available prior to core uncovery, adequate time is available for plant personnel to restore electrical power. Also, plant emergency response personnel would have sufficient time to support the normal shift operating personnel in restoring core cooling. For conditions where less than 2.5 hours are available to core uncovery, the requirements for additional redundancy should prevent any extended loss of DHR due to loss of the Electrical Power System.

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES (continued)	The 2.5 hour time is derived from NRC GL 88-17, which recommends this guideline for plants of Oconee's configuration, for establishing containment closure after a loss of DHR event. GL88-17 intends that closure be established prior to making a release associated with core damage. Duke's conservative prediction of the time to "core uncovery," in regard to these shutdown requirements, is such that additional margin and time exists until the time of actual core uncovery and the subsequent time at which core damage and the associated release of radioactive material would occur. Therefore, these shutdown requirements for the electrical systems provide the capability of establishing containment closure prior to any large release due to a loss of DHR caused by a loss of power, in a manner similar to that recommended in GL 88-17. The 2.5 hour time to core uncovery is also a logical point at which to apply additional restrictions which reduce the probability of a loss of power, analogous to the reduced inventory point at which additional restrictions are imposed through Duke's commitments to GL88-17. A loss of inventory event is not expected to occur coincident with a loss of electrical power to the DHR systems. With no fuel in the core, this specification does not apply. Although AC Distribution - Shutdown/High Decay Heat/Reduced Inventory does not meet the selection criteria of Reference 1, it has been included to support the NRC interim policy statement requirement for DHR.
TS	Both MFBs shall be energized. Each MFB shall be connected to at least two of the three 4kV Switchgear Buses (TC, TD, TE). Implied in this specification is that the three OPERABLE 4kV Switchgear Buses are capable of powering pumps and other necessary support equipment to ensure two trains of DHR are OPERABLE.
APPLICABILITY	Entry into the conditions for which this specification applies is defined by those combinations of decay heat level, RCS inventory, and other parameters which would cause core uncovery to occur within 2.5 hours of a loss of power to the DHR system, assuming no operator action. These combinations of parameters are conservatively described in operating procedures which implement the requirements of this specification. Because of the complex interrelationship of the defining parameters, and because a variety of operating conditions may arise which require reevaluation of the time to core uncovery, changes to the procedural guidelines for determining applicability may be performed in accordance with 10 CFR 50.59. AC distribution requirements when above COLD SHUTDOWN are addressed in the Bases for TS 3.7.2 (AC Distribution - Operating). AC distribution requirements when in COLD SHUTDOWN or REFUELING SHUTDOWN and > 2.5 hours are available prior to core uncovery are addressed in the Bases for TS 3.7.16 (AC Distribution - Shutdown).

(continued)

BASES (continued)

ACTIONS

A.1

In the event one of the two MFBs becomes inoperable, then 24 hours is allowed to return the inoperable MFB to OPERABLE status. This time is justified since the loss of one MFB does not cause either of the required DHR trains to become inoperable. Since a failure of the remaining MFB will probably result in a loss of DHR, the time allowed in this action statement is limited to 24 hours.

B.1

In the event one Switchgear Bus is lost, then 24 hours is allowed to restore the Switchgear Bus. The 24 hour Completion Time is based on engineering judgement taking into consideration the time to complete the Required Action and the availability of the two remaining Switchgears.

C.1

In the event A.1 or B.1 cannot be met within the required Completion Time, then the RCS should be filled such that 2.5 hours are available prior to core uncovery for a loss of DHR event. The 1 hour limit provides the necessary time in order begin closing RCS openings, performing valve lineups, etc. in order to make RCS inventory additions in a controlled manner. Action must continue until at least 2.5 hours would be available in the event of a loss of power for DHR or equipment required by this TS is restored.

D.1

In the event both MFBs are inoperable, action should be initiated immediately to restore at least one MFB to OPERABLE status. One MFB can supply adequate power to both trains of DHR. The Completion Time of "Immediately" implies that the Required Action should pursued without delay and in a controlled manner. For example, if two MFBs are inoperable as part of pre-planned tests or maintenance, use of the procedures which permit waiting for the MFBs to be automatically restored is considered to satisfy the Completion Time.

E.1

In the event two or more Switchgear Buses are lost, then in most cases, DHR will be lost. Action should be initiated immediately to restore at least one Switchgear Bus and restore DHR. The Completion Time of "Immediately" implies that the Required Action should pursued without delay and in a controlled manner. For example, if two or more 4160V switchgear buses are inoperable as part of pre-planned tests or maintenance, use of the procedures which permit waiting for the buses to be automatically restored is considered to satisfy the Completion Time.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.7.15.1

This SR ensures that two MFBs are energizing two 4kV switchgear buses by checking MFB voltage and breaker position indication to the required 4kV switchgears. This SR does not require an actual physical test. The 12 hour frequency takes into account the redundant capability of the energized MFBs and 4kV switchgear buses and control room indications which will alert the operator to system malfunctions.

REFERENCES

1. 52FR3788, NRC Interim Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

B 3.7 ELECTRICAL POWER SYSTEMS

B 3.7.16 AC Distribution - Shutdown

BASES

BACKGROUND

The AC Distribution System is comprised of two Main Feeder Buses (MFBs) and the three 4160 Switchgear Buses (TC, TD, TE). The system is arranged such that each 4160 Switchgear Bus can receive power from either of the two MFBs. Each MFB, which is capable of supplying the entire unit power needs, can receive power from the unit normal auxiliary transformer, startup transformer and one of the standby buses.

During COLD SHUTDOWN conditions, the main function of the distribution system is to supply power to the Decay Heat Removal (DHR) System. Also, battery chargers which supply instrumentation and control buses needed to monitor core cooling and reactivity need to be energized. Only one MFB and 4160 Switchgear Bus is necessary to operate one train of DHR. However, it is not prudent to have two 4160 Switchgear Buses inoperable. So, for planned evolutions, only one 4160 Switchgear Bus should be inoperable at one time.

During periods of low decay heat, there is sufficient time to recover from a loss of DHR event. Therefore, this is when shutdown maintenance should be performed on components of the AC Distribution System. If a loss of DHR occurs due to a loss of the OPERABLE components of the AC Distribution System, time would be available to repair or restore the AC Distribution System or provide alternate means of core cooling.

APPLICABLE SAFETY ANALYSES

Loss of DHR scenarios are not addressed in the FSAR. In response to Generic Letter GL 88-17, Duke Power performed analyses for loss of DHR events. These analyses used bounding decay heat values to conservatively estimate the time to core boiling, core uncovery, and core damage as a function of initial RCS inventory values. Other assumptions were made which are consistent with conditions that would exist prior to entering a reduced inventory mode of operation (RCS vented to reactor building and RCS temperature less that 140°F).

The more restrictive requirements of TS 3.7.13 (AC Sources - Shutdown/High Decay Heat/Reduced Inventory) shall be met when in COLD SHUTDOWN or REFUELING SHUTDOWN and the RCS inventory and core decay heat values are such that the core would become uncovered in less than 2.5 hours for a loss of DHR event. This transition point is a calculated value which uses actual RCS inventory and time after shutdown as the invoking parameters.

The time of 2.5 hours to core uncovery has been chosen as the point where additional redundancy is or is not required of the Electrical Power System. For conditions

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES (continued)

where greater than 2.5 hours are available prior to core uncovery, adequate time is available for plant personnel to restore electrical power. Also, plant emergency response personnel would have sufficient time to support the normal shift operating personnel in restoring core cooling. For conditions where less than 2.5 hours are available to core uncovery, the requirements for additional redundancy should prevent any extended loss of DHR due to loss of the Electrical Power System.

The 2.5 hour time is derived from NRC GL 88-17, which recommends this guideline for plants of Oconee's configuration, for establishing containment closure after a loss of DHR event. GL88-17 intends that closure be established prior to making a release associated with core damage. Duke's conservative prediction of the time to "core uncovery," in regard to these shutdown requirements, is such that additional margin and time exists until the time of actual core uncovery and the subsequent time at which core damage and the associated release of radioactive material would occur. Therefore, these shutdown requirements for the electrical systems provide the capability of establishing containment closure prior to any large release due to a loss of DHR caused by a loss of power, in a manner similar to that recommended in GL 88-17. The 2.5 hour time to core uncovery is also a logical point at which to apply additional restrictions which reduce the probability of a loss of power, analogous to the reduced inventory point at which additional restrictions are imposed through Duke's commitments to GL88-17.

A loss of inventory event is not expected to occur coincident with a loss of electrical power to the DHR systems. With no fuel in the core, this specification does not apply.

Although AC Distribution - Shutdown does not meet the selection criteria of Reference 1, it has been included to support the NRC interim policy statement requirement for DHR.

TS

One of the two available MFBs shall be energized and connected to at least two 4160 Switchgear Buses.

APPLICABILITY

Entry into the conditions for which this specification applies is defined by those combinations of decay heat level, RCS inventory, and other parameters which would assure that core uncovery would not occur within 2.5 hours of a loss of power to the DHR system, assuming no operator action. These combinations of parameters are conservatively described in operating procedures which implement the requirements of this specification. Because of the complex interrelationship of the defining parameters, and because a variety of operating conditions may arise which require reevaluation of the time to core uncovery, changes to the procedural guidelines for determining applicability may be performed in accordance with 10 CFR 50.59.

(continued)

BASES (continued)

APPLICABILITY (continued)

AC distribution requirements when above COLD SHUTDOWN are addressed in the Bases for TS 3.7.2 (AC Distribution - Operating). AC distribution requirements when in COLD SHUTDOWN or REFUELING SHUTDOWN and ≤ 2.5 hours are available prior to core uncovery are addressed in the Bases for TS 3.7.15 (AC Distribution - Shutdown/High Decay Heat/Reduced Inventory).

ACTIONS

A.1

In the event both MFBs are inoperable, REFUELING OPERATIONS must be suspended since response to postulated events could be prevented. Suspension of REFUELING OPERATIONS shall not preclude completion of actions to establish a safe conservative condition.

A.2

In the event both MFBs become deenergized action should be initiated immediately to restore at least one MFB to OPERABLE status. In this case, deenergizing both MFBs may be a planned test or evolution. The Completion Time of "Immediately" implies that the Required Action should pursued without delay and in a controlled manner. For example, if the transformer supplying the MFBs is deenergized as part of pre-planned tests or maintenance, use of the procedures which permit waiting for the MFBs to be automatically re-energized is considered to satisfy the Completion Time.

B.1

In the event that only one 4160 Switchgear Bus is OPERABLE, then 24 hours is allowed to restore a second 4160 Switchgear Bus. Since only one 4160 Switchgear Bus is required for the DHR System, this allows adequate time at minimal risk to repair or restore a second 4160 Switchgear Buses to OPERABLE status.

C.1

In the event all 4160 switchgears are lost, REFUELING OPERATIONS must be suspended since response to postulated events could be prevented. Suspension of REFUELING OPERATIONS shall not preclude completion of actions to establish a safe conservative condition.

(continued)

BASES (continued)

ACTIONS (continued)

C.2

In the event all 4160 Switchgear Buses are lost, then most likely core DHR capability has been lost. Action should be initiated immediately to restore one 4160 Switchgear Bus and restore the DHR system. The Completion Time of "Immediately" implies that the Required Action should pursued without delay and in a controlled manner. For example, if all 4160V Switchgear Buses are lost as part of pre-planned tests or maintenance, use of the procedures which permit waiting for the buses to be automatically restored is considered to satisfy the Completion Time.

SURVEILLANCE REQUIREMENTS

SR 3.7.16.1

This SR ensures that one MFB is energizing two 4160V switchgear buses. This SR does not require an actual physical test. The 12 hour frequency takes into account the redundant capability of the energized 4160V switchgear buses and control room indications which will alert the operator to system malfunctions.

REFERENCES

1. 52FR3788, NRC Interim Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

B 3.7 ELECTRICAL POWER SYSTEMS

B 3.7.17 Vital I&C DC Sources and Distribution - Shutdown/High Decay Heat/Reduced/Inventory

BASES

BACKGROUND

The 125VDC Vital Instrumentation and Control (I&C) System consists of 125VDC battery sources and a distribution system as described below. It provides control power for the Electrical Power System. It provides both motive and control power to selected safety-related and non-safety equipment. It is designed to have sufficient independence and redundancy to perform its functions. During Shutdown High Decay Heat/Reduced Inventory conditions, the basic function of the 125VDC Vital I&C System is to provide control power for breakers and instrumentation necessary to maintain two trains of decay heat removal (DHR) OPERABLE.

Sources:
For each unit, two independent and physically separated 125VDC batteries and buses are provided for the 125VDC Vital I&C System. The DC buses are two conductor metal-clad distribution center assemblies. Three battery chargers are supplied for each unit, with two serving as normal supplies to the bus sections with the associated 125VDC battery floating on the bus. The batteries supply the load without interruption should the battery chargers or the AC source fail. One of these three battery chargers serves as a standby battery charger and is provided for servicing and to back up the normal chargers. A bus tie with normally open breakers is provided between each pair of DC bus sections to back up a battery when it is removed for servicing.

The Vital I&C 125VDC loads are powered from the battery chargers with the batteries floating on the system. Upon loss of AC power to the chargers, each unit's DC system has adequate stored capacity (ampere-hour) to independently supply required shutdown loads for at least 1 hour. This 1 hour is considered conservative, since there are redundant sources of AC power providing energy to these DC auxiliary systems. The loss of all AC power to the DC system is expected to occur very infrequently and for short periods of time. Each battery charger has adequate power output capacity for the steady-state operation of connected loads required during shutdown, while at the same time maintaining its battery bank fully charged. Each battery charger has sufficient capacity to restore the battery to its fully charged state while supplying normal steady state loads.

Distribution:
Four separate 125VDC Vital I&C Panelboards (DIA, DIB, DIC, DID), are provided for each unit. Each panelboard receives its DC power through an auctioneering network of two isolating diode assemblies. One assembly is supplied from the unit's 125 VDC distribution system, and the other assembly is supplied from another unit's (the backup unit) 125VDC Vital Distribution System. The functions of the diode

(continued)

BACKGROUND (continued)

assemblies are to discriminate between the voltage level of the two DC distribution systems to ensure adequate voltage is supplied to the panelboards.

In order to ensure DHR functions required during shutdown conditions, power must be provided from any three of the four Vital I&C DC Panelboards. The auctioneering network described above provides multiple redundancy for assuring that power from the 125VDC Vital I&C Sources would be provided to the Vital I&C DC Panelboards. Therefore, power from any three of the four Vital I&C DC Sources for a particular unit (two for the unit considered, and two from the backup unit) continues to provide redundancy of power sources for functions performed by the Vital I&C DC Panelboards.

Ground Detection:
The ungrounded DC system has detectors and alarms to indicate when there is a ground existing on any leg of the system. A ground on one leg of the DC system will not cause any equipment to malfunction. In order to find and correct a DC ground on the 125VDC Vital I&C System, each unit's DC system must be separated from the other two units. With the backup function disabled, the unit would be in a degraded mode, but would in fact have all of its own DC system available if needed. Each unit's batteries (either CA or CB) is capable of carrying all the 125VDC I&C loads on that unit.

