3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources – Operating

LCO 3.8.1 The following AC electrical sources shall be OPERABLE:

a. Two qualified circuits per bus between the offsite transmission network and the onsite Class 1E AC Electrical Power Distribution System; and

b. Two Diesel Generators (DGs) capable of supplying the onsite Class 1E AC Electrical Power Distribution System.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more buses with one required qualified circuit inoperable.	A.1 Perform SR 3.8.1.1 for the required OPERABLE qualified circuits.	1 hour AND Once per 8 hours thereafter
	AND	
	A.2 Restore required qualified circuit(s) to OPERABLE status.	72 hours AND 6 days from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. One required DG inoperable.	B.1	Perform SR 3.8.1.1 for the required qualified circuits.	1 hour AND Once per 8 hours thereafter
	AND		
	B.2	Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	AND		
	B.3.1	Determine OPERABLE DG is not inoperable due to common cause failure.	24 hours
	OR		
	B.3.2	Perform SR 3.8.1.2 for OPERABLE DG.	24 hours
	AND		
	B.4	Restore DG to OPERABLE status.	72 hours AND 6 days from discovery of failure to meet LCO

(continued)

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ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One or more buses with two required qualified circuits inoperable.	C.1 Restore one required qualified circuit per bus to OPERABLE status.	24 hours
D. One DG inoperable and one or more buses with one required qualified circuit inoperable. OR One DG inoperable and one bus with two required qualified circuits inoperable.	-------------NOTE------------- Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems – Operating," when Condition D is entered with no AC power source to a division. ------------------------------	
	D.1 Restore required qualified circuit(s) to OPERABLE status.	12 hours
	OR	
	D.2 Restore DG to OPERABLE status.	12 hours
E. Two DGs inoperable.	E.1 Restore one DG to OPERABLE status.	2 hours
F. Required Action and associated Completion Time of Condition A, B, C, D, or E not met.	F.1 Be in MODE 3.	6 hours
	AND	
	F.2 Be in MODE 5.	36 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
G. Two DGs inoperable, and one or more buses with one or more required qualified circuits inoperable. OR One DG inoperable, one bus with two required qualified circuits inoperable, and the second bus with one or more required qualified circuits inoperable.	G.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.1.1	Verify correct breaker alignment and indicated power availability for each required qualified circuit.	7 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

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SURVEILLANCE		FREQUENCY
SR 3.8.1.2	-------------------NOTE------------------- A modified DG start involving idling and gradual acceleration to synchronous speed may be used for this SR. When modified start procedures are not used, the time, voltage, and frequency tolerances of SR 3.8.1.7 must be met. Performance of SR 3.8.1.7 satisfies this SR. -- Verify each DG starts from standby condition and achieves steady state voltage ≥ 3950 V and ≤ 4580 V and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	31 days
SR 3.8.1.3	-------------------NOTES------------------- 1. DG loadings may include gradual loading as recommended by the manufacturer. 2. Momentary transients outside the load range do not invalidate this test. 3. This Surveillance shall be conducted on only one DG at a time. 4. This SR shall be preceded by and immediately follow without shutdown a successful performance of SR 3.8.1.2 or SR 3.8.1.7. -- Verify each DG is synchronized and loaded and operates for ≥ 60 minutes at a load ≥ 4950 kW and ≤ 5500 kW.	31 days
SR 3.8.1.4	Verify each day tank contains ≥ 450 gal of fuel oil.	31 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.5	Check for and remove accumulated water from each day tank.	31 days
SR 3.8.1.6	Verify the fuel oil transfer system operates to automatically transfer fuel oil from storage tank(s) to the day tank.	31 days
SR 3.8.1.7	Verify each DG starts from normal standby condition and achieves in ≤ 10 seconds, voltage ≥ 3950 V and ≤ 4580 V, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	184 days
SR 3.8.1.8	Verify manual transfer of AC power sources from the required normal qualified circuit(s) to the reserve required qualified circuit(s).	18 months

RevC

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.9	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1 or 2. -- Verify each DG rejects a load greater than or equal to its associated single largest post-accident load, and: a. Following load rejection, the frequency is ≤ 64.5 Hz; b. Following load rejection, the steady state voltage is maintained ≥ 3950 V and ≤ 4580 V; and c. Following load rejection, the steady state frequency is maintained ≥ 58.8 Hz and ≤ 61.2 Hz.	18 months
SR 3.8.1.10	-------------------NOTES------------------- 1. Momentary transients above the voltage limit immediately following a load rejection do not invalidate this test. 2. This Surveillance shall not be performed in MODE 1 or 2. -- Verify each DG does not trip and voltage is maintained ≤ 4784 V during and following a load rejection of ≥ 4950 kW and ≤ 5500 kW.	18 months

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(continued)

RAI 3.8.1-17

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.11	------------------NOTE------------------ This Surveillance shall not be performed in MODE 1, 2, 3, or 4. --- Verify on an actual or simulated loss of offsite power signal: a. De-energization of ESF buses; b. Load shedding from ESF buses; and c. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤ 10 seconds, 2. energizes auto-connected shutdown loads through the shutdown load sequence timers, 3. maintains steady state voltage ≥ 3950 V and ≤ 4580 V, 4. maintains steady state frequency ≥ 58.8 Hz and ≤ 61.2 Hz, and 5. supplies permanently connected and auto-connected shutdown loads for ≥ 5 minutes.	18 months

(continued)

RAI 3.8-17

REV C

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.12	Verify on an actual or simulated Engineered Safety Feature (ESF) actuation signal each DG auto-starts from standby condition and: a. In ≤ 10 seconds achieves voltage ≥ 3950 V and ≤ 4580 V; b. In ≤ 10 seconds achieves frequency ≥ 58.8 Hz and ≤ 61.2 Hz; and c. Operates for ≥ 5 minutes.	18 months
SR 3.8.1.13	Verify each DG's automatic trips are bypassed on actual or simulated loss of voltage signal on the emergency bus concurrent with an actual or simulated ESF actuation signal except: a. Engine overspeed; and b. Generator differential current.	18 months
SR 3.8.1.14	-------------------NOTES------------------- 1. Momentary transients outside the load range do not invalidate this test. 2. This Surveillance shall not be performed in MODE 1 or 2. --- Verify each DG operates for ≥ 24 hours: a. For ≥ 2 hours loaded ≥ 5775 kW and ≤ 6050 kW; and b. For the remaining hours of the test loaded ≥ 4950 kW and ≤ 5500 kW.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.15	------------------NOTES------------------ 1. This Surveillance shall be performed within 5 minutes of shutting down the DG after the DG has operated ≥ 2 hours loaded ≥ 4950 kW and ≤ 5500 kW or until operating temperature has stabilized. 2. Momentary transients outside of load range do not invalidate this test. -- Verify each DG starts and achieves in ≤ 10 seconds voltage ≥ 3950 V and ≤ 4580 V, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	18 months
SR 3.8.1.16	------------------NOTE------------------ This Surveillance shall not be performed in MODE 1, 2, 3, or 4. -- Verify each DG: a. Synchronizes with offsite power source while loaded with emergency loads upon a simulated restoration of offsite power; b. Transfers loads to offsite power source; and c. Returns to ready-to-load operation.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.17	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. -- Verify, with a DG operating in test mode and connected to its bus, an actual or simulated ESF actuation signal overrides the test mode by: a. Returning DG to ready-to-load operation; and b. Automatically energizing the emergency load from offsite power.	18 months
SR 3.8.1.18	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. -- Verify interval between each sequenced load block is within ± 10% of design interval for each safeguards and shutdown sequence timer.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