Inter-unit Dependencies:
Unit 1 panelboards 1DIC and 1DID provide primary and backup for SK and SL breakers control power, standby bus protective relaying control power, standby breakers control power for all three Units, and retransfer-to-startup source switching circuits for all three Oconee Unit's Emergency Power Switching Logic Systems. These Unit 1 panelboards are required to be OPERABLE prior to and during operations while in the High Decay/Reduced Inventory condition. Operability of these panelboards ensures the necessary redundancy exists while using CT-4 or CT-5 as a required power source. All other functions supported by the Vital 125VDC Panelboard are unit specific.

APPLICABLE SAFETY ANALYSES

Loss of DHR scenarios are not addressed in the FSAR. In response to Generic Letter GL 88-17, Duke Power performed analyses for loss of DHR events. These analyses used bounding decay heat values to conservatively estimate the time to core boiling, core uncovery, and core damage as a function of initial RCS inventory values. Other assumptions were made which are consistent with conditions that would exist prior to entering a reduced inventory mode of operation (RCS vented to reactor building and RCS temperature less that 140°F).

The more restrictive requirements of the Vital I&C DC Sources and Distribution - Shutdown/High Decay Heat/Reduced Inventory TS shall be met when in COLD SHUTDOWN or REFUELING SHUTDOWN and the RCS inventory and core decay heat values are such that the core would become uncovered in less than 2.5 hours for

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES (continued)

a loss of DHR event. This transition point is a calculated value which uses actual RCS inventory and time after shutdown as the invoking parameters.

The time of 2.5 hours to core uncovery has been chosen as the point where additional redundancy is or is not required of the Electrical Power System. For conditions where greater than 2.5 hours are available prior to core uncovery, adequate time is available for plant personnel to restore electrical power. Also, plant emergency response personnel would have sufficient time to support the normal shift operating personnel in restoring core cooling. For conditions where less than 2.5 hours are available to core uncovery, the requirements for additional redundancy should prevent any extended loss of DHR due to loss of the Electrical Power System.

The 2.5 hour time is derived from NRC GL 88-17, which recommends this guideline for plants of Oconee's configuration, for establishing containment closure after a loss of DHR event. GL88-17 intends that closure be established prior to making a release associated with core damage. Duke's conservative prediction of the time to "core uncovery," in regard to these shutdown requirements, is such that additional margin and time exists until the time of actual core uncovery and the subsequent time at which core damage and the associated release of radioactive material would occur. Therefore, these shutdown requirements for the electrical systems provide the capability of establishing containment closure prior to any large release due to a loss of DHR caused by a loss of power, in a manner similar to that recommended in GL 88-17. The 2.5 hour time to core uncovery is also a logical point at which to apply additional restrictions which reduce the probability of a loss of power, analogous to the reduced inventory point at which additional restrictions are imposed through Duke's commitments to GL88-17.

A loss of inventory event is not expected to occur coincident with a loss of electrical power to the DHR systems. With no fuel in the core, this specification does not apply.

Although Vital I&C DC Sources and Distribution - Shutdown/High Decay Heat/Reduced Inventory does not meet the selection criteria of Reference 1, it has been included to support the NRC interim policy statement requirement for DHR.

TS

The four 125VDC I&C Panelboards (DIA, DIB, DIC & DID) shall be OPERABLE. A panelboard is considered OPERABLE when it is energized from an OPERABLE source. In addition, no single battery may be the only OPERABLE source of power to more than one panelboard.

Because power from any three of the four panelboards DIA, DIB, DIC or DID would support all safety function associated with the panelboards, these requirements ensure that the supported safety functions have sufficient redundancy.

(continued)

BASES (continued)

TS (continued)

For the shutdown unit being considered, in association with its backup unit, a total of three of the four 125VDC Vital Batteries and associated chargers and distribution centers, including interconnections through their associated auctioneering diodes, as follows:

Unit 1: 1CA, 1CB, 2CA, 2CB
Unit 2: 2CA, 2CB, 3CA, 3CB
Unit 3: 3CA, 3CB, 1CA, 1CB

In each case, one Vital I&C 125VDC Source associated with the unit being considered must be included.

APPLICABILITY

Entry into the conditions for which this specification applies is defined by those combinations of decay heat level, RCS inventory, and other parameters which would cause core uncovery to occur within 2.5 hours of a loss of power to the DHR, assuming no operator action. These combinations of parameters are conservatively described in operating procedures which implement the requirements of this specification. Because of the complex interrelationship of the defining parameters, and because a variety of operating conditions may arise which require reevaluation of the time to core uncovery, changes to the procedural guidelines for determining applicability may be performed in accordance with 10 CFR 50.59.

Vital I&C DC sources and distribution requirements when above COLD SHUTDOWN are addressed in the Bases for TS 3.7.9 (Vital I&C DC Sources and Distribution - Operating). Requirements when in COLD SHUTDOWN or REFUELING SHUTDOWN and > 2.5 hours are available prior to core uncovery are addressed in the Bases for TS 3.7.18 (Vital I&C DC Sources and Distribution - Shutdown).

ACTIONS

The required actions have been established and based on the extent of degradation of the 125VDC Vital I&C System.

A.1

With one Vital I&C DC panelboard inoperable, the three remaining panelboards will continue to provide power for all safety functions supported by these panelboards, provided that no redundant safety functions are inoperable. An inoperable panelboard shall be restored to OPERABLE status within 24 hours. This conservative requirement assures continued redundancy in the 125VDC Vital I&C Distribution System, and recognizes the importance of the multiple functions supported by the panelboards.

(continued)

BASES (continued)

ACTIONS (continued)

B.1

Inoperability of some of the Auctioneering Diode Panels (ADA1, ADA2, ADB1, ADB2, ADC1, ADC2, ADD1, ADD2), or a combination of inoperability of 125VDC Vital I&C Sources and auctioneering diode panels, could cause a single battery to become the only battery power supply for more than one 125VDC Vital I&C Panelboard. In this condition, a failure of that battery (or its associated equipment) could cause loss of more than one panelboard so that required safety functions might not be supported. Therefore, within 24 hours after such a condition arises, affected equipment shall be restored and aligned such that no single battery is the only battery power supply for more than one 125VDC Vital I&C Panelboard for the unit under consideration.

C.1

With one of the required 125VDC Vital I&C Sources inoperable, the remaining sources are fully capable of providing adequate voltage to the minimum number of DC panelboards (three panelboards) necessary to shut down the operating unit and maintain it in a safe shutdown condition, assuming no single failure. However, overall reliability is reduced and the minimum required shutdown functions may not being supported. Therefore, the inoperable source must be restored to OPERABLE status within 24 hours.

The completion times for actions in this TS are based on engineering judgment, taking into consideration the extent of degradation involved, the likelihood of events or failures which could challenge the system, and the time required to reasonably complete the required actions.

D.1

If events occur where required Vital I&C DC sources cannot be restored, then the RCS should be filled such that 2.5 hours are available prior to core uncovery for a loss of decay heat removal event. The 2 hour limit provides the necessary time in order begin closing RCS openings, performing valve lineups, etc., in order to make RCS inventory additions in a controlled manner. Action must continue until at least 2.5 hours would be available in the event of a loss of power for DHR or equipment required by this TS is restored.

SURVEILLANCE REQUIREMENTS

SR 3.7.17.1

See Bases for SR 3.7.9.1 through SR 3.7.9.5.

REFERENCES

1. 52FR3788, NRC Interim Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

B 3.7 ELECTRICAL POWER SYSTEMS

B 3.7.18 Vital I&C DC Sources and Distribution - Shutdown

BASES

BACKGROUND

The Vital I&C DC Sources and Distribution System is described in the basis for TS 3.7.9 (Operating) and 3.7.17 Vital I&C DC Sources and Distribution-(Shutdown/High Decay Heat/Reduced Inventory). While the unit is Shutdown, but not in the High Decay Heat/Reduced Inventory condition, less risk is involved when removing from service components of the Vital I&C DC Sources and Distribution System. This is because there is more time (greater than 2.5 hours to core uncovery) available for plant personnel to respond to any significant degradation of the Vital I&C DC Sources and Distribution System.

The minimum equipment required by TS 3.7.18 will ensure that all equipment necessary maintain two trains of Decay Heat Removal (DHR) operable and is available. Also, voltage sensing circuits and breaker control power will be available to provide an electrical pathway to the Main Feedwater Buses (MFBs) (and DHR pump switchgear) from the required AC sources.

The best time for maintenance on the Vital I&C DC Sources and Distribution System is during this Shutdown Condition. Maintenance on DC panelboards, auctioneering diodes, batteries, and DC distribution buses should be performed in this low risk mode.

APPLICABLE SAFETY ANALYSES

Loss of DHR scenarios are not addressed in the FSAR. In response to Generic Letter GL 88-17, Duke Power performed analyses for loss of DHR events. These analyses used bounding decay heat values to conservatively estimate the time to core boiling, core uncovery, and core damage as a function of initial RCS inventory values. Other assumptions were made which are consistent with conditions that would exist prior to entering a reduced inventory mode of operation (RCS vented to reactor building and RCS temperature less that 140°F).

The more restrictive requirements of the TS 3.7.16 (Vital I&C DC Sources and Distribution - Shutdown/High Decay Heat/Reduced Inventory) shall be met when in COLD SHUTDOWN or REFUELING SHUTDOWN and the RCS inventory and core decay heat values are such that the core would become uncovered in less than 2.5 hours for a loss of DHR event. This transition point is a calculated value which uses actual RCS inventory and time after shutdown as the invoking parameters.

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES (continued)	The time of 2.5 hours to core uncovery has been chosen as the point where additional redundancy is or is not required of the Electrical Power System. For conditions where greater than 2.5 hours are available prior to core uncovery, adequate time is available for plant personnel to restore electrical power. Also, plant emergency response personnel would have sufficient time to support the normal shift operating personnel in restoring core cooling. For conditions where less than 2.5 hours are available to core uncovery, the requirements for additional redundancy should prevent any extended loss of DHR due to loss of the Electrical Power System. The 2.5 hour time is derived from NRC GL 88-17, which recommends this guideline for plants of Oconee's configuration, for establishing containment closure after a loss of DHR event. GL88-17 intends that closure be established prior to making a release associated with core damage. Duke's conservative prediction of the time to "core uncovery," in regard to these shutdown requirements, is such that additional margin and time exists until the time of actual core uncovery and the subsequent time at which core damage and the associated release of radioactive material would occur. Therefore, these shutdown requirements for the electrical systems provide the capability of establishing containment closure prior to any large release due to a loss of DHR caused by a loss of power, in a manner similar to that recommended in GL 88-17. The 2.5 hour time to core uncovery is also a logical point at which to apply additional restrictions which reduce the probability of a loss of power, analogous to the reduced inventory point at which additional restrictions are imposed through Duke's commitments to GL88-17. A loss of inventory event is not expected to occur coincident with a loss of electrical power to the DHR systems. With no fuel in the core, this specification does not apply. Although Vital I&C DC Sources and Distribution - Shutdown does not meet the selection criteria of Reference 1, it has been included to support the NRC interim policy statement requirement for DHR.
TS	Whenever the Unit is in the SHUTDOWN condition, at least one of the Unit's DC Source and Distribution System (Battery, Battery Charger, and Battery Bus CA or CB) shall be OPERABLE. In addition, three of the four I&C DC panelboards (DIA, DIB, DIC, DID) shall be OPERABLE. One I&C DC panelboard may be inoperable indefinitely except as noted below. I&C Panelboards 1DIC and 1DID affect components required by Technical Specifications on all three Oconee units. Unless all three Oconee units are in an SHUTDOWN condition and not in the High Decay Heat/Reduced Inventory condition, these panelboards may only be inoperable for 24 hours as required by TS 3.7.9 (Operating) and 3.7.17 Vital I&C DC Sources and Distribution (Shutdown/High Decay Heat/Reduced Inventory).

(continued)

BASES (continued)

APPLICABILITY

Entry into the conditions for which this specification applies is defined by those combinations of decay heat level, RCS inventory, and other parameters which would cause core uncovery to occur within 2.5 hours of a loss of power to the DHR system, assuming no operator action. These combinations of parameters are conservatively described in operating procedures which implement the requirements of this specification. Because of the complex interrelationship of the defining parameters, and because a variety of operating conditions may arise which require reevaluation of the time to core uncovery, changes to the procedural guidelines for determining applicability may be performed in accordance with 10 CFR 50.59.

Vital I&C DC sources and distribution requirements when above COLD SHUTDOWN are addressed in the Bases for TS 3.7.9 (Vital I&C DC Sources and Distribution - Operating). Requirements when in COLD SHUTDOWN or REFUELING SHUTDOWN and ≤ 2.5 hours are available prior to core uncovery are addressed in the Bases for TS 3.7.17 (Vital I&C DC Sources and Distribution - Shutdown/High Decay Heat/Reduced Inventory).

ACTIONS

A.1

If more than one of a Unit's I&C DC panelboards is inoperable, then motive power for breakers, and voltage sensing circuits associated with AC sources could be lost. This may cause the tripping of running DHR pumps or the loss of AC sources providing power to the DHR System. If an additional panelboard (one more than the one allowed for unrestricted operation) is made inoperable intentionally, compensatory measures can be taken to ensure that adequate AC Sources and DHR trains remain OPERABLE. However, only 12 hours is allowed for such an unusual configuration.

B.1

In the event that the one required DC source is inoperable, REFUELING OPERATIONS must be suspended since response to postulated events could be prevented. Suspension of REFUELING OPERATIONS shall not preclude completion of actions to establish a safe conservative condition.

B.2

If the one required DC Source and Distribution System is inoperable, then the affected unit would not have any of its own DC sources available. Depending on the status of the backup batteries, one or more I&C DC panelboards could be lost resulting in a potential for a loss of DHR function or AC power to the DHR System. Intentional removal of the remaining DC Source and Distribution System could be accomplished without loss of any of the required I&C DC panelboards. However, because of the loss of redundancy, only 24 hours is allowed to restore the minimum number of DC Sources and Distribution to OPERABLE status.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.7.18.1

See Bases for SRs 3.7.9.1 through 3.7.9.5.

REFERENCES

1. 52FR3788, NRC Interim Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

DUKE POWER COMPANY

OCONEE NUCLEAR STATION

ATTACHMENT 3

MARKUP OF CURRENT TECHNICAL SPECIFICATION 3.7

3/9/93

3.7 AUXILIARY ELECTRICAL SYSTEMS

Applicability

Applies to the availability of off-site and on-site electrical power for station operation and for operation of station auxiliaries.

BASES ① **Objective**

To define those conditions of electrical power availability necessary to provide for safe reactor operation and to provide for continuing availability of engineered safety features systems in an unrestricted manner and to prescribe safety evaluation and reporting requirements to be followed in the event that the auxiliary electric power systems become degraded.

Specifications

2A TS 3.7.1 → 3.7.6 + TS 3.7.9 - 11 ACTIONS

2B APPLICABILITY

3.7.1 Except as permitted by 3.7.2, 3.7.3, 3.7.4, 3.7.5, 3.7.6, 3.7.7, and 3.7.8, the reactor shall not be above 200°F unless the following conditions are met.

③ TS 3.7.1 (a) At least two 230KV transmission lines, on separate towers, shall be in service.