RAI 3.8.1-17

SURVEILLANCE		FREQUENCY
SR 3.8.1.19	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. --- Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ESF actuation signal: a. De-energization of ESF buses; b. Load shedding from ESF buses; and c. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤ 10 seconds, 2. energizes auto-connected emergency loads through the safeguards sequence timers, 3. achieves steady state voltage ≥ 3950 V and ≤ 4580 V, 4. achieves steady state frequency ≥ 58.8 Hz and ≤ 61.2 Hz, and 5. supplies permanently connected and auto-connected emergency loads for ≥ 5 minutes.	18 months
SR 3.8.1.20	Verify when started simultaneously from standby condition, each DG achieves, in ≤ 10 seconds, frequency ≥ 58.8 Hz.	10 years

RAI 3.8.1-17

3.8 ELECTRICAL POWER SYSTEMS

3.8.2 AC Sources – Shutdown

LCO 3.8.2 The following AC electrical power sources shall be OPERABLE:

a. One qualified circuit between the offsite transmission network and the onsite Class 1E AC electrical power distribution subsystem(s) required by LCO 3.8.10. "Distribution Systems – Shutdown"; and

b. One Diesel Generator (DG) capable of supplying one division of the onsite Class 1E AC electrical power distribution subsystem(s) required by LCO 3.8.10.

RAI 3.8.2-2

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

------------------------------------NOTE------------------------------------
LCO 3.0.3 is not applicable.

RAI 3.8.1-22

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required qualified circuit inoperable.	------------NOTE------------ Enter applicable Conditions and Required Actions of LCO 3.8.10, with one required division de-energized as a result of Condition A. -----------------------------	
	A.1 Declare affected required feature(s) with no offsite power available inoperable.	Immediately
	OR	
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND	
	A.2.4 Initiate action to restore required qualified circuit to OPERABLE status.	Immediately
	AND	
	A.2.5 Declare affected Low Temperature Overpressure Protection (LTOP) feature(s) inoperable.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. Required DG inoperable.	B.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	B.2	Suspend movement of irradiated fuel assemblies.	Immediately
	AND		
	B.3	Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND		
	B.4	Initiate action to restore required DG to OPERABLE status.	Immediately
	AND		
	B.5	Declare affected LTOP feature(s) inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.2.1	-------------------NOTE------------------- The following SRs are not required to be performed: SR 3.8.1.3 SR 3.8.1.14 SR 3.8.1.9 SR 3.8.1.15 SR 3.8.1.10 SR 3.8.1.16 SR 3.8.1.11 SR 3.8.1.18 SR 3.8.1.13 SR 3.8.1.19 ---	
	For AC sources required to be OPERABLE, the following SRs are applicable: SR 3.8.1.1 SR 3.8.1.11 SR 3.8.1.2 SR 3.8.1.12 SR 3.8.1.3 SR 3.8.1.13 SR 3.8.1.4 SR 3.8.1.14 SR 3.8.1.5 SR 3.8.1.15 SR 3.8.1.6 SR 3.8.1.16 SR 3.8.1.7 SR 3.8.1.18 SR 3.8.1.9 SR 3.8.1.19. SR 3.8.1.10	In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.3 Diesel Fuel Oil

LCO 3.8.3 The stored diesel fuel oil shall be within limits for each required Diesel Generator (DG).

APPLICABILITY: When associated DG is required to be OPERABLE.

ACTIONS

---------------------------------NOTE---------------------------------
Separate Condition entry is allowed for each DG.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more DGs with stored fuel volume < 44,000 gal and > 41,138 gal in storage tank(s).	A.1 Restore stored fuel oil volume to within limits.	48 hours
B. One or more DGs with stored fuel oil total particulates not within limit.	B.1 Restore fuel oil total particulates within limit.	7 days
C. One or more DGs with new fuel oil properties not within limits.	C.1 Restore stored fuel oil properties to within limits.	30 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Conditions A, B, or C not met. OR One or more DGs with diesel fuel oil not within limits for reasons other than Condition A, B, or C.	D.1 Declare associated DG inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.3.1	Verify each DG fuel oil storage tank(s) contains ≥ 44,000 gal of fuel.	31 days
SR 3.8.3.2	Verify fuel oil properties of new and stored fuel oil are tested in accordance with, and maintained within the limits of, the Diesel Fuel Oil Testing Program.	In accordance with the Diesel Fuel Oil Testing Program
SR 3.8.3.3	Check for and remove accumulated water from each fuel oil storage tank.	31 days

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. Required DG inoperable.	B.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	B.2	Suspend movement of irradiated fuel assemblies.	Immediately
	AND		
	B.3	Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND		
	B.4	Initiate action to restore required DG to OPERABLE status.	Immediately
	AND		
	B.5	Declare affected LTOP feature(s) inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.2.1	------------------NOTE------------------ The following SRs are not required to be performed: SR 3.8.1.3 SR 3.8.1.14 SR 3.8.1.9 SR 3.8.1.15 SR 3.8.1.10 SR 3.8.1.16 SR 3.8.1.11 SR 3.8.1.18 SR 3.8.1.13 SR 3.8.1.19 ---	
	For AC sources required to be OPERABLE, the following SRs are applicable: SR 3.8.1.1 SR 3.8.1.11 SR 3.8.1.2 SR 3.8.1.12 SR 3.8.1.3 SR 3.8.1.13 SR 3.8.1.4 SR 3.8.1.14 SR 3.8.1.5 SR 3.8.1.15 SR 3.8.1.6 SR 3.8.1.16 SR 3.8.1.7 SR 3.8.1.18 SR 3.8.1.9 SR 3.8.1.19. SR 3.8.1.10	In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.3 Diesel Fuel Oil

LCO 3.8.3 The stored diesel fuel oil shall be within limits for each required Diesel Generator (DG).

APPLICABILITY: When associated DG is required to be OPERABLE.