④ TS 3.7.1 (b) Two independent on-site emergency power paths shall be operable and shall consist of:

1. One Keowee hydro unit; through the underground feeder path; through transformer CT4; through the Keowee standby bus feeder breakers (SK1 and SK2) to two standby buses; and capable of supplying emergency power through the standby bus to main feeder bus breakers (S1 and S2).

⑤ BASES

④ TS 3.7.1

⑥ TS 3.7.1

2. The other (redundant) Keowee hydro unit through the Keowee main step-up transformer and breaker PCB-9; the 230 kV switchyard yellow bus and safety related PCB-18, -27, or 30; through the respective operating unit's startup transformer (CT-1, 2, or 3) or aligned and connected alternate startup transformer; and capable of supplying emergency power through the startup transformer to main feeder bus breakers (E1 and E2). One startup transformer may not be aligned to supply power to more than one unit.

⑦ BASES

⑥ TS 3.7.1

⑧ BASES

⑨ See Table 3.7-1

(c) The Emergency Power Switching Logic (EPSL) circuitry shall be operable as specified by the conditions of Table 3.7-1 for normal operation. Furthermore, if the reactor is subcritical, the conditions of Table 3.7-1 for normal operation shall be satisfied before the reactor is returned to criticality.

⑩ TS 3.7.0

⑪ TS 3.7.2 (d) Two 4160 volt main feeder buses shall be energized.

(12) TS 3.7.2 (e) The three 4160 volt Engineered Safety Features switchgear buses (TC, TD, and TE), three 600 volt load centers (X8, 9, and 10), and the three 600-208 volt Engineered Safety Features MCC Buses (XS1, XS2, XS3) shall be energized.

(f) For each unit, the 125 VDC Instrumentation and Control Power System shall be operable as specified below:

(13) TS 3.7.9 1. Both 125 VDC instrumentation and control distribution centers (DCA and DCB);

(14) TS 3.7.9 2. (A) All four 125 VDC instrumentation and control panelboards (DIA, DIB, DIC, and DID) (B) including the associated isolating transfer diodes (C) and diode monitors (D) (ADA 1 & 2, ADB 1 & 2, ADC 1 & 2, ADD 1 & 2);

(15) TS 3.7.11 3. All four 120 VAC vital instrumentation power panelboards (KVIA, KVIB, KVIC, and KVID), including the associated static inverter

(16) TS 3.7.11 4. The 240/120 VAC regulated power panelboard (KRA).

5. The 125 VDC Instrumentation and Control (I&C) batteries with associated chargers shall be operable per all the following conditions:

(17) TS 3.7.17 & 18 (a) Each unit, when in a cold shutdown condition, shall have at least one of that unit's I&C batteries operable;

(18) TS 3.7.9 (b) For operation of two or more units, five of the six batteries shall be operable;

(19) TS 3.7.9 (c) For operation of Unit 1, three of the following four batteries shall be operable: 1CA, 1CB, 2CA, and 2CB.

For operation of Unit 2, three of the following four batteries shall be operable: 2CA, 2CB, 3CA, and 3CB.

For operation of Unit 3, three of the following four batteries shall be operable: 3CA, 3CB, 1CA, and 1CB.

(20) TS 3.7.10 (g) Both of the 125 VDC 230KV switching station batteries (SY-1, SY-2), with associated chargers, distribution centers, and panelboards shall be operable.

(21) TS 3.7.1 BASES (h) Both of the 125 VDC Keowee batteries (Bank 1 & 2) with associated chargers and distribution centers (1DA & 2DA) shall be operable.

(22) TS 3.7.1 BASES (i) The level of Keowee Reservoir shall be at least 775 feet above sea level.

23 TS 3.7.1 BASES (j) The Keowee station auxiliary transformers (1X and 2X) and the Keowee station backup auxiliary transformer (CX) shall be operable.

3.7.2 With the reactor heated above 200°F, provisions of 3.7.1 may be modified to allow the following conditions to exist:

24 TS 3.7.1 CONDITION C (a)(1) One of the two independent on-site emergency power paths, as defined in 3.7.1(b), may be inoperable for periods not exceeding 72 hours for test or maintenance, provided the alternate power path is verified operable within one hour of the loss and every ~~eight~~ 12 hours thereafter. 24B

25 TS 3.7.1 CONDITION C (2) Both Keowee station auxiliary transformers (1X and 2X) may be inoperable for periods not exceeding 72 hours for test or maintenance, provided that the backup auxiliary transformer (CX) and its associated underground power path from Oconee switchgear 1TC is operable;

26 TS 3.7.1 CONDITION C (3) Keowee backup auxiliary transformer (CX) and its associated underground power path from Oconee switchgear 1TC may be inoperable for periods not exceeding 72 hours for test or maintenance, provided that the Keowee main step-up transformer and both auxiliary transformers (1X and 2X) are operable;

27 TS 3.7.1 BASES (4) Keowee auxiliary transformer (1X) may be inoperable for test or maintenance provided that Keowee Unit 2 is aligned to the overhead path;

28 TS 3.7.1 BASES (5) Keowee auxiliary transformer (2X) may be inoperable for test or maintenance provided that Keowee Unit 1 is aligned to the overhead path.

29 SEE TABLE 3.7-1 (b) Except for the allowable conditions defined in Specifications 3.7.2(a), 3.7.2(c), 3.7.2(i), 3.7.4, 3.7.6 and 3.7.7 the circuits or channels of any single functional unit of the EPSL may be inoperable for test or maintenance for periods not exceeding 24 hours, provided that:

1. The conditions of Table 3.7-1 for degraded operation are satisified for that specific functional unit; and

30 2. The conditions of Table 3.7-1 for normal operation are satisified for all other functional units.

31 Beyond the conditions allowed by 3.7.2(b)1 and 2, the circuits or channels of more than one functional unit of the EPSL may be inoperable only if:

1. The inoperability results from a loss of power due to the inoperability of a 125 VDC instrumentation and control panelboard (see 3.7.2(e) below); and

(32) TS 3.7.3 → 3.7.6 2. The conditions of Table 3.7-1 for degraded operation are satisfied for the affected functional units.

(33) TS 3.7.0

In any event, if the reactor is subcritical, the inoperable circuit(s) or channel(s) shall be restored to operability and the conditions of Table 3.7-1 for normal operation shall be satisfied for all functional units before the reactor is returned to criticality.

(34) TS 3.7.2 CONDITION A

(c) One 4160 volt main feeder bus may be inoperable for 24 hours.

(35) TS 3.7.2 CONDITION C

(d) One complete single string (i.e., 4160 volt switchgear (TC, TD, or TE), 600 volt load center, (X8, X9, or X10), 600-208 volt MCC (XS1, XS2, or XS3), and their loads) of each unit's 4160 volt Engineered Safety Features Power System may be inoperable for 24 hours.

(e) One or more of the following DC distribution components may be inoperable for periods not exceeding 24 hours[1] (except as noted in 3.7.2(g) below):

(36) TS 3.7.10 CONDITION A

A 1. One complete single string or single component (i.e., 125VDC battery, charger, distribution center, and panelboards) of the 125VDC 230KV Switching Station Power System.

(37) TS 3.7.1 COMPLETION TIME CONSISTENT WITH POWER PATH

2. One complete single string or single component (i.e., 125VDC battery, charger, and distribution center) of the Keowee 125VDC Power System may be inoperable provided the remaining string of the Keowee 125 VDC Power System is operable and electrically connected to an operable Keowee hydro unit.

(38) TS 3.7.9 CONDITION B, D, F

3. One complete single string or single component (i.e., 125VDC battery, charger, distribution center, and associated isolating and transfer diodes) of any units 125VDC Instrumentation and Control Power System. Only one battery more than the number allowed to be inoperable per 3.7.1 (f) for the Station may be removed from service under this paragraph.

(39) TS 3.7.9 CONDITION A

A 4. One 125 VDC instrumentation and control panelboard and its associated loads, per unit, B provided that no additional AC buses are made inoperable beyond the provisions of 3.7.2(a), (c), and (d) C and provided that the conditions of Table 3.7-1 for normal operation are satisfied for all functional units of the EPSL before the 125 VDC instrumentation and control panelboard becomes inoperable. D Additionally, the provisions of 3.7.2.(h) must be observed for the 120 VAC vital instrumentation power panelboard which is powered by the affected 125 VDC panelboard.

(40) TS 3.7.9 CONDITION B

(f) For periods not to exceed 24 hours each unit's 125 VDC system may be separated from its backup unit via the isolating and transfer diodes.

SEE NEXT PAGE

(g) One battery each, from one or more of the following 125VDC systems may be simultaneously inoperable for 72 hours in order to perform an equalizer charge after the surveillance requirements of Specification 4.6.10 or performance test:

36 B

[1] One 230kV switchyard battery and associated distribution center may be inoperable for 7 days for its respective battery replacement modification.

41 TS 3.7.10 CONDITION B 1. 230 KV Switching Station 125VDC Power System

42 TS 3.7.1 CONDITION E 2. Keowee Hydro Station 125VDC Power System

43 TS 3.7.9 CONDITION C 3. Each unit's 125VDC Instrumentation and Control Power System, provided that only one battery more than the number allowed to be inoperable per 3.7.1 (f) (5) for the station is removed from service under this paragraph.

(h) One 120 VAC vital instrumentation power panelboard per unit and/or its associated static inverter may be inoperable for periods as specified below: TS 3.7.11

44 TS 3.7.11

	Panelboard	Maximum Allowed Period of Inoperability
CONDITION A	KVIA	4 hours
CONDITION A	KVIB	4 hours
CONDITION C	KVIC	24 hours
CONDITION C	KVID	24 hours

45 REQ'D ACTION A.1 → C.1 A single vital bus static inverter per unit may continue to be inoperable beyond the specified period, but no longer than 7 days total,
46 A.1→C.1 provided that its associated 120 VAC vital instrumentation power panelboard is connected to the 240/120 VAC Regulated Power System (KRA)
47 A.2→C.2 and verified to be operable once every 24 hours.

48 TS 3.7.1 CONDITIONS A+B

A (i) 1. A startup transformer may be inoperable for periods not exceeding 72 hours for test or maintenance,
B provided the underground feeder path, through transformer CT4, and to two 4160V standby buses is verified operable within one hour of loss and every eight hours thereafter.
C The remaining operable startup transformers can be shared between units within the same 72 hours of the above startup transformer being determined inoperable. Prior to exceeding 72 hours, they shall be aligned and connected such that each one is providing a path for power to one and only one unit.

A 2. In the event that a startup transformer becomes inoperable for unplanned reasons, then one unit shall be in cold shutdown within 72 hours
C with its loads powered from the standby buses. The remaining operable startup transformers can be shared between units within the same 72 hours of the above startup transformer being determined inoperable. Prior to exceeding 72 hours, they shall be aligned and connected such that each one is providing a path for power to one and only one unit.

49 REQ'D ACTION NOT MET.....

3.7.3 In the event that the conditions of Specifications 3.7.1 are not met within the time specified in Specification 3.7.2, except as noted below in Specification 3.7.4, 3.7.5, 3.7.6, 3.7.7, and 3.7.8, the reactor shall be placed in a hot shutdown condition within 12 hours. If these requirements are not met within an additional 48 hours, the reactor shall be placed in the cold shutdown condition within 24 hours.

50 A TS 3.7.1 CONDITION G

B TS 3.7.1 ACTIONS NOTE

3.7.4 In the event that all conditions in Specification 3.7.1 are met except that one of the two Keowee hydro units is expected to be unavailable for longer than the test or maintenance period of 72 hours, the reactor may be heated above 200°F if previously shutdown or be permitted or remain critical or be restarted provided the following restrictions are observed.

51 TS 3.7.1 REQ'D ACTION G.1.1

(a) Prior to heating the reactor above 200°F or prior to the restart of a shutdown reactor or within 72 hours of the loss of one Keowee hydro unit, the 4160 volt standby buses shall be energized by a Lee gas turbine through the 100 kV circuit.

52 TS 3.7.1 BASES

The Lee gas turbine and 100 kV transmission circuit shall be electrically separate from the system grid and offsite non-safety-related loads.

53 TS 3.7.1 REQ'D ACTION G.3

(b) The remaining Keowee hydro unit shall be connected to the unde ground feeder circuit and this path shall be verified operable within 1 hour and weekly thereafter.

54 DELETED

55 TS 3.7.1 COND. G NOTE 1

(c) ~~The remaining Keowee hydro unit shall be available to the overhead transmission circuit~~ but generation to the system grid shall be prohibited except for periods of test.

56 A TS 3.7.1 REQ'D ACTION G.5

(d) Operation in this mode is restricted to periods not to exceed 45 days and the provisions of this specification may be utilized without prior NRC approval only once in three years for each Keowee hydro unit.

B The U.S. NRC Regional Office, Region II, will be notified within 24 hours.

57 TS 3.7.1 CONDITION F

3.7.5 A In the event that all conditions of Specification 3.7.1 are met except that all 230 kV transmission lines are lost,

B the reactor shall be permitted to remain critical or be restarted provided the following restrictions are observed:

C (a) Prior to the restart of a shutdown reactor or within 1 hour of losing all 230 kV transmission lines for an operating reactor, the 4160 volt standby buses shall be energized by one of the Lee gas turbines through the 100 kV transmission circuit.

D The Lee gas turbine and the 100kV transmission circuit shall be completely separate from the system grid and offsite non-safety-related loads.

58 DELETED

(b) The reactor coolant T_{avg} shall be above 525°F. Reactor coolant pump power may be used to elevate the temperature from 500°F to 525° in the case of restart. If T_{avg} decreases belc 500°F, restart is not permitted by this specification.

two

(c) If all 230 kV transmission lines are lost, restore at least one of the inoperable 230kV offsite sources to operable status within 24 hours or be in at least hot standby within the next 6 hours. With only one offsite source restored, restore at least two 230kV offsite circuits to operable status within 72 hours from time of initial loss or be in at least hot standby within the next 6 hours and in cold shutdown within the following 30 hours.

59 TS 3.7.1 CONDITION F (A) (B)

(d) After loss of all 230 kV transmission lines, this information shall be reported within 24 hours to the U.S. NRC Regional Office, Region II. If the outage is expected to exceed 24 hours, a written report shall be submitted detailing the circumstances of the outage and the estimated time to return the 230 kV transmission lines to operating condition.

60 DELETED

1 HOUR

3.7.6 (A) In the event that all conditions of Specification 3.7.1 are met and (B) planned tests or maintenance are required which will make both Keowee units unavailable, the 4160 volt standby buses shall first be energized by a Lee gas turbine through the 100 kV transmission circuit (C) and shall be separate from the system grid and offsite non-safety-related loads. The reactor shall then be permitted to remain critical for (D) periods not to exceed 72 hours with both Keowee units unavailable.

61 TS 3.7.1 CONDITION E

62 (A) Prior to hot restart of a reactor from a tripped condition, the causes and the effects of the shutdown shall be established and analyzed. A (B) restart will be permitted if the cause of such trips is the result of error or of minor equipment malfunctions. A restart will not be permitted if the trip is a result of system transients or valid protection system action.

3.7.7 (A) In the event that all conditions of Specification 3.7.1 are met except that both Keowee hydro units become unavailable for unplanned reasons, (B) the reactor shall be permitted to remain critical for periods not to exceed 24 hours provided the 4160 volt standby buses are energized (C) within 1 hour by the Lee gas turbine through the 100 kV transmission (D) circuit and it shall be separate from the system grid and all offsite non-safety-related loads.

63 TS 3.7.1 CONDITION E

64 (A) Prior to hot restart of a reactor from a tripped condition, the causes and the effects of the shutdown shall be established and analyzed. A (B) restart will be permitted if the cause of such trips is the result of error or of minor equipment malfunctions. A restart will not be permitted if the trip is a result of system transients or valid protection system action.

3.7.8 (A) In the event that all conditions in Specification 3.7.1 are met except (B) that any one of the following is expected to be unavailable for longer than the test or maintenance period of 72 hours, as allowed by 3.7.2(a):

65 TS 3.7.1 CONDITION G

1) Keowee Main Step-up transformer (including both Keowee Auxiliary Transformers);
2) Both Keowee Auxiliary Transformers (1X and 2X);

66 DELETED → 3) Keowee Backup Auxiliary Transformer (CX);

67 TS 3.7.1 ACTIONS NOTE

the reactor may be heated above 200°F if previously shutdown or be permitted to remain critical or be restarted provided the following restrictions are observed:

68 TS 3.7.1 CONDITION G

A (a) Prior to heating the reactor above 200°F or prior to the re-start of a shutdown reactor or within 72 hours of the loss of any one of the following:

1) Keowee Main Step-up Transformer (including both Keowee Auxiliary Transformers);

2) Both Keowee Auxiliary Transformers (1X and 2X);

B TS 3.7.1 COND. C 3) Keowee Backup Auxiliary Transformer (CX);

A the 4160 volt standby buses shall be energized by a Lee gas turbine through the 100kV circuit. C The Lee gas turbine and 100kV transmission circuit shall be electrically separate from the system grid and off-site non-safety related loads.

(b) D A Keowee hydro unit shall be connected to the underground feeder circuit and this path shall be verified operable within 1 hour and weekly thereafter.

69 TS 3.7.1 CONDITION C

(c) The remaining Keowee Hydro Unit shall be available to the overhead if using this Specification due to Keowee Backup Transformer (CX) unavailability. Generation to the system gr shall be prohibited except for periods of test.

If the overhead path is unavailable, the remaining Keowee Hydro Unit must be operable and shall be available to the underground feeder circuit.

70 A TS 3.7.1 REQ'D ACTION G.4

(d) Operating in this mode is restricted to periods not to exceed 28 days and the provisions of this specification may be utilized without prior NRC approval. B The U.S. NRC Regional Office Region II, will be notified within 24 hours.

3.7.9 Any degradation beyond Specifications 3.7.2, 3.7.4, 3.7.5, 3.7.6, 3.7.7, and 3.7.8 above shall be reported to the U.S. NRC Regional Office, Region II, within 24 hours. A safety evaluation shall be performed by Duke Power Company for the specific situation involved which justifies the safest course of action to be taken. The results of this evaluation together with plans for expediting the return to the unrestricted operating conditions of Specification 3.7.1 above shall be submitted in a written report to the Office of Nuclear Reactor Regulation with a copy to the U.S. NRC Regional Office, Region II, within five days.

71 DELETED

Bases

The auxiliary electrical power systems are designed to supply the required Engineered Safeguards loads in one unit and safe shutdown loads of the other two units and are so arranged that no single contingency can inactivate enough engineered safety features to jeopardize plant safety. These systems were designed to meet the following criteria:

TABLE 3.7-1

OPERABILITY REQUIREMENTS FOR THE
EMERGENCY POWER SWITCHING LOGIC CIRCUITS

	Functional Unit	Minimum Operable Circuits/Channels	
		Normal Operation Per Spec 3.7.1(c)	Degraded Operation Per Spec 3.7.2(b)
72 TS 3.7.4	1. Normal Source Voltage Sensing Circuits (One per Phase)	3	2
73 TS 3.7.4	2. Startup Source Voltage Sensing Circuits (One per Phase)	3	2
74 TS 3.7.4	3. Standby Bus Voltage Sensing Circuits (One per Phase on each bus)	6	4[a]
75 TS 3.7.3	4. Main Feeder Bus Undervoltage Relays (~~Three~~ ONE per bus)	6	4[a]
76 TS 3.7.3	5. Load Shed and Transfer to Standby Circuits (Channels A and B)	2	1
77 TS 3.7.6	6. Keowee Emergency Start Circuit (Channels A and B)	2	1
78 TS 3.7.3	7. Retransfer to Startup Circuits (Channels A and B)	2	1
79 TS 3.7.5	8. Normal Source Breakers N1* and N2 Control Circuitry	4[b]	2[c]

Notes: a. 2 per bus.
b. 2 trip coils and associated trip circuitry for each breaker.
c. 1 trip coil and associated trip circuitry for each breaker.

*The trip coils and associated trip circuitry for the N_1 and/or N_2 breaker(s) are not required to be operable if the breaker(s) are in the tripped position.

4.6 EMERGENCY POWER PERIODIC TESTING

Applicability

Applies to the periodic testing surveillance of the emergency power sources.

Objective

To verify that the emergency power sources and equipment will respond promptly and properly when required.

Specification

80 SR3.7.1.2

4.6.1 Monthly, a test of the Keowee Hydro units shall be performed to verify proper operation of these emergency power sources and associated equipment. This test shall assure that:

a. Each hydro unit can be automatically started from the Unit 1 and 2 control room.

b. Each hydro unit can be synchronized through the 230 kV overhead circuit to the startup transformers.

c. Each hydro unit can energize the 13.8 kV underground feeder.

81 SR3.7.1.3 d. The 4160 volt startup transformer main feeder bus breakers and standby bus breaker shall be exercised.

82 SR3.7.1.7

4.6.2 a. Annually, the Keowee Hydro units will be started using the emergency start circuits in each control room to verify that each hydro unit and associated equipment is available to carry load within 25 seconds of a simulated requirement for engineered safety features.

b. Promptly following the above annual test, each hydro unit will be loaded to at least the combined load of the auxiliaries actuated by ESG signal in one unit and the auxiliaries of the other two units in hot shutdown by synchronizing the hydro unit to the offsite power system and assuming the load at the maximum practical rate.

83 SR3.7.1.4 4.6.3 Monthly, the Keowee Underground Feeder Breaker Interlock shall be verified to be operable.

84 SR3.7.1.8 4.6.4 During each refueling outage, a simulated emergency transfer of the 4160 volt main feeder buses to the startup transformer (i.e., CT1, CT2 or CT3) and to the 4160 volt standby buses shall be made to verify proper operation.

85 SR3.7.7.1 RELOCATED TO SLC 4.6.5 Quarterly, the External Grid Trouble Protection System logic shall be tested to demonstrate its ability to provide an isolated power path between Keowee and Oconee.

86 SR3.7.1.5 4.6.6 Annually and prior to planned extended Keowee outages, it shall be demonstrated that a Lee Station combustion turbine can be started and

87

SR 3.7.1.5 connected to the 100 kV line. It shall be demonstrated that the 100 kV line can be separated from the rest of the system and supply power to the 4160 volt main feeder buses.

88 4.6.7 At least once every 18 months, it shall be demonstrated that a Lee station combustion turbine can be started and connected to the isolated 100 kV line and carry the equivalent of the maximum safeguards load of one Oconee unit (4.8 MVA) within one hour.

SR 3.7.1.6

89 4.6.8 Annually, it shall be demonstrated that a Lee station combustion turbine can be started and carry the equivalent of the maximum safeguards load of one Oconee unit plus the safe shutdown loads of two Oconee units on the system grid.

SR 3.7.1.6

90 4.6.9 Batteries in the Instrumentation and Control, Keowee, and Switching Station shall have the following periodic inspections performed to assure maximum battery life. Any battery or cell not in compliance with these periodic inspection requirements shall be corrected to meet the requirements within 90 days or the battery shall be declared inoperable.

TS 3.7.12

a. Weekly verify that:

91 SR 3.7.12.3 (1) The electrolyte level of each pilot cell is in between the minimum and maximum level indication marks.

92 SR 3.7.12.2 (2) The pilot cell specific gravity, corrected to 77°F and full electrolyte level, is $\geq$ 1.200.

93 SR 3.7.12.1 (3) The pilot cell float voltage is $\geq$ 2.12 2.13 VDC.

94 SR 3.7.9.1 (4) The overall battery float voltage is $\geq$ 125 VDC.

b. Quarterly verify that:

95 (A) SR 3.7.12.5 (1) The specific gravity of each cell corrected to 77°F and full electrolyte level, is $\geq$ 1.200 and is not less than
(B) SR 3.7.12.8 0.010 below the average of all cells measured.

96 SR 3.7.12.4 (2) The voltage of each cell under float charge is $\geq$ 2.12 2.13 VDC.

97 SR 3.7.12.6 (3) The electrolyte level of each connected cell is between the minimum and maximum level indication marks.

c. Annually verify that:

98 SR 3.7.9.5 (1) The cells, end-cell plates and battery racks show no visual indication of structural damage or degradation.

99 SR 3.7.9.6 (2) The cell to cell and terminal connections are clean, tight and coated with anti-corrosion grease.

(100) SR 3.7.9.4

4.6.10 Annually, a one hour discharge service test at the required maximum load shall be made on the instrument and control batteries, the Keowee batteries, and the switching station batteries.

(101) SR 3.7.9.2

4.6.11 Monthly, the operability of the individual diode monitors in the Instrument and Control Power System shall be verified by imposing a simulated diode failure signal on the monitor.

(102) SR 3.7.9.3

4.6.12 Semiannually, the peak inverse voltage capability of each auctioneering diode in the 125 VDC Instrument and Control Power System shall be measured and recorded.

Bases

The Keowee Hydro units, in addition to serving as the emergency power sources for the Oconee Nuclear Station, are power generating sources for the Duke system requirements. As power generating units, they are operated frequently, normally on a daily basis at loads equal to or greater than required by Table 8.1-1 of the FSAR for ESF bus loads. Normal as well as emergency startup and operation of these units will be from the Oconee Unit 1 and 2 Control Room. The frequent starting and loading of these units to meet Duke system power requirements assures the continuous availability for emergency power for the Oconee auxiliaries and engineered safety features equipment. It will be verified that these units will carry the equipment of the maximum safeguards load within 25 seconds, including instrumentation lag, after a simulated requirement for engineered safety features. To further assure the reliability of these units as emergency power sources, they will be, as specified, tested for automatic start on a monthly basis from the Oconee control room. These tests will include verification that each unit can be synchronized to the 230 kV bus and that each unit can energize the 13.8 kV underground feeder.

The interval specified for testing of transfer to emergency power sources is based on maintaining maximum availability of redundant power sources.

Starting a Lee Station gas turbine, separation of the 100 kV line from the remainder of the system, and charging of the 4160 volt main feeder buses are specified to assure the continuity and operability of this equipment. The one hour time limit is considered the absolute maximum time limit that would be required to accomplish this.

REFERENCE

FSAR, Section 8

DUKE POWER COMPANY

OCONEE NUCLEAR STATION

ATTACHMENT 4

TECHNICAL JUSTIFICATION

Technical Justification
Attachment 4

Attachment 3 provides a markup of the current approved section 3.7 including a cross reference to the proceeding justifications. These justifications are intended to highlight differences between the current approved section and the proposed section 3.7, they are not intended to provide the basis for requirements in the proposed section 3.7. Therefore, the Bases provided with the proposed section 3.7 are considered to be an integral part of the justification for changes.

1) In general, the Applicability and Objective sections have been relocated to the Bases. The objective section states that safety evaluation and reporting requirements are provided; the new location of specific requirements is identified with the requirement.

2) A. [3.7.1] In general, 3.7.2 through 3.7.8 specify Conditions, Required Actions, and Completion Times. Therefore, this provision of 3.7.1 is now included in the ACTIONS section of TS 3.7.1 through TS 3.7.6, TS 3.7.9, TS 3.7.10, and TS 3.7.11. There is no technical change from current requirements.

   B. [3.7.1] By definition 200°F is cold shutdown. The APPLICABILITY of TS 3.7.1 through TS 3.7.6, TS 3.7.9, TS 3.7.10, and TS 3.7.11 is therefore in most cases "above COLD SHUTDOWN." There is no technical change from current requirements.

3) [3.7.1(a)] Requirements for offsite sources are included in TS 3.7.1. A more complete discussion of independence, rather than a simple requirement for separate towers, is included in the TS section of the Bases. There is no technical change from current requirements.

4) [3.7.1(b)] Requirements for the underground emergency power path are included in TS 3.7.1. The more complete specific listing of components in the underground emergency power path is included in the TS section of the Bases. There is no technical change from current requirements.

5) [3.7.1(b)1] As discussed in #4, a more complete listing of components in the underground emergency power path is included in the TS section of the Bases. There is no technical change from current requirements.

6) [3.7.1(b)2] Requirements for the overhead emergency power path are included in TS 3.7.1. The more complete specific listing of components in the overhead emergency power path is included in the TS section of the Bases. There is no technical change from current requirements.

7) [3.7.1(b)2] As discussed in #6, a more complete listing of components in the overhead emergency power path is included in the TS section of the Bases. There is no technical change from current requirements.

8) [3.7.1(b)2] The restriction regarding alignment of startup transformers

is included in the requirements for overhead emergency power path operability in the TS section of the Bases. Further, TS 3.7.1 Conditions A and B specifically address degradation of a startup transformer. There is no technical change from current requirements.

9) [3.7.1(c)] The new locations for EPSL circuitry operability requirements are identified on the markup to Table 3.7-1.

10) [3.7.1(c)] The restriction on startup with EPSL circuitry inoperable is retained by TS 3.7.0. In fact, TS 3.7.0 is more restrictive in that it does not permit any "mode change" unless the TS is met or a specific exception is provided. This change is an additional restriction not presently included in the Technical Specifications.

11) [3.7.1(d)] Requirements for main feeder bus operability are included in TS 3.7.2. There is no technical change from current requirements.

12) [3.7.1(e)] The three 4160V ESF switchgear buses, 600V load centers, and 600-208V MCC buses have been designated as "ES power system strings" in TS 3.7.2. The specific listing of components in the string is provided in the TS section of the Bases. There is no technical change from current requirements.

13) [3.7.1(f)1] 125VDC I&C Distribution center requirements are included in TS 3.7.9. Requirements for the 125VDC Vital I&C DC System have been modified for clarity: rather than a listing of specific equipment (battery, charger, distribution center) with separate and potentially conflicting requirements, TS 3.7.9 defines a "source" which includes the battery, charger, and distribution center. Operability requirements for the sources are based on single failure analysis and loading analysis for the 125VDC vital I&C panelboards. In certain instances, the 3.7.1(f)1 requirement for both distribution centers could be reduced if the three of four source requirement for each Unit were satisfied. This is acceptable since single failure criteria is met with one distribution center for the plant (ie. one source) inoperable due to the availability of auctioneering diodes.

14) [3.7.1(f)2]

A. 125VDC I&C panelboard requirements are included in TS 3.7.9. A review has been performed to identify inter-Unit dependencies, as a result a specific requirement for redundant DC sources for panelboards 1DIC and 1DID has been added to address single failure criteria for the SK and SL breakers control power, standby bus protective relaying control power, S breaker control power for all three Units, and retransfer-to-startup source switching for all three Oconee Unit's EPSL systems. This is considered an additional restriction not presently included in the technical specifications.