ACTIONS

-----------------------------------NOTE-----------------------------------
Separate Condition entry is allowed for each DG.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more DGs with stored fuel volume < 44,000 gal and > 41,138 gal in storage tank(s).	A.1 Restore stored fuel oil volume to within limits.	48 hours
B. One or more DGs with stored fuel oil total particulates not within limit.	B.1 Restore fuel oil total particulates within limit.	7 days
C. One or more DGs with new fuel oil properties not within limits.	C.1 Restore stored fuel oil properties to within limits.	30 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Conditions A, B, or C not met. OR One or more DGs with diesel fuel oil not within limits for reasons other than Condition A, B, or C.	D.1 Declare associated DG inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.3.1	Verify each DG fuel oil storage tank(s) contains ≥ 44,000 gal of fuel.	31 days
SR 3.8.3.2	Verify fuel oil properties of new and stored fuel oil are tested in accordance with, and maintained within the limits of, the Diesel Fuel Oil Testing Program.	In accordance with the Diesel Fuel Oil Testing Program
SR 3.8.3.3	Check for and remove accumulated water from each fuel oil storage tank.	31 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources – Operating

LCO 3.8.4 Division 11(21) and Division 12(22) DC electrical power subsystems shall be OPERABLE and not crosstied to the opposite unit.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One battery charger inoperable.	A.1 Crosstie opposite-unit bus with associated OPERABLE battery charger to the affected division. <u>AND</u> A.2 Restore battery charger to OPERABLE status.	2 hours 24 hours
B. One DC electrical power division crosstied to opposite-unit DC electrical power subsystem that has an inoperable battery charger, while opposite unit is in MODE 1, 2, 3, or 4.	B.1 Open at least one crosstie breaker between the crosstied divisions.	60 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. One DC electrical power division crosstied to opposite-unit DC electrical power subsystem with an inoperable source, while opposite unit is in MODE 5, 6, or defueled.	C.1	----------NOTE-------- Only required when opposite unit has an inoperable battery. -------------------- Verify opposite-unit DC bus load ≤ 200 amps.	 Once per 12 hours
	<u>AND</u>		
	C.2	Open at least one crosstie breaker between the crosstied divisions.	7 days
D. One DC electrical power subsystem inoperable for reasons other than Condition A, B, or C.	D.1	Restore DC electrical power subsystem to OPERABLE status.	2 hours
E. Required Action and Associated Completion Time not met.	E.1	Be in MODE 3.	6 hours
	<u>AND</u>		
	E.2	Be in MODE 5.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is ≥ 127.6 V on float charge.	7 days
SR 3.8.4.2	Verify no visible corrosion at battery terminals and connectors. OR Verify battery connection resistance is ≤ 1.5E-4 ohm for inter-cell connections, ≤ 1.5E-4 ohm for inter-rack connections, ≤ 1.5E-4 ohm for inter-tier connections, and ≤ 1.5E-4 ohm for terminal connections.	92 days
SR 3.8.4.3	Verify battery cells, cell plates, and racks show no visual indication of physical damage or abnormal deterioration that could degrade battery performance.	18 months
SR 3.8.4.4	Remove visible terminal corrosion, verify battery cell to cell and terminal connections are clean and tight, and are coated with anti-corrosion material.	18 months
SR 3.8.4.5	Verify battery connection resistance is ≤ 1.5E-4 ohm for inter-cell connections, ≤ 1.5E-4 ohm for inter-rack connections, ≤ 1.5E-4 ohm for inter-tier connections, and ≤ 1.5E-4 ohm for terminal connections.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.4.6	Verify each battery charger supplies a load equal to the manufacturer's rating for ≥ 8 hours.	18 months
SR 3.8.4.7	------------------NOTES------------------ 1. The modified performance discharge test in SR 3.8.4.8 may be performed in lieu of the service test in SR 3.8.4.7. 2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. --- Verify battery capacity is adequate to supply, and maintain OPERABLE status, the required emergency loads for the design duty cycle when subjected to a battery service test.	18 months

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(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.8	------------------NOTE------------------ This Surveillance shall not be performed in MODE 1, 2, 3, or 4. -- Verify battery capacity is ≥ 80% of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.	60 months <u>AND</u> 12 months when battery shows degradation or has reached 85% of the expected life with capacity < 100% of manufacturer's rating <u>AND</u> 24 months when battery has reached 85% of the expected life with capacity ≥ 100% of manufacturer's rating

REV C

REV C

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources – Shutdown

LCO 3.8.5 The following shall be OPERABLE, with at least one unit crosstie breaker per division open:

a. One DC electrical power subsystem capable of supplying one division of the onsite Class 1E DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution System – Shutdown"; and

b. One source of DC electrical power, other than that required by LCO 3.8.5.a, capable of supplying the remaining onsite Class 1E DC electrical power distribution subsystem(s) when required by LCO 3.8.10.

---------------------------NOTE---------------------------
One division may be crosstied to the opposite unit, when the opposite unit is in MODE 1, 2, 3, or 4 with an inoperable battery charger.

RAI 38.2-2

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

---------------------------NOTE---------------------------
LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required DC electrical power subsystems inoperable for reasons other than Condition B.	A.1.1 Declare affected required feature(s) inoperable. <u>OR</u>	Immediately (continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.2.1	Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>		
	A.2.2	Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>		
	A.2.3	Initiate action to suspend operations involving positive reactivity additions.	Immediately
	<u>AND</u>		
	A.2.4	Initiate action to restore required DC electrical power subsystems to OPERABLE status.	Immediately
	<u>AND</u>		
	A.2.5	Declare affected Low Temperature Overpressure Protection feature(s) inoperable.	Immediately

(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. One DC electrical power division crosstied to opposite-unit DC electrical power subsystem with an inoperable source, while opposite unit is in MODE 5, 6, or defueled.	B.1	----------NOTE--------- Only required when opposite unit has an inoperable battery. --------------------------------- Verify opposite-unit DC bus load is ≤ 200 amps.	 Once per 12 hours
	<u>AND</u>		
	B.2	Open at least one crosstie breaker between the crosstied divisions.	7 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.5.1	--------------------NOTE-------------------- The following SRs are not required to be performed: SR 3.8.4.6, SR 3.8.4.7, and SR 3.8.4.8. -- For DC sources required to be OPERABLE, the following SRs are applicable: SR 3.8.4.1 SR 3.8.4.5 SR 3.8.4.2 SR 3.8.4.6 SR 3.8.4.3 SR 3.8.4.7 SR 3.8.4.4 SR 3.8.4.8.	 In accordance with applicable SRs

Rev C

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3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Cell Parameters

LCO 3.8.6 Battery cell parameters for Division 11(21) and Division 12(22) batteries shall be within limits of Table 3.8.6-1.

APPLICABILITY: When associated DC electrical power subsystems are required to be OPERABLE.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each battery.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more batteries with one or more battery cell parameters not within Category A or B limits.	A.1	Verify pilot cell electrolyte level and float voltage meet Table 3.8.6-1 Category C limits.	1 hour
	<u>AND</u>		
	A.2	Verify battery cell parameters meet Table 3.8.6-1 Category C limits.	24 hours <u>AND</u> Once per 7 days thereafter
	<u>AND</u>		
	A.3	Restore battery cell parameters to Category A and B limits of Table 3.8.6-1.	31 days

continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time of Condition A not met. <u>OR</u> One or more batteries with average electrolyte temperature of the representative cells < 60°F. <u>OR</u> One or more batteries with one or more battery cell parameters not within Category C values.	B.1 Declare associated battery inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

CTS 3.8.7-1

SURVEILLANCE		FREQUENCY
SR 3.8.6.1	Verify battery cell parameters meet Table 3.8.6-1 Category A limits.	7 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.6.2	Verify battery cell parameters meet Table 3.8.6-1 Category B limits.	92 days AND Once within 7 days after a battery discharge < 110 V AND Once within 7 days after a battery overcharge > 145 V
SR 3.8.6.3	Verify average electrolyte temperature of representative cells is ≥ 60°F.	92 days

Table 3.8.6-1 (page 1 of 1)
Battery Cell Parameters Requirements

PARAMETER	CATEGORY A: LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B: LIMITS FOR EACH CONNECTED CELL	CATEGORY C: ALLOWABLE LIMITS FOR EACH CONNECTED CELL
Electrolyte Level	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark[(a)]	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark[(a)]	Above top of plates, and not overflowing
Float Voltage	≥ 2.13 V	≥ 2.13 V[(b)]	> 2.07 V
Specific Gravity[(c)(d)]	≥ 1.200	≥ 1.195 AND Average of all connected cells > 1.205	Not more than 0.020 below average of all connected cells AND Average of all connected cells ≥ 1.195

(a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum during equalizing charges provided it is not overflowing.

(b) Corrected for average electrolyte temperature.

(c) Corrected for electrolyte temperature.

(d) A battery charging current of < 3 amps when on float charge is acceptable for meeting specific gravity limits following a battery recharge, for a maximum of 7 days. When charging current is used to satisfy specific gravity requirements, specific gravity of each connected cell shall be measured prior to expiration of the 7 day allowance.

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Inverters - Operating

LCO 3.8.7 Four instrument bus inverters shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

RAI 3.8.1-22

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One instrument bus inverter inoperable.	A.1	---------NOTE-------- Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating" with any instrument bus de-energized. -------------------- Restore inverter to OPERABLE status.	24 hours
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	6 hours
	<u>AND</u>		
	B.2	Be in MODE 5.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.7.1	Verify correct inverter voltage and breaker alignment to AC instrument buses.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.8 Inverters - Shutdown

LCO 3.8.8 The following shall be OPERABLE:

a. Two inverters capable of supplying one division of the onsite Class 1E AC instrument bus electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution System - Shutdown"; and

b. One source of instrument bus power, other than that required by LCO 3.8.8.a, capable of supplying the remaining onsite Class 1E AC instrument bus electrical power distribution subsystem(s) when required by LCO 3.8.10.

RAI 3.8.2-2

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

---NOTE---
LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required AC instrument bus power sources inoperable.	A.1	Declare affected required feature(s) inoperable.	Immediately
	<u>OR</u>		
			(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.2.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	A.2.2	Suspend movement of irradiated fuel assemblies.	Immediately
	AND		
	A.2.3	Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND		
	A.2.4	Initiate action to restore required inverters to OPERABLE status.	Immediately
	AND		
	A.2.5	Declare affected Low Temperature Overpressure Protection feature(s) inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.8.1	Verify correct inverter voltage and breaker alignment to required AC instrument buses.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.9 Distribution Systems – Operating

LCO 3.8.9 The following AC, DC, and AC instrument bus electrical power distribution subsystems shall be OPERABLE for the applicable unit:

Unit 1	Unit 2
A. Division 11 AC Subsystem	A. Division 21 AC Subsystem
4.16 kV Bus 141 480 volt Bus 131X 480 volt Bus 131Z	4.16 kV Bus 241 480 volt Bus 231X 480 volt Bus 231Z
Division 11 AC Instrument Bus Subsystem	Division 21 AC Instrument Bus Subsystem
Instrument Bus 111 Instrument Bus 113	Instrument Bus 211 Instrument Bus 213
Division 11 DC Subsystem	Division 21 DC Subsystem
125 VDC Bus 111	125 VDC Bus 211
B. Division 12 AC Subsystem	B. Division 22 AC Subsystem
4.16 kV Bus 142 480 volt Bus 132X 480 volt Bus 132Z	4.16 kV Bus 242 480 volt Bus 232X 480 volt Bus 232Z
Division 12 AC Instrument Bus Subsystem	Division 22 AC Instrument Bus Subsystem
Instrument Bus 112 Instrument Bus 114	Instrument Bus 212 Instrument Bus 214
Division 12 DC Subsystem	Division 22 DC Subsystem
125 VDC Bus 112	125 VDC Bus 212

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

RAI 3.8.9-2

RAI 3.8.9-2

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One AC electrical power distribution subsystem inoperable.	A.1	Restore AC electrical power distribution subsystem to OPERABLE status.	8 hours AND 16 hours from discovery of failure to meet LCO
B. One AC instrument bus electrical power distribution subsystem inoperable.	B.1	Restore AC instrument bus electrical power distribution subsystem to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO
C. One DC electrical power distribution subsystem inoperable.	C.1	Restore DC electrical power distribution subsystem to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO
D. Required Action and associated Completion Time of Condition A. B. or C not met.	D.1 AND D.2	Be in MODE 3. Be in MODE 5.	6 hours 36 hours

(continued)

RAI 3.8.9-2

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Two electrical power distribution subsystems inoperable that result in a loss of safety function.	E.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.9.1	Verify correct breaker alignments and voltage to AC, DC, and AC instrument bus electrical power distribution subsystems.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems – Shutdown

LCO 3.8.10 The necessary portions of the following AC, DC, and AC instrument bus electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE for the applicable unit.

Unit 1	Unit 2
A. Division 11 AC Subsystem	A. Division 21 AC Subsystem
4.16 kV Bus 141 480 volt Bus 131X 480 volt Bus 131Z	4.16 kV Bus 241 480 volt Bus 231X 480 volt Bus 231Z
Division 11 AC Instrument Bus Subsystem	Division 21 AC Instrument Bus Subsystem
Instrument Bus 111 Instrument Bus 113	Instrument Bus 211 Instrument Bus 213
Division 11 DC Subsystem	Division 21 DC Subsystem
125 VDC Bus 111	125 VDC Bus 211
B. Division 12 AC Subsystem	B. Division 22 AC Subsystem
4.16 kV Bus 142 480 volt Bus 132X 480 volt Bus 132Z	4.16 kV Bus 242 480 volt Bus 232X 480 volt Bus 232Z
Division 12 AC Instrument Bus Subsystem	Division 22 AC Instrument Bus Subsystem
Instrument Bus 112 Instrument Bus 114	Instrument Bus 212 Instrument Bus 214
Division 12 DC Subsystem	Division 22 DC Subsystem
125 VDC Bus 112	125 VDC Bus 212

RAI 3.8.2-2

APPLICABILITY: MODES 5 and 6.
During movement of irradiated fuel assemblies.

ACTIONS

---NOTE---
LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required AC, DC, or AC instrument bus electrical power distribution subsystems inoperable.	A.1	Declare associated supported required feature(s) inoperable.	Immediately
	<u>OR</u>		
			(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND	
	A.2.4 Initiate actions to restore required AC, DC, and AC instrument bus electrical power distribution subsystem(s) to OPERABLE status.	Immediately
	AND	
	A.2.5 Declare associated required residual heat removal train(s) inoperable and not in operation.	Immediately
	AND	
	A.2.6 Declare affected Low Temperature Overpressure Protection feature(s) inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.10.1	Verify correct breaker alignments and voltage to required AC, DC, and AC instrument bus electrical power distribution subsystems.	7 days

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources – Operating

BASES

RAI 3.8.1-8

BACKGROUND

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

The onsite Class 1E AC Distribution System is divided into redundant load groups (divisions) so that the loss of any one group does not prevent the minimum safety functions from being performed. Each division has connections to two offsite power sources and a single DG.