B. 3.7.1(f)2 specifies that the associated isolating transfer diodes be operable, however there is no clear tie to the battery requirements. Operability requirements for the diodes have been developed based on single failure analysis for the 125VDC vital I&C panelboards. These requirements are included by the restriction that no single source may be the only source aligned to more than one panelboard. Expressing diode requirements in these terms is not considered to be a change from current requirements.

C. 3.7.1(f)2 specifies that the associated diode monitors be operable. Diode monitors provide indication only and have no effect on the function of the diodes. SR 3.7.9.2 (measure peak inverse voltage capability of each diode) is an actual test of the diodes and ensures operability. Operability of the diode monitors will be ensured by the normal preventative maintenance program.

D. 3.7.1(f)2 provides the component numbers for required diodes (and diode monitors). These numbers have been retained in the associated Design Basis Document. There is no technical change from current requirements.

15) [3.7.1(f)3] 120VAC Vital I&C power panelboard requirements are included in TS 3.7.11. Detailed requirements regarding the static inverters are included in the TS section of the Bases. There is no technical change from current requirements.

16) [3.7.1(f)4] Requirements for operability of 240/120 VAC regulated power panelboard KRA have been retained as part of TS 3.7.11. Specifically, KRA feeds no safety related loads unless one of the static inverters feeding a vital I&C power panelboard is inoperable. Currently, technical specifications include no actions for inoperability of KRA, unless it is feeding one of the vital I&C power panelboards. These actions have been retained and are discussed in detail with the comments to 3.7.2(h).

17) [3.7.1(f)5(a)] I&C Battery requirements during cold shutdown are specified in TS 3.7.17 and 3.7.18. TS 3.7.17 Vital I&C DC Sources and Distribution - Shutdown/High Decay Heat/Reduced Inventory includes DC source requirements that are significantly more restrictive than the existing requirement for one operable battery. TS 3.7.18 Vital I&C DC Sources and Distribution - Shutdown requires one operable battery as in 3.7.2(f)5(a) as well as additional restrictions on I&C panelboard operability. This change is an additional restriction not presently included in the Technical Specifications.

18) [3.7.1(f)5(b)] The requirements of 3.7.2(f)5(b) have been retained as TS 3.7.9 part 3b. There is no technical change from current requirements.

19) [3.7.1(f)5(c)] The requirements of 3.7.2(f)5(c) have been retained as TS 3.7.9 parts 3b, 3c, and 3d. There is no technical change from current

requirements.

20) [3.7.1(g)] Requirements for 230kV switchyard DC sources and distribution have been retained as TS 3.7.10. Panelboards DYD and DYH are powered from distribution centers SY-DC1 and SY-DC2 respectively, but feed strictly non-safety related loads; these panelboards have specifically been excluded from the requirements of TS 3.7.10. This is not considered to be a technical change.

21) [3.7.1(h)] Requirements for Keowee battery operability are included in the Bases of TS 3.7.1 as a part of emergency power path operability. There is no technical change from current requirements.

22) [3.7.1(i)] Requirements for Keowee reservoir level are included in the Bases of TS 3.7.1 as part of emergency power path operability. There is no technical change from current requirements.

23) [3.7.1(j)] Requirements for Keowee station auxiliary transformers are included in the Bases of TS 3.7.1 as part of emergency power path operability. Transformer 1X is required to be operable only when Keowee Unit 1 is aligned to the overhead emergency power path. Transformer 2X is required to be operable only when Keowee Unit 2 is aligned to the overhead emergency power path. Transformer CX is required for operability of the underground emergency power path. Further details on these requirements are provided in the discussion for 3.7.2(a)(4) and (5). There is no technical change from current requirements.

24) A. [3.7.2(a)(1)] The 72 hour allowable outage time (AOT) for inoperability of one emergency power path has been retained as TS 3.7.1 Required Action C.2. The requirement to verify operability of the remaining emergency power path within one hour has been retained as TS 3.7.1 Required Action C.1. There is no technical change from current requirements.

Required Action C.1 includes a NOTE which permits performance of this verification up to twelve hours prior to inoperability of one of the emergency power paths. This NOTE is considered to be a necessary clarification to the current completion time requirements to permit testing of the remaining emergency power path prior to a planned outage of one emergency power path and to potentially credit routine testing of the emergency power paths.

B. The requirement to verify the remaining emergency power path every eight hours thereafter has been changed to a frequency of twelve hours. The twelve hour frequency has been chosen based on the shift time of twelve hours and the reliability of the Keowee Hydro Units.

25) [3.7.2(a)(2)] If both Keowee station auxiliary transformers 1X and 2X are

inoperable, the overhead emergency power path (as defined in the TS section of TS 3.7.1 Bases) is inoperable. This restriction has been retained as TS 3.7.1 Required Action C.2. There is no technical change from current requirements.

26) [3.7.2(a)(3)] If the Keowee backup auxiliary transformer CX is inoperable, the underground emergency power path (as defined in the TS section of TS 3.7.1 Bases) is inoperable. This restriction has been retained as TS 3.7.1 Required Action C.2. However, the requirement to maintain the Keowee main step-up transformer and both auxiliary transformers operable has been clarified: 1) with the underground emergency power path inoperable due to CX inoperability or any other reason, single failure analyses do not credit availability of both auxiliary transformers since only one is required for operability of the overhead emergency power path; and 2) 3.7.2(a)(4) and (5) would also allow simultaneous inoperability of one auxiliary transformer and backup auxiliary transformer CX provided that the Keowee Unit with an operable auxiliary transformer is aligned to the overhead emergency power path. Thus, there is no technical change from current requirements.

27) [3.7.2(a)(4)] The overhead emergency power path (as described in the TS section of TS 3.7.1 Bases) requires that 1X be operable when Keowee Unit 1 is aligned to the overhead emergency power path. There is no technical change from current requirements.

28) [3.7.2(a)(5)] The overhead emergency power path (as described in the TS section of TS 3.7.1 Bases) requires that 2X be operable when Keowee Unit 2 is aligned to the overhead emergency power path. There is no technical change from current requirements.

29,30,31,32)
[3.7.2(b)] The new location of specific requirements for EPSL functional units is provided in the markup to Table 3.7-1. The restriction on inoperability of circuits or channels of more than one functional unit has only been retained where necessary to satisfy single failure criterion. This allowance exists in the current 3.7 only if the inoperability results from a loss of power due to inoperability of a 125 VDC I&C panelboard. The Table 3.7-1 functional units have been grouped by function and logic dependency in TS 3.7.3 through 3.7.6. Restrictions on operation with multiple functional units inoperable have been retained where necessary to assure there is no loss of safety function. For example, inoperability of one channel of Startup Source Voltage Sensing (TS 3.7.4) has no impact on operability of the EPSL Automatic Transfer Functions (TS 3.7.3), EPSL N and SL breakers (TS 3.7.5), or the Keowee Emergency Start Function channels (TS 3.7.6). TS 3.7.3 groups all EPSL automatic transfer functions and permits both retransfer to startup and load shed/transfer to standby to be inoperable, provided that only Channel A or Channel B is impacted. Configurations which have portions of both Channel A and Channel B inoperable are prohibited since simultaneous inoperability of

both automatic transfer functions could result in a loss of safety function.

33) [3.7.2(b) last paragraph] The restriction on criticality with EPSL circuitry inoperable is retained by TS 3.7.0. In fact, TS 3.7.0 is more restrictive in that it does not permit any "mode change" unless the TS is met or a specific exception is provided. This change is an additional restriction not presently included in the Technical Specifications.

34) [3.7.2(c)] The 24 hour AOT for inoperability of one main feeder bus has been retained as TS 3.7.2 Required Action A.1. One of the causes for main feeder bus inoperability could be inoperability of the associated E and S breakers. However, the definition of an emergency power path would indicate that both emergency power paths must be declared inoperable in this configuration. The appropriate Required Action for this configuration is provided in TS 3.7.2. Therefore, TS 3.7.1 Condition D "one inoperable E breaker and one inoperable S breaker on the same main feeder bus" has been included to direct the operator to the correct Required Actions. There is no technical change from current requirements.

35) [3.7.2(d)] The 24 hour AOT for inoperability of an entire ES power system string has been retained as TS 3.7.2 Required Action B.1.

36) [3.7.2(e)1] The 24 hour AOT for inoperability of the 125VDC 230kV switchyard power system has been retained as TS 3.7.10 Required Action A.1. There is no technical change from current requirements for panelboards which support redundant functions. However, the accident analysis acceptance criteria can be met with panelboards from both distribution centers inoperable provided that redundant panelboards are not inoperable. For example, simultaneous inoperability of panelboard DYA (powered by SY-DC1) and DYF (powered by SY-DC2) is acceptable since the required safety functions would be supported. Simultaneous inoperability of DYA and DYE is prohibited since these panelboards support redundant safety related loads. Thus, appropriate restrictions on panelboard operability have been retained consistent with single failure criteria.

37) [3.7.2(e)2] Requirements for the Keowee 125VDC power systems are included in the Bases of TS 3.7.1 as part of emergency power path operability. The Keowee Unit 1 125VDC power system is required to be operable only when Keowee Unit 1 is operable. The Keowee Unit 2 125VDC power system is required to be operable only when Keowee Unit 2 is operable. The effect of not specifically providing a LCO for the Keowee 125VDC power system is that: 1) Whenever a 125VDC power system is inoperable, the associated Keowee Unit and emergency power path would then be considered to be inoperable, and 2) The AOT for one Keowee 125VDC power system is extended to be consistent with the AOTs for the emergency power paths and the Keowee Units. This is considered to be acceptable since accident analysis assumptions are based on emergency power path operability rather than individual emergency power path components.

38) [3.7.2(e)3] The 24 hour AOT for a complete string or single component of the 125VDC vital I&C distribution system has been retained by equivalent requirements on DC sources and the panelboards. Specifically, if a required battery, charger, and/or distribution center is inoperable TS 3.7.9 Conditions B, D, F, or G would be entered as appropriate; each of these Conditions has a 24 hour Completion Time.

As a result of the review of inter-Unit dependencies, additional restrictions which apply to all three Units have been added for the DC sources for panelboards 1DIC and 1DID. This is considered an additional restriction not presently included in the technical specifications.

39) [3.7.2(e)4] The required actions in the event of 125VDC vital I&C panelboard inoperability have been retained as TS 3.7.9 as detailed below:

A. A maximum of one panelboard per Unit may be inoperable per Condition A. In addition, inoperability of panelboards 1DIC or 1DID would restrict operation of all three Units to 24 hours. This is considered an additional restriction not presently included in the technical specifications.

B(1). The restriction on inoperability of AC buses in the emergency power paths beyond that allowed by 3.7.2(a) has been retained as TS 3.7.1 Required Actions E.2.1 and G.2.1. There is no technical change from current requirements.

B(2). The restriction on inoperability of the main feeder buses beyond that allowed by 3.7.2(c) has been retained as TS 3.7.1 Required Actions E.2.1 and G.2.1.

B(3). The restriction on inoperability of the ES power system strings beyond that allowed by 3.7.2(d) has been retained as TS 3.7.1 Required Actions E.2.1 and G.2.1.

C. The requirement that the conditions of Table 3.7-1 for normal operation be satisfied for all EPSL functional Units prior to inoperability of the panelboard has been retained where necessary in the EPSL TS. The new location of specific requirements for EPSL functional units is provided in the markup to Table 3.7-1. The restriction on inoperability of circuits or channels of more than one functional unit has only been retained where necessary to satisfy single failure criterion. Further detail is provided with Justification 29-32.

D. The requirement that the provisions of 3.7.2(h) be observed for the associated 120VAC vital instrumentation power panelboard has been retained in TS 3.7.11. There is no technical change from current requirements.

40) [3.7.2(f)] The 24 hour AOT on separation of each Unit's 125VDC system from its backup unit has been retained as TS 3.7.9 Condition B. There is

no technical change from current requirements.

41) [3.7.2(g)1] The 72 hour AOT for equalizer charge of the 230kV switchyard batteries has been retained as TS 3.7.10 Required Action B.1. There is no technical change from current requirements.

42) [3.7.2(g)2] The 72 hour AOT for equalizer charge of Keowee batteries is no longer specifically identified since the Keowee batteries are considered part of the emergency power path.

43) [3.7.2(g)3] The 72 hour AOT for equalizer charge of the 125VDC vital I&C batteries has been retained as TS 3.7.9 Required Action C.1. The specific restriction that only one battery more than the number allowed to be inoperable per 3.7.1(f)(5) has been retained due to the format of TS 3.7.9. There is no technical change from current requirements.

44) [3.7.2(h)] The 4 hour AOT for KVIA or KVIB inoperability has been retained as TS 3.7.11 Required Action B.1. The 24 hour AOT for KVIC or KVID inoperability has been retained as TS 3.7.11 Required Action D.1. There is no technical change from current requirements.

45) [3.7.2(h)] The 7 day AOT for inverter inoperability has been retained as TS 3.7.11 Required Action A.3 and C.3. There is no technical change from current requirements.

46) [3.7.2(h)] The requirement to power the inoperable panelboard from KRA has been retained as TS 3.7.11 Required Action A.1 and C.1. The Completion Time is based on the AOT for an inoperable panelboard. There is no technical change from current requirements.

47) [3.7.2(h)] The requirement to verify the panelboard connected to KRA is operable every 24 hours has been retained as TS 3.7.11 Required Action A.2 and C.2. The term "operable" has been changed to "energized" since technically a panelboard that is receiving non-battery backed power is inoperable. There is no technical change from current requirements.

48) [3.7.2(i)] The required actions in the event of startup transformer inoperability due to planned and unplanned reasons has been combined into TS 3.7.1 Conditions A and B as detailed below:

A. The more restrictive AOT of 72 hours **to reach cold shutdown** has been retained as Required Action A.3.2 and B.2.

B. The requirement to verify operability of the underground emergency power path within 1 hour has been retained as Required Action A.1. The requirement to verify operability of the underground emergency power path every eight hours thereafter has been changed to a frequency of twelve hours. The twelve hour frequency has been chosen based on the shift duration of twelve hours and the reliability of the Keowee Hydro Units.

Required Action A.1 includes a NOTE which permits performance of this verification up to twelve hours prior to inoperability of the startup transformer. This NOTE is considered to be a necessary clarification to the current completion time requirements to permit testing of the underground emergency power path prior to a planned outage of a startup transformer and to potentially credit routine testing of the emergency power paths.

C. The allowance (not requirement) to share the operable startup transformer of another unit has been retained as Required Action A.2 due to the importance of providing redundant AC sources for a normal plant shutdown and potential accident scenarios. A 12 hour Completion Time has been established for this Required Action based on the time required to close disconnects to share startup transformers. The requirements to power the cold shutdown unit's loads from the standby buses and align the shared startup transformer to only one unit have not been retained since the voltage and capacity of the shared startup transformer is adequate in this configuration.

49) [3.7.3] The shutdown track specified in 3.7.3 has been retained as a default condition "Required Actions and associated Completion Times not met" for the operating specifications (TS 3.7.1 through TS 3.7.11). There is no technical change from current requirements.