Offsite power is supplied to the station switchyard from the transmission network. From the switchyard, two electrically and physically separated lines (i.e., independent transmission circuits) provide AC power through their associated System Auxiliary Transformer (SAT) banks (SATs 142-1 and 142-2 from one line, and SATs 242-1 and 242-2 from the second line), to the 4.16 kV ESF buses. Normally, SATs 142-1 and 142-2 feed Unit 1 4.16 kV ESF buses, and SATs 242-1 and 242-2 feed Unit 2 4.16 kV ESF buses. Additionally, each 4.16 kV ESF bus has a reserve feed via its associated crosstie to an opposite-unit 4.16 kV ESF bus. Each unit is required to have qualified normal and reserve circuits to each 4.16 kV bus (detailed in the LCO Bases for this Specification). The transmission network and switchyard are maintained in accordance with UFSAR, and are not governed by the requirements of Technical Specifications. A detailed description of the offsite power network and the circuits to the Class 1E ESF buses is found in the UFSAR, Chapter 8 (Ref. 2).

BASES

BACKGROUND (continued)

The onsite standby power source for each 4.16 kV ESF bus is a dedicated DG. DGs 1A (2A) and 1B (2B) are dedicated to ESF buses 141 (241) and 142 (242), respectively. A DG starts automatically on a Safety Injection (SI) signal (i.e., manual SI, low steam line pressure, low pressurizer pressure or high-1 containment pressure signals) or on an ESF bus degraded voltage or undervoltage signal (refer to LCO 3.3.5, "Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation"). After the DG has started, it will automatically tie to its respective bus after offsite power is tripped as a consequence of ESF bus undervoltage or degraded voltage, independent of or coincident with an SI signal. The DGs will also start and operate in the standby mode without tying to the ESF bus on an SI signal alone. Following the trip of offsite power, an undervoltage signal strips nonpermanent loads from the ESF bus. When the DG is tied to the ESF bus, loads are then sequentially connected to its respective ESF bus by automatic load sequencing. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading the DG by automatic load application.

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

Certain required unit loads are automatically connected to the DGs in a predetermined sequence in order to prevent overloading the DG in the process. Within 1 minute after the initiating signal is received, all loads needed to recover the unit or maintain it in a safe condition are automatically connected to the DGs.

Continuous service ratings for Train A and Train B DGs satisfy the requirements of Regulatory Guide 1.9 (Ref. 3). The continuous service rating of each DG is 5500 kW with 10% overload permissible for up to 2 hours in any 24 hour period. The ESF loads that are powered from the 4.16 kV ESF buses are listed in Reference 2.

BASES

APPLICABLE SAFETY ANALYSES

The initial conditions of DBA and transient analyses in the UFSAR, Chapter 6 (Ref. 4) and Chapter 15 (Ref. 5), assume ESF systems are OPERABLE. The AC electrical power sources are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

The OPERABILITY of the AC electrical power sources is consistent with the initial assumptions of the Accident analyses and is based upon meeting the design basis of the plant. This results in maintaining at least one division of the onsite or offsite AC sources OPERABLE during Accident conditions in the event of:

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

b. A worst case single failure.

The AC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

Two qualified circuits per 4.16 kV bus between the offsite transmission network and the onsite Class 1E Electrical Power System and separate and independent DGs for each division ensure availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an Anticipated Operational Occurrence (AOO) or a postulated DBA.

Qualified circuits are those that are described in the UFSAR and are part of the licensing basis for the plant.

Each qualified circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the ESF buses.

BASES

LCO (continued)

For Unit 1 (Unit 2), the two qualified circuits (a normal circuit and a reserve circuit) per ESF bus between the offsite transmission network and the onsite 4.16 kV ESF buses are as follows:

a. NORMAL

ESF bus 141 (241)	345 kV system through system auxiliary transformer (SAT) 142-1 (242-1) or by use of disconnect links via SAT 142-2 (242-2); and
ESF bus 142 (242)	345 kV system through SAT 142-2 (242-2) or by use of disconnect links via SAT 142-1 (242-1); and

b. RESERVE

ESF bus 141 (241)	345 kV system through SAT 242-1 (142-1) or by use of disconnect links via SAT 242-2 (142-2), to 4.16 kV ESF bus 241 (141) crosstied to 4.16 kV ESF bus 141 (241); and
ESF bus 142 (242)	345 kV system through SAT 242-2 (142-2) or by use of disconnect links via SAT 242-1 (142-1), to 4.16 kV ESF bus 242 (142) crosstied to 4.16 kV ESF bus 142 (242).

A standby (onsite) source to the 4.16 kV ESF buses is provided by DG 1A (2A) for 4.16 kV ESF bus 141 (241) and DG 1B (2B) for 4.16 kV ESF bus 142 (242).

BASES

LCO (continued)

RAI 3.8.1-17

Each DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage. This will be accomplished within 10 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as DG engine hot and DG engine at ambient conditions. Additional DG capabilities must be demonstrated to meet required Surveillances (e.g., capability of the DG to revert to standby status on an Emergency Core Cooling System (ECCS) signal while operating in parallel test mode).

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

The AC sources in one division must be separate and independent (to the extent possible) of the AC sources in the other division. For the DGs, separation and independence are complete. For the qualified circuits, separation and independence are to the extent practical.

APPLICABILITY

The AC sources are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

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

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

The AC power requirements for MODES 5 and 6 are covered in LCO 3.8.2, "AC Sources – Shutdown."

BASES

ACTIONS

A.1

To ensure a highly reliable power source remains with one required qualified circuit inoperable, it is necessary to verify the OPERABILITY of the remaining required qualified circuit on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action not met. However, if another required circuit fails SR 3.8.1.1, this qualified circuit is inoperable, and additional Conditions and Required Actions may be appropriate. If the additional inoperability results in a bus with two required qualified circuits inoperable Condition C is entered. If the additional inoperability results in the second bus with one required qualified circuit inoperable Condition A is still applicable.

A.2

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition A for a period that should not exceed 72 hours. With one or more buses with one required qualified circuit inoperable, the reliability of the offsite system is degraded, and the potential for a loss of offsite power is increased, with attendant potential for a challenge to the plant safety systems. In this Condition, however, the remaining OPERABLE required qualified circuits and DGs are adequate to supply electrical power to the onsite Class 1E Distribution System.