50) [3.7.4] The Keowee Hydro Unit special inoperability period has been retained as TS 3.7.1 Condition G.

A. The requirement that "all conditions in Specification 3.7.1 are met" has been retained as a prerequisite in Required Action G.2.1. This requirement also provides a specific listing of the requirements of the other TS which apply. The existing 3.7 does not address the situation where one of these prerequisites is not met during the special inoperability period; Required Action G.2.2 permits up to 4 hours to restore an inoperable component in this situation. This change is considered to be a necessary clarification to current completion time requirements to avoid an unnecessary shutdown of one or all three Oconee Units due to a lack of redundancy of required equipment.

B. The allowance for "mode change" during the special inoperability period has been retained by a NOTE to the APPLICABILITY of TS 3.7.1 which provides for an exception to TS 3.7.0 when a Lee gas turbine is energizing the standby buses as required by Required Action G.1.

51) [3.7.4(a)] The requirement that the standby buses be energized by a Lee gas turbine through the 100kV circuit has been retained as a prerequisite in TS 3.7.1 Required Action G.1. The existing 3.7 does not explicitly address the situation where this prerequisite is discovered not to be met

during the special inoperability period; Required Action G.1 in the second part of the Completion Time permits up to 1 hour to reenergize the standby buses from a Lee gas turbine. This change is considered to be a necessary clarification to current completion time requirements to avoid an unnecessary shutdown of one or all three Oconee Units due to a lack of redundancy of AC sources.

52) [3.7.4(a)] The requirement to provide a 100kV transmission circuit which is separate from the system grid is considered design type information which is more appropriate for the Bases. There is no technical change from current requirements.

53) [3.7.4(b)] The requirement for verification of operability of the underground emergency power path on a 7 day frequency has been retained as TS 3.7.1 Required Action G.3. The requirement to perform this verification within one hour is retained as TS 3.7.1 Required Action C.1. There is no technical change from current requirements.

54) [3.7.4(c)] The requirement to keep the operable Keowee hydro Unit available to the overhead emergency power path while it is also aligned to the underground emergency power path has been deleted. Use of the overhead emergency power path would require manual operator action to realign the operable Keowee Unit and would only be necessary if there was a concurrent loss of offsite power, failure of the power path from the Lee gas turbine to the standby buses, and failure of the underground emergency power path that did not include the operable Keowee Hydro Unit. Therefore, this requirement is considered to be unnecessarily restrictive given the low likelihood that overhead emergency power path would be used.

55) [3.7.4(c)] The restriction on generation to the system grid has been retained as NOTE 1 to TS 3.7.1 Condition G. There is no technical change from current requirements.

56) [3.7.4(d)]
A. The 45 day per three year period AOT has been retained as TS 3.7.1 Required Action G.5. 3.7.4(d) permits operation with a Keowee Unit inoperable greater than 72 hours under this special inoperability period only once in a three year period without prior NRC approval. For example, if in 1993 a Keowee Unit was inoperable for one day under 3.7.4(d); prior NRC approval would be required if operation under 3.7.4(d) for 0 to 44 days was required between 1993 and 1996. From a cumulative risk perspective, there is no difference between a 45 day inoperability in one day increments spread over 3 years and a 45 day inoperability at any one time during a three year period. Further, it is anticipated that planned inspections and modifications may require inoperability of one Keowee Unit for greater than 72 hours more than one time in a three year period. Based on the above considerations, the "one time" restriction has been deleted.

B. The reporting requirements have been deleted. The existance of a NRC resident inspector makes additional reporting requirements unnecessary.

C. NOTE 2 has been included in Condition G to allow the operable Keowee Hydro Unit to be made inoperable for 12 hours if required to restore both Keowee Hydro Units to operable status. This NOTE is considered to be a necessary clarification to the current completion time requirements to permit restoration of the inoperable Keowee Hydro Unit. This NOTE is also considered to be more restrictive than current requirements which allow 60 hours (72 hours minus 12 hours to HOT SHUTDOWN = 60 hours) for inoperability of both Keowee Hydro Units.

57) [3.7.5] The requirements for inoperable offsite sources have been retained as TS 3.7.1 Condition F.

A. The requirement that "all conditions in Specification 3.7.1 are met" has been retained as Required Action F.2.1. This requirement also provides a specific listing of the requirements of the other TS which apply. The existing 3.7 does not address the situation where one of these requirements is not met while required offsite sources are inoperable; Required Action F.2.2 permits up to 4 hours to restore an inoperable component in this situation. This change is considered to be a necessary clarification to current completion time requirements to avoid an unnecessary shutdown of one or all three Oconee Units due to a lack of redundancy of required equipment.

B. The allowance for "mode change" during the special inoperability period has been retained by a NOTE to the APPLICABILITY of TS 3.7.1 which provides for an exception to TS 3.7.0 when a Lee gas turbine is energizing the standby buses as required by Required Action F.1.

C. The requirement that the standby buses be energized by a Lee gas turbine through the 100kV circuit has been retained as TS 3.7.1 Required Action F.1. The existing 3.7 does not explicitly address the situation where this requirement is discovered not to be met while required offsite sources are inoperable; Required Action F.1 in the second part of the Completion Time permits up to 1 hour to reenergize the standby buses from a Lee gas turbine. This change is considered to be a necessary clarification to current completion time requirements to avoid an unnecessary shutdown of one or all three Oconee Units due to a lack of redundancy of AC sources for a short period of time.

D. The requirement to provide a 100kV transmission circuit which is separate from the system grid is considered design type information which is more appropriate for the Bases. There is no technical change from current requirements.

58) [3.7.5(b)] The restriction on the ability to restart if T_{avg} decreases

below 500°F has been deleted. In the event of degraded conditions in the 230kV switchyard forcing an Oconee Unit to shutdown or to remain shutdown would prevent the additional base load unit from contributing to the ability to restore the grid. Further, there is no basis for the 500°F limit.

59) [3.7.5(c)] The requirements for restoration of inoperable offsite sources have been retained as TS 3.7.1 Required Action F.3 with a 24 hour Completion Time. This Completion Time applies to restoration of all required offsite sources, rather than 24 hours to restore one. This change is an additional restriction not presently included in the technical specifications.

A. The requirement to be in hot standby within the next 6 hours if one of the required offsite sources is not restored has been replaced with the requirement to be in hot shutdown in 12 hours. This change provides consistency with the "shutdown track" for the remainder of TS 3.7 which permits 12 hours to be in hot shutdown.

B. The requirement to restore the required offsite sources has been reduced from 72 hours to 24 hours. The requirement to be in cold shutdown within a total of 108 hours after initial loss has been reduced to 84 hours. This change provides consistency with the "shutdown track" for the remainder of TS 3.7.

60) [3.7.5(d)] Reporting requirements in the event of a loss all 230kV transmission lines have been deleted as they are redundant to 10CFR50.72 and 50.73.

61) [3.7.6] The required actions in the event of inoperability of both Keowee Hydro Units due to planned and unplanned reasons has been combined into TS 3.7.1 Condition E as detailed below:

A. The requirement that "all conditions in Specification 3.7.1 are met" has been retained as Required Action E.2.1. The broad statement in the existing 3.7 is erroneous in that even with both Keowee Units inoperable, the EPSL Keowee emergency start function and the Keowee DC power system would be required to be operable. Appropriate requirements have been retained by providing a specific listing of the requirements of the other TS which apply. In addition, the existing 3.7 does not address the situation where one of these requirements is not met while both Keowee Hydro Units are inoperable; Required Action E.2.2 permits up to 4 hours to restore an inoperable component in this situation. This change is considered to be a necessary clarification to current completion time requirements to avoid an unnecessary shutdown of one or all three Oconee Units due to a lack of redundancy of required equipment.

B. The requirement that the standby buses be energized by a Lee gas turbine has been retained as Required Action E.1. However, the completion time has been changed from being a prerequisite to 1 hour. The 1 hour completion time is consistent with the current completion time in 3.7.7 (both Keowee Hydro units inoperable for unplanned reasons) and 3.7.5 (all 230kV transmission lines lost). The one hour Completion Time is also more restrictive than that allowed by the Standard Technical Specifications (two hours) for two inoperable Diesel Generators. In practice there has been confusion in defining the difference between a "planned" and an "unplanned" outage. There is no difference in the probability or the consequences of postulated events requiring emergency power during this one hour period if the inoperability of both Keowee Hydro Units is due to "planned" or "unplanned" reasons. Although not required by the Technical Specifications, good engineering practice will be followed and the standby buses will be energized by a Lee gas turbine prior to future pre-planned outages of both Keowee Hydro Units.

The existing 3.7 does not explicitly address the situation where this requirement is discovered not to be met when both Keowee Hydro Units are inoperable; Required Action E.1 in the second part of the Completion Time permits up to 1 hour to reenergize the standby buses from a Lee gas turbine. This change is considered to be a necessary clarification to current completion time requirements to avoid an unnecessary shutdown of one or all three Oconee Units due to a lack of redundancy of AC sources.

C. The requirement to provide a 100kV transmission circuit which is separate from the system grid is considered design type information which is more appropriate for the Bases. There is no technical change from current requirements.

D. The 72 hour AOT has been retained as Required Action E.3 and H.1; 60 hours at power plus 12 hours to hot shutdown. There is no technical change from current requirements.

62) [3.7.6]

A. The requirement for identification and analysis of the causes and effects of a reactor trip prior to restart have been retained in existing Systems Engineering Directives for post-trip review. There is no technical change from current requirements.

B. The restriction on restart following a trip has been deleted. This requirement is redundant to the Post trip review, technical specifications, and corrective action requirements of 10CFR50 Appendix B which assure that restart of a unit is safe. The ability to restart an Oconee Unit when the Keowee Units are inoperable and Lee is energizing the standby buses will provide greater grid stability and is considered to decrease the possibility of reliance on the emergency power source.

63) [3.7.7] The required actions in the event of inoperability of both Keowee Hydro Units due to planned and unplanned reasons has been combined into TS 3.7.1 Condition E as detailed below:

A. The requirement that "all conditions in Specification 3.7.1 are met" has been retained as Required Action E.2.1. The broad statement in the existing 3.7 is erroneous in that even with both Keowee Units inoperable, the EPSL Keowee emergency start function and the Keowee DC power system would be required to be operable. Appropriate requirements have been retained by providing a specific listing of the requirements of the other TS which apply. In addition, the existing 3.7 does not address the situation where one of these requirements is not met while both Keowee Units are inoperable; Required Action E.2.2 permits up to 4 hours to restore an inoperable component in this situation. This change is considered to be a necessary clarification to current completion time requirements to avoid an unnecessary shutdown of one or all three Oconee Units due to a lack of redundancy of required equipment.

B. The 24 hour AOT has been extended to 60 hours to be consistent with current requirements for "planned" outages. In practice there has been confusion in defining the difference between a "planned" and an "unplanned" outage. In addition, there is no difference in the probability or the consequences of postulated events requiring emergency power during the additional 36 hour hour period if the inoperability of both Keowee Hydro Units is due to "planned" or "unplanned" reasons.

C. The requirement that the standby buses be energized by a Lee gas turbine has been retained as Required Action E.1. The existing 3.7 does not explicitly address the situation where this requirement is discovered not to be met when both Keowee Hydro Units are inoperable; Required Action E.1 in the second part of the Completion Time permits up to 1 hour to reenergize the standby buses from a Lee gas turbine. This change is considered to be a necessary clarification to current completion time requirements to avoid an unnecessary shutdown of one or all three Oconee Units due to a lack of redundancy of AC sources.

D. The requirement to provide a 100kV transmission circuit which is separate from the system grid is considered design type information which is more appropriate for the Bases. There is no technical change from current requirements.

64) [3.7.7]

A. The requirement for identification and analysis of the causes and effects of a reactor trip prior to restart have been retained in existing Systems Engineering Directives for post-trip review. There is no technical change from current requirements.

B. The restriction on restart following a trip has been deleted. This requirement is redundant to the Post trip review, technical specifications, and corrective action requirements of 10CFR50 Appendix B which assure that restart of a unit is safe. The ability to restart an Oconee Unit when the Keowee Units are inoperable and Lee is energizing the standby buses will provide greater grid stability and is considered to decrease the possibility of reliance on the emergency power source.

65) [3.7.8 1) and 2)] The required actions in the event of Keowee main step-up transformer inoperability and Keowee auxiliary transformer inoperability have been retained as TS 3.7.1 Condition G as detailed below:

A. The requirement that "all conditions in Specification 3.7.1 are met" has been retained as Required Action G.2.1. Appropriate requirements have been retained by providing a specific listing of the requirements of the other TS which apply. In addition, the existing 3.7 does not address the situation where one of these requirements is not met while both Keowee Units are inoperable; Required Action G.2.2 permits up to 4 hours to restore an inoperable component in this situation. This change is considered to be a necessary clarification to current completion time requirements to avoid an unnecessary shutdown of one or all three Oconee Units due to a lack of redundancy of required equipment.

B. The Keowee auxiliary transformers (1X and 2X) are an integral part of the Keowee main step-up transformer. Therefore, the auxiliary transformers need not be identified separately in Condtion G. There is no technical change from current requirements.

66) [3.7.8 3)] The special inoperability period for Keowee backup auxiliary transformer (CX) has been deleted. All inoperabilities of CX will be limited to 72 hours per TS 3.7.1 Condition C since it is defined as part of the underground emergency power path. This change has been proposed since a spare transformer has been made available which should permit changeout of CX within 72 hours.

67) [3.7.8] The allowance for "mode change" during the special inoperability period has been retained by a NOTE to the APPLICABILITY TS 3.7.1 which provides for an exception to TS 3.7.0 when a Lee gas turbine is energizing the standby buses as required by Required Action G.1

68) [3.7.8(a)]
A. The requirement that the standby buses be energized by a Lee gas turbine through the 100kV circuit has been retained as a prerequisite in TS 3.7.1 Required Action G.1. The existing 3.7 does not explicitly address the situation where this prerequisite is discovered not to be met during the special inoperability period; Required Action G.1 in the second part of the Completion Time permits up to 1 hour to reenergize the standby buses from a Lee gas turbine. This change is considered to be a necessary clarification to current completion time requirements to avoid an unnecessary shutdown of one or all three Oconee Units due to a lack of redundancy of AC sources.

B. The special inoperability period for Keowee backup auxiliary transformer (CX) has been deleted. All inoperabilities of CX will be limited to 72 hours per TS 3.7.1 Condition C since it is defined as part of the underground emergency power path. This change has been proposed since a spare transformer has been made available which should permit changeout of CX within 72 hours.

C. The requirement to provide a 100kV transmission circuit which is separate from the system grid is considered design type information which is more appropriate for the Bases. There is no technical change from current requirements.
D. [3.7.8(b)] The requirement for verification of operability of the underground emergency power path on a 7 day frequency has been retained as TS 3.7.1 Required Action G.3. The requirement to perform this verification within one hour is retained as TS 3.7.1 Required Action C.1. There is no technical change from current requirements.

69) [3.7.8(c)] The special inoperability period for Keowee backup auxiliary transformer (CX) has been deleted. All inoperabilities of CX will be limited to 72 hours per TS 3.7.1 Condition C since it is defined as part of the underground emergency power path. This change has been proposed since a spare transformer has been made available which should permit changeout of CX within 72 hours.

70) [3.7.8(d)]
A. The 28 day AOT has been retained as Required Action G.4. There is no technical change from current requirements.

B. The reporting requirements have been deleted. The existance of a NRC resident inspector makes additional reporting requirements unnecessary.

71) [3.7.9] The allowance to continue operation with degradation beyond electrical TS requirements provided reporting and safety evaluation requirements are met has been deleted. Future degradations beyond the requirements of TS 3.7 would require entry into TS 3.0. This is an additional restriction not presently included in the technical specifications.

72) [Table 3.7-1 item 1]
A. Requirements for Normal Source Voltage Sensing Circuits are included in TS 3.7.4. 3.7.2(b) currently allows only one "EPSL Functional Unit" to be inoperable at a time, unless the inoperability is due to loss of power from a 125VDC I&C panelboard. TS 3.7.4 allows one channel of one or more circuits to be inoperable regardless of the cause. This is acceptable since the voltage sensing function would be reduced to 2 out of 2 logic without loss of the voltage sensing function to any bus. Further detail is provided with Justification 29-32.

B. TS 3.7.4 contains a NOTE indicating that Normal Source Voltage Sensing is not required when the N breakers are open. The safety function of the Normal Source Voltage Sensing Circuits is to provide a safety-related trip signal to the N breakers. When the N breakers are open, the Normal Source Voltage Sensing Circuits do not perform a safety function and therefore need not be operable.

C. Currently no surveillance requirements are specified for the Normal Source Voltage Sensing Circuits. SR 3.7.4.1 has been added to require a refueling frequency CHANNEL TEST. This is an additional restriction not presently included in the technical specifications.

73) [Table 3.7-1 item 2]
A. Requirements for Startup Source Voltage Sensing Circuits are included in TS 3.7.4. 3.7.2(b) currently allows only one "EPSL Functional Unit" to be inoperable at a time, unless the inoperability is due to loss of power from a 125VDC I&C panelboard. TS 3.7.4 allows one channel of one or more circuits to be inoperable regardless of the cause. This is acceptable since the voltage sensing function would be reduced to 2 out of 2 logic without loss of the voltage sensing function to any bus. Further detail is provided with Justification 29-32.

B. Currently no surveillance requirements are specified for the Startup Source Voltage Sensing Circuits. SR 3.7.4.1 has been added to require a refueling frequency CHANNEL TEST. This is an additional restriction not presently included in the technical specifications.

74) [Table 3.7-1 item 3]
A. Requirements for Standby Bus Voltage Sensing Circuits are included in TS 3.7.4. 3.7.2(b) currently allows only one "EPSL Functional Unit" to be inoperable at a time, unless the inoperability is due to loss of power from a 125VDC I&C panelboard. TS 3.7.4 allows one channel of one or more circuits to be inoperable regardless of the cause. This is acceptable since the voltage sensing function would be reduced to 2 out of 2 logic without loss of the voltage sensing function to any bus. Further detail is provided with Justification 29-32.

B. Currently no surveillance requirements are specified for the Standby Bus Voltage Sensing Circuits. SR 3.7.4.1 has been added to require a refueling frequency CHANNEL TEST. This is an additional restriction not presently included in the technical specifications.

75) [Table 3.7-1 item 4] The main feeder bus undervoltage relays inputs to Load Shed and Transfer to Standby Logic, however the function of the main feeder bus monitor undervoltage relays (three per bus) has been determined to be non-safety-related by the 4kV Design Basis Document. Requirements for operability of these relays has been replaced by requirements for operability of the main feeder bus undervoltage relays (one per bus) which provides the safety input to the transfer function. These requirements have been included within the TS 3.7.3 EPSL Automatic Transfer Functions.

Requirements for operability of the Main Feeder Bus Monitor Panel will be included in a Selected Licensee Commitment.

76) [Table 3.7-1 item 5] Requirements for Load Shed and Transfer to Standby Circuits are included in TS 3.7.3. 3.7.2(b) currently allows only one "EPSL Functional Unit" to be inoperable at a time, unless the inoperability is due to loss of power from a 125VDC I&C panelboard. TS 3.7.3 allows channel A or B of one or both automatic transfer functions to be inoperable regardless of the cause. This is acceptable since the automatic transfer function would be capable of performing the required safety function with Channel A or Channel B inoperable. Further details are provided in Justification 29-32.

77) [Table 3.7-1 item 6] Requirements for the Keowee Emergency Start Circuit are included in TS 3.7.6. 3.7.2(b) currently allows only one "EPSL Functional Unit" to be inoperable at a time, unless the inoperability is due to loss of power from a 125VDC I&C panelboard. TS 3.7.6 allows one channel of the Keowee Emergency Start Function to be inoperable at the same time as other "Functional Units" regardless of the cause. This is acceptable since the Keowee Emergency Start Function would be capable of performing the required safety function as long as the TS or Required Actions for the remaining functional units were met.

The 24 hour AOT for the Keowee Emergency Start Function has effectively been extended to 72 hours. This is acceptable since from a single failure standpoint, a configuration with one channel inoperable is equivalent to one emergency power path inoperable. The AOT for one emergency power path inoperable is 72 hours.

Entry into 3.7.9 or 3.0 will no longer be required if both channels are inoperable; rather TS 3.7.6 Required Action C.1 requires that both Keowee Hydro Units be declared inoperable. The provisions of TS 3.7.1 Condition E would apply. This is acceptable since a configuration with both channels inoperable is equivalent to (and potentially less significant than) inoperability of both emergency power paths.

78) [Table 3.7-1 item 7] Requirements for Retransfer to Startup Circuits are included in TS 3.7.3. 3.7.2(b) currently allows only one "EPSL Functional Unit" to be inoperable at a time, unless the inoperability is due to loss of power from a 125VDC I&C panelboard. TS 3.7.3 allows channel A or B of one or both automatic transfer functions to be inoperable regardless of the cause. This is acceptable since the automatic transfer function would be capable of performing the required safety function with Channel A or Channel B inoperable. Further details are provided in Justification 29-32.

79) [Table 3.7-1 item 8]
A. Requirements for Normal Source Breaker Control Circuitry are included in TS 3.7.5. 3.7.2(b) currently allows only one "EPSL Functional

Unit" to be inoperable at a time, unless the inoperability is due to loss of power from a 125VDC I&C panelboard. TS 3.7.5 allows one trip coil on one or more breakers to be inoperable regardless of the cause. This is acceptable since the trip coils would be capable of performing the required safety function with with one inoperable on each breaker. Further details are provided in Justification 29-32.

B. Currently no surveillance requirements are specified for the N and SL breakers. SR 3.7.5.1 has been added to require a monthly breaker exercise. This is an additional restriction not presently included in the technical specifications.

80) [4.6.1] The monthly tests of the emergency power paths have been retained as SR 3.7.1.2. There is no technical change from current requirements.

81) [4.6.1.d] The monthly exercise of the E breakers and S breakers has been retained as SR 3.7.1.3. There is no technical change from current requirements.

82) [4.6.2] The annual test of the overhead emergency power path has been retained as SR 3.7.1.7. There is no technical change from current requirements.

83) [4.6.3] The test of the Keowee underground feeder breaker interlock has been retained as SR 3.7.1.4. The test interval has been extended to 6 months based on evaluation of previous test data and interlock design. The interlock is accomplished by use of breaker auxiliary contacts which are not expected to change or fail without hardware modifications. These contacts are excercised routinely during breaker operation.

84) [4.6.4] The simulated emergency transfer of the main feeder buses to the startup transformer and to the standby buses has been retained as SR 3.7.1.8. In addition, SR 3.7.1.8 also requires a retransfer to startup. This is an additional restriction not presently included in the technical specifications.

85) [4.6.5] The quarterly test of the external grid trouble protection system logic has been replaced by a refueling frequency test of the new EPSL Degraded Grid Voltage Protection System per SR 3.7.7.1. Analysis has shown grid voltage values become critical for ES actuation at voltages less than normal values and greater than the External Grid Trouble Protection System (EGTPS) setpoints. The new system provides protection for safety systems. Therefore, primary DBA protection is provided by the new system. The frequency portion of the EGTPS will be maintained as safety related. A Selected Licensee Commitment (SLC) will be provided to contain the logic test requirement of 4.6.5.

86/87) [4.6.6] The annual test from a Lee Gas Turbine to the main feeder buses has been replaced with a test which does not imply connection to the main feeder buses. More frequent cycling of the standby breakers is performed per SR 3.7.1.3. The new surveillance is SR 3.7.1.5. 4.6.6 infers that there is a separate surveillance performed prior to "planned extended Keowee outages." TS 3.7.1 Required Action G.1 effectively includes this requirement for all extended Keowee outages by requiring the standby buses be energized by a Lee gas turbine prior to exceeding 72 hours. There are no technical changes from current requirements.

88) [4.6.7] The 18 month loading (to max ES load of one Oconee Unit) of a Lee gas turbine through the isolated 100kV line has been combined with 4.6.8 to require annual loading (to one Unit's ES load plus two Unit's hot shutdown load) on the system grid within one hour. The new surveillance is SR 3.7.1.6. SR 3.7.1.6 does not require loading 4.8MVA onto the isolated 100kV line. The 4.8MVA value was based on previous load demand calculations for a single unit with a LOCA. Current calculations show that the load demand would be significantly more. It is not possible to provide this load from a shutdown unit for testing, therefore the load testing requirements for the isolated 100kV line have been made consistent with the test requirements for the Keowee Units.

89) [4.6.8] The requirements of 4.6.8 have been retained as SR 3.7.1.6. By combining 4.6.8 with 4.6.7, SR 3.7.1.6 includes the time restriction of 1 hour. This is an additional restriction not presently included in the technical specifications.

90) [4.6.9] The 90 day AOT for battery cell parameters has been retained as TS 3.7.12 Required Actions D.1, E.1, F.1, and G.1. There is no technical change from current requirements.

91) [4.6.9a(1)] The weekly verification of pilot cell electrolyte level has been retained as SR 3.7.12.3. There is no technical change from current requirements.

92) [4.6.9a(2)] The weekly verification of pilot cell specific gravity has been retained as SR 3.7.12.2. There is no technical change from current requirements.

93) [4.6.9a(3)] The weekly verification of pilot cell float voltage has been retained as SR 3.7.12.1. The acceptance criterion has been increased from 2.12VDC to 2.13VDC consistent with IEEE 450-1980 guidance.

94) [4.6.9a(4)] The weekly verification of overall battery float voltage has been retained as SR 3.7.9.1. There is no technical change from current requirements.

95) [4.6.9b(1)]
A. The quarterly verification of specific gravity has been retained as SR 3.7.12.5. There is no technical change from current requirements.

B. The quarterly comparison of average cell specific gravity has been retained as SR 3.7.12.8. There is no technical change from current requirements.

96) [4.6.9b(2)] The quarterly verification of cell float voltage has been retained as SR 3.7.12.4. The acceptance criterion has been increased from 2.12VDC to 2.13VDC consistent with IEEE 450-1980 guidance.

97) [4.6.9b(3)] The quarterly verification of electrolyte level has been retained as SR 3.7.12.6. There is no technical change from current requirements.

98) [4.6.9c(1)] The annual verification of battery integrity has been retained as SR 3.7.9.5. There is no technical change from current requirements.

99) [4.6.9c(2)] The annual verification of battery connections has been retained as SR 3.7.9.6. There is no technical change from current requirements.

100) [4.6.10] The annual battery service test has been retained as SR 3.7.9.4. There is no technical change from current requirements.

101) [4.6.11] The monthly test of the diode monitors has been retained as SR 3.7.9.2. There is no technical change from current requirements.

102) [4.6.12] The semiannual test of the auctioneering diodes has been retained as SR 3.7.9.3. There is no technical change from current requirements.

ADDITIONAL REQUIREMENTS NOT CURRENTLY INCLUDED IN TECHNICAL SPECIFICATIONS

1) There are currently no Tech Spec requirements for operability of the SL breaker trip coils. If power is lost to transformer CT-5 while it is energizing the standby buses, the SL breakers must open to allow CT-4 to energize the standby buses. Thus, the SL breaker function is similar to that of the N breakers. TS 3.7.5 has been developed to address requirements for the N and SL breakers.

2) There are currently no Tech Spec requirements to exercise the N and SL breakers. 4.6.1.d requires exercise of the E breakers and S breakers to ensure availability of these infrequently used breakers. Since the N and SL breakers are used infrequently, SR 3.7.5.1 has been developed to require a monthly exercise. Currently, the N breakers are cycled with the E breakers.

3) There are currently no Tech Spec requirements to verify proper AC distribution system alignment. SR 3.7.2.1 has been developed to require

a weekly verification of correct breaker alignment and indicated power availability for the AC distribution system.

4) As described in LER 269/90-05 degraded grid protection is currently addressed in Tech Specs by the undervoltage setpoints of the E breakers. TS 3.7.7 has been developed based on the new EPSL Degraded Grid Voltage Protection system.

5) There are currently no specific Tech Spec requirements in the event that battery electrolyte level is below the top of the cell plates, cell float voltage is < 2.07 volts, or electrolyte temperature is < 60°F. TS 3.7.12 Conditions A, B, and C have been developed to require that the associated DC source be declared inoperable in these situations.

6) There are currently no specific Tech Spec requirements in the event that more than two cells have been jumpered in one battery. TS 3.7.12 Condition H has been developed to require that the associated DC source be declared inoperable in this situation.

7) There are currently no Tech Spec requirements to verify operability of interlocks preventing the Keowee Unit which is aligned to the underground path from automatically closing to the overhead path. SR 3.7.1.2 includes this requirement.

DUKE POWER COMPANY

OCONEE NUCLEAR STATION

ATTACHMENT 5

NO SIGNIFICANT HAZARDS CONSIDERATION EVALUATION

NO SIGNIFICANT HAZARDS CONSIDERATION EVALUATION

Duke Power Company (Duke) has made the determination that this amendment request involves a No Significant Hazards Consideration by applying the standards established by NRC regulations in 10CFR50.92. This ensures that operation of the facility in accordance with the proposed amendment would not:

(1) <u>Involve a significant increase in the probability or consequences of an accident previously evaluated:</u>

Each accident analysis addressed within the Oconee Final Safety Analysis Report (FSAR) has been examined with respect to the changes proposed within this amendment request. The probability of any Design Basis Accident (DBA) is not affected by this change, nor are the consequences of a DBA affected by this change since the proposed amendment assures availability of electrical power systems and is therefore not considered to be an initiator or contributor to any accident analysis addressed in the Oconee FSAR. Therefore, there will be no significant increase in the probability or consequences of any previously evaluated accidents.

(2) <u>Create the possibility of a new or different kind of accident from any kind of accident previously evaluated:</u>

Operation of ONS in accordance with these Technical Specifications will not create any failure modes not bounded by previously evaluated accidents. Consequently, this change will not create the possibility of a new or different kind of accident from any kind of accident previously evaluated.

(3) <u>Involve a significant reduction in a margin of safety:</u>

The design basis of auxiliary electrical systems is to supply the required ES loads of one Unit and safe shutdown loads of the other two units. The proposed amendment assures the availability of electrical power systems, thus preserving the existing margin of safety. Therefore, there will be no significant reduction in any margin of safety.