The 72 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

BASES

ACTIONS (continued)

The second Completion Time for Required Action A.2 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition A is entered while, for instance, a DG is inoperable and that DG is subsequently returned OPERABLE, the LCO may already have been not met for up to 72 hours. This could lead to a total of 144 hours, since initial failure to meet the LCO, to restore the required qualified circuit(s). At this time, a DG could again become inoperable, the circuit(s) restored OPERABLE, and an additional 72 hours (for a total of 9 days) allowed prior to complete restoration of the LCO. The 6 day Completion Time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "<u>AND</u>" connector between the 72 hour and 6 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

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

<u>B.1</u>

To ensure a highly reliable power source remains with an inoperable DG, it is necessary to verify the availability of the required qualified circuits on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action being not met. However, if a required qualified circuit fails to pass SR 3.8.1.1, it is inoperable, and additional Conditions and Required Actions apply.

BASES

ACTIONS (continued)

B.2

Required Action B.2 is intended to provide assurance that a loss of offsite power, during the period that a DG is inoperable, does not result in a complete loss of safety function of critical systems. These features (i.e., systems, subsystems, trains, components, and devices) are designed with redundant safety related trains. This includes the diesel driven auxiliary feedwater pump. Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has an inoperable DG.

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

a. An inoperable DG exists; and

b. A required feature on the other division is inoperable.

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

RAI 3.8.1-6

Discovering one required DG inoperable coincident with one or more inoperable required redundant feature(s) results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

BASES

ACTIONS (continued)

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

<u>B.3.1 and B.3.2</u>

Required Action B.3.1 provides an allowance to avoid unnecessary testing of OPERABLE DG(s). If it can be determined that the cause of the inoperable DG does not exist on the OPERABLE DG, SR 3.8.1.2 does not have to be performed. If the cause of inoperability exists on the other DG, the other DG would be declared inoperable upon discovery and Condition E of LCO 3.8.1 would be entered. Once the failure is repaired, the common cause failure no longer exists, and Required Action B.3.1 is satisfied. If the cause of the initial inoperable DG cannot be confirmed not to exist on the remaining DG, performance of SR 3.8.1.2 suffices to provide assurance of continued OPERABILITY of that DG.

In the event the inoperable DG is restored to OPERABLE status prior to completing either B.3.1 or B.3.2, the Problem Identification and Investigation Procedure will continue to evaluate the common cause possibility and determine the need for any additional DG testing. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in Condition B.

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

BASES

ACTIONS (continued)

B.4

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition B for a period that should not exceed 72 hours.

In Condition B, the remaining OPERABLE DG and required qualified circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The 72 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

The second Completion Time for Required Action B.4 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition B is entered while, for instance, a required qualified circuit is inoperable and that circuit is subsequently restored OPERABLE, the LCO may already have been not met for up to 72 hours. This could lead to a total of 144 hours, since initial failure to meet the LCO, to restore the DG. At this time, a required qualified circuit could again become inoperable, the DG restored OPERABLE, and an additional 72 hours (for a total of 9 days) allowed prior to complete restoration of the LCO. The 6 day Completion Time provides a limit on time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "AND" connector between the 72 hour and 6 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

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

BASES

ACTIONS (continued)

C.1

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

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

D.1 and D.2

In Condition D, with one DG inoperable and one or more buses with one qualified circuit inoperable or with one DG and one bus with both qualified circuits inoperable, individual redundancy is lost in both the offsite electrical power system and the onsite AC electrical power system. Since power system redundancy is provided by two diverse sources of power, however, the reliability of the power systems in this Condition may appear higher than that in Condition C. This difference in reliability is offset by the susceptibility of this power system configuration to a single bus or switching failure. The 12 hour Completion Time to restore the DG or the required qualified circuit(s) takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

BASES

ACTIONS (continued)

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it were inoperable, resulting in de-energization. Therefore, the Required Actions of Condition D are modified by a Note to indicate that when Condition D is entered with no AC source to any division (one or more divisions de-energized), the Conditions and Required Actions for LCO 3.8.9, "Distribution Systems – Operating," must be immediately entered. This allows Condition D to provide requirements for the loss of one DG and one required qualified circuit on one or more buses, without regard to whether a division is de-energized. LCO 3.8.9 provides the appropriate restrictions for a de-energized division.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition D for a period that should not exceed 12 hours.

E.1

With Train A and Train B DGs inoperable, there are no remaining standby AC sources. Thus, with an assumed loss of offsite electrical power, insufficient standby AC sources are available to power the minimum required ESF functions. Since the offsite electrical power system is the only source of AC power for this level of degradation, the risk associated with continued operation for a very short time could be less than that associated with an immediate controlled shutdown (the immediate shutdown could cause grid instability, which could result in a total loss of AC power). Since any inadvertent generator trip could also result in a total loss of offsite AC power, the time allowed for continued operation is severely restricted. The intent here is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

According to Reference 6, with both DGs inoperable, operation may continue for a period that should not exceed 2 hours.

BASES

ACTIONS (continued)

F.1 and F.2

If the inoperable AC electric power sources cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

G.1

Condition G corresponds to a level of degradation in which all redundancy in the AC electrical power supplies may be lost. At this severely degraded level, any further losses in the AC electrical power system may cause a loss of function. Therefore, no additional time is justified for continued operation. The unit is required by LCO 3.0.3 to commence a controlled shutdown. Examples of inoperabilities that require entry into Condition G are: 1) both DGs inoperable and both qualified circuits inoperable on one bus, and 2) one DG inoperable and both qualified circuits inoperable on one bus and one qualified circuit inoperable on the second bus.

BASES

SURVEILLANCE REQUIREMENTS

The AC sources are designed to permit inspection and testing of all important areas and features, especially those that have a standby function, in accordance with 10 CFR 50, Appendix A, GDC 18 (Ref. 8). Periodic component tests are supplemented by extensive functional tests during refueling outages (under simulated accident conditions). The SRs for demonstrating the OPERABILITY of the DGs are in general conformance with the recommendations of Regulatory Guide 1.9 (Ref. 3), and Regulatory Guide 1.137 (Ref. 10), as addressed in the UFSAR.

Where the SRs discussed herein specify voltage and frequency tolerances, the following is applicable. The minimum steady state output voltage of 3950 V is 95% of the nominal 4160 V output voltage. This value allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage is specified as 90% or 3600 V. It also allows for voltage drops to motors and other equipment down through the 120 V level where minimum operating voltage is also usually specified as 90% of name plate rating. The specified maximum steady state output voltage of 4580 V is equal to the maximum operating voltage specified for 4000 V motors. It ensures that for a lightly loaded distribution system, the voltage at the terminals of 4000 V motors is no more than the maximum rated operating voltages. The specified minimum and maximum frequencies of the DG are 58.8 Hz and 61.2 Hz, respectively. These values are equal to ± 2% of the 60 Hz nominal frequency and are derived from the recommendations given in Regulatory Guide 1.9 (Ref. 3).

SR 3.8.1.1

This SR ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. The breaker alignment verifies that each breaker is in its correct position to ensure that distribution buses and loads are connected to their preferred power source, and that appropriate independence of offsite circuits is maintained. The 7 day Frequency is adequate since breaker position is not likely to change without the operator being aware of it and because its status is displayed in the control room.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.2 and SR 3.8.1.7

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

Each SR 3.8.1.2 and SR 3.8.1.7 DG start requires the DG to achieve and maintain a steady state voltage and frequency range. The start signals used for this test may consist of one of the following signals:

a. Manual;

b. Simulated loss of ESF bus voltage by itself;

c. Simulated loss of ESF bus voltage in conjunction with an ESF actuation test signal; or

d. An ESF actuation test signal by itself.