Duke has concluded based on the above, and the technical justification in Attachment 4 that there are no significant hazards considerations involved in this amendment request.

DUKE POWER COMPANY

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ATTACHMENT 6

SELECTED LICENSEE COMMITMENTS (FSAR CHAPTER 16)

16.8 ELECTRICAL POWER SYSTEMS

16.8.1 Main Feeder Bus Monitor Panel (MFBMP)

SLC 16.8.1 The MFBMP shall be OPERABLE as follows:

1) Three undervoltage sensing relays per bus, and

2) Two channels of undervoltage actuation logic.

APPLICABILITY: Above COLD SHUTDOWN

ACTIONS

CONDITION		REQUIRED ACTION		COMPLETION TIME
A.	One undervoltage sensing relay inoperable one or both MFBs.	A.1	Restore undervoltage sensing relays to OPERABLE status.	7 days
B.	One actuation logic channel inoperable.	C.1	Restore one logic channel to OPERABLE status.	7 days
C.	Two logic channels inoperable. OR Two or more undervoltage sensing relays inoperable on one or both MFBs.	C.1	Restore one logic channel to OPERABLE status.	24 hours
D.	Required Action and associated Completion Time not met.	D.1	Prepare a station report in accordance with XXX.	30 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 16.8.1.1 Perform a CHANNEL TEST.	Refueling

BASES

SLC (continued)

channels. Each channel has two time-delay and auxiliary relays, one time delay relay and one auxiliary relay for each MFB. Both time delay relays and auxiliary relays for each channel must actuate for the associated channel to operate.

APPLICABILITY

This system is required above COLD SHUTDOWN to coincide with requirements for ES and other support/protective systems used to ensure adequate power is available for core and containment protection.

ACTIONS

A.1

One undervoltage sensing relay on each MFB, or one undervoltage sensing relay on both MFBs degrades both MFBMP channels to a 2/2 logic. However, both channels can still perform the intended function. The allowable time of 7 days was chosen to provide adequate time for restoration and any needed verifications. The completion time is based on engineering judgement, taking into consideration the time required to complete the required action and the availability of the remaining relays.

B.1

One actuation logic channel inoperable still allows the MFBMP system to function through the redundant channel. However, the system is vulnerable to single failure and therefore the allowable time for restoration of one channel is limited to 7 days. The completion time is based on engineering judgement, taking into consideration the time required to complete the required action and the availability of the remaining channel.

C.1

When both actuation logic channels are inoperable or there are two or more undervoltage sensing relays inoperable on one or both MFBs, all automatic protection for LOOP events are removed. This places additional burden on the operators, even though they are still the credible resource for restoring power in a LOOP event. EPSL response from ES events are not

(continued)

ACTIONS

C.1 (continued)

affected. Therefore, allowable time for this condition is limited to 24 hours. The completion time is based on engineering judgement taking into consideration the time to complete the required action, and the availability of adequate time for operator response to a LOOP.

D.1

If the Required Actions and associated completion times cannot be met, a station report should be prepared in accordance with XXX. Operator action is the credited response to mitigate a postulated LOOP, therefore no limitations are placed on Unit operations.

SURVEILLANCE REQUIREMENTS

SR 16.8.2.1

A Refueling surveillance test is to be performed to verify relay actions and alarms. Timer calibrations are also verified at a frequency determined by relay reliability.

REFERENCES

4 kV System Design Basis Document, OSS-0254.00-00-2000.

STATION MANAGER APPROVAL______________________ DATE______________________

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ELECTRICAL POWER SYSTEMS

.2 External Grid Trouble Protection System (EGTPS)

16.8.2 Quarterly, the EGTPS logic shall be tested to demonstrate its ability to provide an isolated power path between Keowee and Oconee.

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ES

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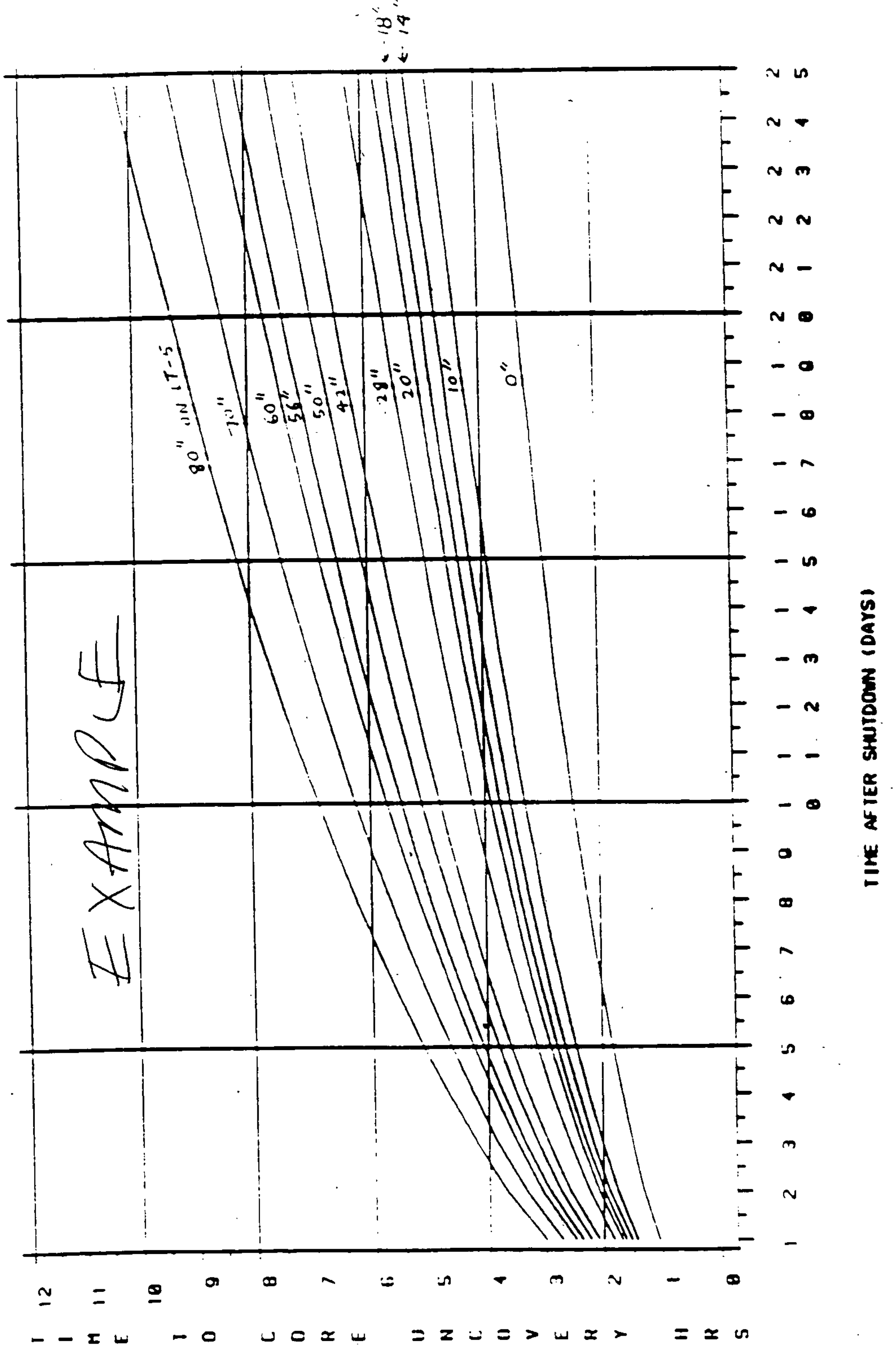
FIGURE 16.8-1


TIME AFTER SHUTDOWN (DAYS)
TIME TO CORE UNCOVERY HRS
80" on LT-5
70"
60"
56"
50"
42"
28"
20"
18"
14"
10"
0"
EXAMPLE

BASES

BACKGROUND

Technical Specifications 3.7.13 through 3.7.18 specify the Applicability based on the amount of time to core uncovery following a loss of power for decay heat removal. If this time is < 2.5 hours, the "Shutdown/High Decay Heat/Reduced Inventory" TS will apply. If this time is ≥ 2.5 hours, the "Shutdown" TS will apply. This SLC provides curves with time after shutdown versus reactor vessel level in order to determine which Electrical Power Systems TS apply.

APPLICABLE SAFETY ANALYSES

Loss of DHR scenarios are not addressed in the FSAR. In response to Generic Letter (GL) 88-17, Duke Power performed analyses for loss of DHR events. These analyses used bounding decay heat values to conservatively estimate the time to core boiling, core uncovery, and core damage as a function of initial (RCS) inventory values. Other assumptions were made which are consistent with conditions that would exist prior to entering a reduced inventory mode of operation (RCS vented to reactor building and RCS temperature less that 140°F). Additional analyses have been performed that provide the time to boil based on various temperatures < 140°F.

The more restrictive requirements of the Electrical Power Systems TS shall be met when in COLD SHUTDOWN or REFUELING SHUTDOWN and the RCS inventory and core decay heat values are such that the core would become uncovered in less than 2.5 hours for a loss of DHR event. This transition point is a calculated value which uses actual RCS inventory and time after shutdown as the invoking parameters.

The time of 2.5 hours to core uncovery has been chosen as the point where additional redundancy is or is not required of the Electrical Power System. For conditions where greater than 2.5 hours are available prior to core uncovery, adequate time is available for plant personnel to restore electrical power. Also, plant emergency response personnel would have sufficient time to support the normal shift operating personnel in restoring core cooling. For conditions where less than 2.5 hours are available to core uncovery, the requirements for additional redundancy should prevent any extended loss of DHR due to loss of the Electrical Power System.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)	The 2.5 hour time is derived from NRC GL 88-17, which recommends this guideline for plants of Oconee's configuration, for establishing containment closure after a loss of DHR event. GL88-17 intends that closure be established prior to making a release associated with core damage. Duke's conservative prediction of the time to "core uncovery," in regard to these shutdown requirements, is such that additional margin/time exists until the time of actual core uncovery and the subsequent time at which core damage and the associated release of radioactive material would occur. Therefore, these shutdown requirements for the electrical systems provide the capability of establishing containment closure prior to any large release due to a loss of DHR caused by a loss of power, in a manner similar to that recommended in GL 88-17. The 2.5 hour time to core uncovery is also a logical point at which to apply additional restrictions which reduce the probability of a loss of power, analogous to the reduced inventory point at which additional restrictions are imposed through Duke's commitments to GL88-17. A loss of inventory event is not expected to occur coincident with a loss of electrical power to the DHR systems. With no fuel in the core, this SLC does not apply.
SLC	The combination of Time After Shutdown and Reactor Vessel Level (LT-5) as shown in Figure 16.8-1 shall be used to determine the time to core uncovery following a loss of power for decay heat removal. The time to core uncovery determines which Electrical Power Systems Technical Specifications (TS 3.7.13 through 3.7.18) apply.
APPLICABILITY	Use of this SLC is required when in COLD SHUTDOWN or REFUELING SHUTDOWN to coincide with associated Electrical Power Systems TS requirements.
REFERENCES	GL 88-17

STATION MANAGER APPROVAL______________________DATE__________

DUKE POWER COMPANY

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ATTACHMENT 7

DIFFERENCES BETWEEN OPERATING AND SHUTDOWN REQUIREMENTS

COMPARISON OF NEW SHUTDOWN TECHNICAL SPECIFICATIONS WITH OPERATING TECHNICAL SPECIFICATIONS

In a December 9, 1991 meeting with the NRC staff regarding proposed new Technical Specification requirements for shutdown modes, the staff requested that a comparison be provided between the new shutdown requirements and the operating requirements. The following information is provided as a brief summary. Specific requirements are delineated in the Technical Specifications and associated Bases. All requirements are the same, except where noted.

TS 3.7.1 AC Sources - Operating
TS 3.7.13 AC Sources - Shutdown/High Decay Heat/Reduced Inventory
TS 3.7.14 AC Sources - Shutdown

The operating specification references offsite sources and emergency power paths while the shutdown sections address requirements to transformers, regardless of how many sources may supply them. The number of transformers required are decreased based on decay heat levels and RCS water inventory in reference to the number of hours to core uncovery due to a loss of power/decay heat removal.

TS 3.7.2 AC Distribution - Operating
TS 3.7.15 AC Distribution - Shutdown/High Decay Heat/Reduced Inventory
TS 3.7.16 AC Distribution - Shutdown

The operating specification requires both Main Feeder buses and all three complete ES power strings energized. Both of the MFBs must be connected to at least 2 of three power strings. The TS 3.7.15 is identical to TS 3.7.2 with the exception of "default" Required Actions and specific requirements for loss of both MFBs specific requirements for loss of two or three 4160V switchgear buses. TS 3.7.16 only requires one MFB energized, but two of the three 4160V switchgear buses must be energized. The change in requirements from ES Power Strings to 4160V switchgear buses is to prevent unnecessary restrictions in electrical maintenance activities below the level of 4160V during times when ES systems are not required.

TS 3.7.3 EPSL Automatic Transfer Functions

There is no corresponding shutdown TS.

TS 3.7.4 EPSL Voltage Sensing Circuits

There is no corresponding shutdown TS.

TS 3.7.5 EPSL N and SL breakers.

There is no corresponding shutdown TS, however implicit in the AC source requirements is the capability to operate required breakers to provide primary and backup power to the MFBs.

TS 3.7.6 EPSL Keowee Emergency Start Function

There is no corresponding shutdown TS, however implicit in the AC source requirements is the capability to start Keowee Hydro Unit(s) when necessary.

TS 3.7.7 EPSL Degraded Grid Voltage Protection

There is no corresponding shutdown TS, degraded grid protection is provided by the undervoltage setpoints of the E and N breakers in shutdown modes.

TS 3.7.8 EPSL CT-5 Degraded Grid Voltage Protection

There is no corresponding shutdown TS, degraded grid protection is provided by standby bus voltage sensing in shutdown modes.

TS 3.7.9 Vital I&C DC Sources and Distribution - Operating
TS 3.7.17 Vital I&C DC Sources and Distribution - Shutdown/High Decay Heat/Reduced Inventory

1) 1DIC and 1DID are not required for Units 2 and 3 in 3.7.16.
2) The 72 hour AOT for equalizer charge is not permitted by 3.7.16.

TS 3.7.9 Vital I&C DC Sources and Distribution - Operating
TS 3.7.18 Vital I&C DC Sources and Distribution - Shutdown

1) TS 3.7.17 allows one panelboard to be inoperable indefinitely.
2) TS 3.7.17 allows a single source to be the only source aligned to more than one panelboard.
3) TS 3.7.17 requires one of two sources (not from backup unit) rather than three of four sources in 3.7.9.

TS 3.7.10 230kV Switchyard DC Sources and Distribution

There is no corresponding shutdown TS. Loads supplies from 230kV Switchyard DC system are addressed by TS 3.7.13 and 3.7.14.

TS 3.7.11 AC Vital Distribution - Operating

There is no corresponding shutdown TS. Loads supplied from vital AC (i.e. NIs) are addressed in their own TS or SLC.

TS 3.7.12 Battery Cell Parameters

The TS applies to both operating and shutdown; whenever the associated DC sources are required to be OPERABLE.