RAI 3.8.1-17

For the purpose of SR 3.8.1.2 testing, the DGs are started from standby conditions once per 31 days. Standby conditions for a DG mean that the diesel engine coolant and oil are being continuously circulated and temperature is being maintained consistent with manufacturer's recommended operating range (low lube oil and jacket water temperature alarm settings to the high lube oil and jacket water temperature alarm settings).

For the purposes of SR 3.8.1.7 testing, the DGs are started from normal standby conditions once per 184 days. Normal standby conditions for a DG mean that the diesel engine coolant and oil are being continuously circulated and temperature is being maintained within the prescribed temperature bands of these subsystems when the diesel generator has been at rest for an extended period of time with the prelube oil and jacket water circulating systems operational. The prescribed temperature band is 115°F - 135°F which accounts for instrument tolerances. DG starts for these Surveillances are followed by a warmup period prior to loading.

BASES

SURVEILLANCE REQUIREMENTS (continued)

In order to reduce stress and wear on diesel engines, a modified start is used in which the starting speed of DGs is limited, warmup is limited to this lower speed, and the DGs are gradually accelerated to synchronous speed prior to loading. These start procedures are the intent of starts in accordance with SR 3.8.1.2.

SR 3.8.1.7 requires that, at a 184 day Frequency, the DG starts from normal standby conditions and achieves required voltage and frequency within 10 seconds. The 10 second start requirement supports the assumptions of the design basis LOCA analysis in the UFSAR, Chapter 15 (Ref. 5).

The 10 second start requirement is not applicable to SR 3.8.1.2 (see SR Note) when a modified start procedure as described above is used. If a modified start is not used, the 10 second start requirement of SR 3.8.1.7 applies.

Since SR 3.8.1.7 requires a 10 second start, it is more restrictive than SR 3.8.1.2, and it may be performed in lieu of SR 3.8.1.2. This is also addressed in SR 3.8.1.2 Note.

The 31 day Frequency for SR 3.8.1.2 is consistent with Regulatory Guide 1.9 (Ref. 3). The 184 day Frequency for SR 3.8.1.7 is a reduction in cold testing consistent with Generic Letter 84-15 (Ref. 7). These Frequencies provide adequate assurance of DG OPERABILITY, while minimizing degradation resulting from testing.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.3

This Surveillance verifies that the DGs are capable of synchronizing with the offsite electrical system and accepting loads greater than or equal to the equivalent of the maximum expected accident loads. A minimum run time of 60 minutes is required to stabilize engine temperatures.

Although no power factor requirements are established by this SR, the DG is normally operated between 0 and 1000 kVARs. The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

The 31 day Frequency for this Surveillance is consistent with Regulatory Guide 1.9 (Ref. 3).

RAI 3.8.1-23

This SR is modified by four Notes. Note 1 indicates that diesel engine runs for this Surveillance may include gradual loading, as recommended by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized. Note 2 states that momentary transients (e.g., changing bus loads) do not invalidate this test. Similarly, momentary kVAR transients outside of the specified range do not invalidate the test. Note 3 indicates that this Surveillance should be conducted on only one DG at a time in order to avoid common cause failures that might result from offsite circuit or grid perturbations. Note 4 stipulates a prerequisite requirement for performance of this SR. A successful DG start must precede this test to credit satisfactory performance.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.4

This SR provides verification that the level of fuel oil in the day tank is at or above the level at which fuel oil is automatically added. The level is expressed as an equivalent volume in gallons, and is selected to ensure adequate fuel oil for a minimum of 1 hour of DG operation at full load plus 10%.

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

SR 3.8.1.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel oil day tanks once every 31 days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 10). This SR is for preventative maintenance. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during the performance of this Surveillance.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.6

This Surveillance demonstrates that each required (one of two transfer pumps per DG is "required" to support DG OPERABILITY) fuel oil transfer pump operates and transfers fuel oil from its associated storage tank(s) to its associated day tank. This is required to support continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oil piping system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer systems are OPERABLE.

The design of fuel transfer systems is such that one pump will operate automatically in order to maintain an adequate volume of fuel oil in the day tank during or following DG testing. Therefore, a 31 day Frequency is appropriate.

SR 3.8.1.8

Transfer of each 4.16 kV ESF bus power supply from the normal offsite circuit to the alternate offsite circuit demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The 18 month Frequency of the Surveillance is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.9

Each DG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by the loss of a large load could cause diesel engine overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. The single largest post-accident load associated with each DG is the Essential Service Water (SX) pump (1290 brake horsepower, 1034 kW at full load conditions). This Surveillance is accomplished by simultaneously tripping loads supplied by the DG which have a minimum combined load equivalent to the single largest post-accident load. This method is employed due to the difficulty of attaining SX full load conditions during normal plant operations.

As required by IEEE-308 (Ref. 9), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint (64.5 Hz), or 15% above synchronous speed (69 Hz), whichever is lower.

The voltage and frequency tolerances specified in this SR are derived from Regulatory Guide 1.9 (Ref. 3) recommendations for response during load sequence intervals. The voltage and frequency specified are consistent with the design range of the equipment powered by the DG. SR 3.8.1.9.a corresponds to the maximum frequency excursion, while SR 3.8.1.9.b and SR 3.8.1.9.c are steady state voltage and frequency values to which the system must recover following load rejection. The 18 month Frequency is consistent with the recommendation of Regulatory Guide 1.9 (Ref. 3).

This SR is modified by a Note. The reason for the Note is that during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, plant safety systems.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.10

This Surveillance demonstrates the DG capability to reject a full load without overspeed tripping or exceeding the predetermined voltage limits. The DG full load rejection may occur because of a system fault or inadvertent breaker tripping. This Surveillance ensures proper engine/generator response under the simulated test conditions. This test simulates a full load rejection and verifies that the DG does not trip upon loss of the load. These acceptance criteria provide for DG damage protection. While the DG is not expected to experience this transient during an event and continues to be available, this response ensures that the DG is not degraded for future application, including reconnection to the bus if the trip initiator can be corrected or isolated.

The 18 month Frequency is consistent with the recommendation of Regulatory Guide 1.9 (Ref. 3) and is intended to be consistent with expected fuel cycle lengths.

Rev C Rev C RAI 3.8.1-21

This SR has been modified by two Notes. Note 1 states that momentary transients above the stated voltage limit immediately following a load rejection (i.e., the DG full load rejection) do not invalidate this test. The reason for Note 2 is that during operation with the reactor critical, performance of this SR could cause perturbation to the electrical distribution systems that could challenge continued steady state operation and, as a result, plant safety systems.

SR 3.8.1.11

In general conformance with the recommendations of Regulatory Guide 1.9 (Ref. 3), paragraph 2.2.4, this Surveillance demonstrates the as designed operation of the standby power sources during loss of the offsite source. This test verifies all actions encountered from the loss of offsite power, including shedding of the nonessential loads and energization of the emergency buses and respective loads from the DG. It further demonstrates the capability of the DG to automatically achieve the required voltage and frequency within the specified time, and maintain a steady state voltage and frequency range.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The DG autostart time of 10 seconds is derived from requirements of the accident analysis to respond to a design basis large break LOCA. The Surveillance should be continued for a minimum of 5 minutes in order to demonstrate that all starting transients have decayed and stability is achieved.

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

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.12

This Surveillance demonstrates that the DG automatically starts and achieves the required voltage and frequency within the specified time (10 seconds) from the design basis actuation signal (LOCA signal) and operates for ≥ 5 minutes. The 5 minute period provides sufficient time to demonstrate stability.

The Frequency of 18 months takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with the expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.8.1.13

This Surveillance demonstrates that DG noncritical protective functions (e.g., high jacket water temperature) are bypassed on a loss of voltage signal concurrent with an ESF actuation test signal. The noncritical trips are bypassed during DBAs and provide an alarm on an abnormal engine condition. This alarm provides the operator with sufficient time to react appropriately. The DG availability to mitigate the DBA is more critical than protecting the engine against minor problems that are not immediately detrimental to emergency operation of the DG.

The 18 month Frequency is based on engineering judgment, taking into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The DG autostart time of 10 seconds is derived from requirements of the accident analysis to respond to a design basis large break LOCA. The Surveillance should be continued for a minimum of 5 minutes in order to demonstrate that all starting transients have decayed and stability is achieved.

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

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.12

This Surveillance demonstrates that the DG automatically starts and achieves the required voltage and frequency within the specified time (10 seconds) from the design basis actuation signal (LOCA signal) and operates for ≥ 5 minutes. The 5 minute period provides sufficient time to demonstrate stability.

The Frequency of 18 months takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with the expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.8.1.13

This Surveillance demonstrates that DG noncritical protective functions (e.g., high jacket water temperature) are bypassed on a loss of voltage signal concurrent with an ESF actuation test signal. The noncritical trips are bypassed during DBAs and provide an alarm on an abnormal engine condition. This alarm provides the operator with sufficient time to react appropriately. The DG availability to mitigate the DBA is more critical than protecting the engine against minor problems that are not immediately detrimental to emergency operation of the DG.

The 18 month Frequency is based on engineering judgment, taking into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.14

RAI 3.8.1-17

Regulatory Guide 1.9 (Ref. 3), paragraph 2.2.9, recommends demonstration once per 18 months that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours, ≥ 2 hours of which is at a load band equivalent to 105% to 110% of the continuous duty rating and the remainder of the time at a load equivalent to the continuous duty rating of the DG. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are also applicable to this SR.

Although no power factor requirements are established by this SR, a portion of the testing is performed between 0 and 1000 kVARs. The practice of performing this entire test at rated power factor has been determined to be unjustified, potentially destructive, testing due to exceeding the vendors recommendation for maximum voltage of the generator if the DG output breaker should open during testing. Therefore, the DG is to be operated at rated power factor for only a short duration during the performance of this surveillance in accordance with the following guidance:

During the period that the DG is loaded at ≥ 5500 kW and ≤ 1000 kVAR, the following shall be performed once to verify DG operability at rated power factor:

a. Over a two minute period, raise kVAR loading to 4125 kVAR;

b. Operate the DG at 4125 kVAR for 1 minute or until kVAR and kW loading has stabilized; and

c. Reduce kVAR loading to ≤ 1000 kVAR.

The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This Surveillance is modified by two Notes. Note 1 states that momentary transients (e.g., due to changing bus loads) do not invalidate this test. The reason for Note 2 is that during operation with the reactor critical, performance of this Surveillance could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, plant safety systems.

SR 3.8.1.15

This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within 10 seconds. The 10 second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3).

This SR is modified by two Notes. Note 1 ensures that the test is performed with the diesel sufficiently hot. The load band is provided to avoid routine overloading of the DG. Routine overloads may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. The requirement that the diesel has operated for at least 2 hours at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. Alternatively, the DG can be operated until operating temperatures have stabilized. Note 2 states that momentary transients (e.g., due to changing bus loads) do not invalidate this test.

BASES

RAI 3.8.1-18

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.16

As required by Regulatory Guide 1.9 (Ref. 3), paragraph 2.2.11, this Surveillance ensures that the manual synchronization and load transfer from the DG to the offsite source can be made and the DG can be returned to ready to load status when offsite power is restored. It also ensures that the autostart logic is reset to allow the DG to reload if a subsequent loss of offsite power occurs. The DG is considered to be in ready to load status when the DG is at rated speed and voltage, the output breaker is open and can receive an autoclose signal on bus undervoltage, and the load sequence timers are reset.

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), and takes into consideration unit conditions required to perform the Surveillance.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.17

Demonstration of the test mode override ensures that the DG availability under accident conditions will not be compromised as the result of testing and the DG will automatically reset to ready to load operation if a LOCA actuation signal is received during operation in the test mode. Ready to load operation is defined as the DG running at rated speed and voltage with the DG output breaker open. These provisions for automatic switchover are required by IEEE-308 (Ref. 9), paragraph 6.2.6(2).

The intent in the requirement associated with SR 3.8.1.17.b is to show that the emergency loading was not affected by the DG operation in test mode. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the emergency loads to perform these functions is acceptable.

This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.18

Under accident and loss of offsite power conditions, loads are sequentially connected to the bus by the automatic load sequence timers. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. The 10% load sequence time interval tolerance ensures that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Reference 2 provides a summary of the automatic loading of ESF buses.

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.19

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

This Surveillance demonstrates the DG operation, as discussed in the Bases for SR 3.8.1.11, during a loss of offsite power actuation test signal in conjunction with an ESF actuation signal. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

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

This SR is modified by a Note. The reason for the Note is that the performance of the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems.

SR 3.8.1.20

This Surveillance demonstrates that the DG starting independence has not been compromised. Also, this Surveillance demonstrates that each engine can achieve proper speed within the specified time when the DGs are started simultaneously.

The 10 year Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3).

BASES

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.
2. UFSAR, Chapter 8.
3. Regulatory Guide 1.9, Rev. 3, July 1993.
4. UFSAR, Chapter 6.
5. UFSAR, Chapter 15.
6. Regulatory Guide 1.93, Rev. 0, December 1974.
7. Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," July 2, 1984.
8. 10 CFR 50, Appendix A, GDC 18.
9. IEEE Standard 308-1978.
10. Regulatory Guide 1.137, Rev. 1, October 1979.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.2 AC Sources – Shutdown

BASES

BACKGROUND

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

APPLICABLE SAFETY ANALYSES

The OPERABILITY of the minimum AC sources during MODES 5 and 6, and during movement of irradiated fuel assemblies ensures that:

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

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

c. Adequate AC electrical power is provided to mitigate events postulated during shutdown, such as a fuel handling accident.

In general, when the unit is shut down, the Technical Specifications requirements ensure that the unit has the capability to mitigate the consequences of postulated accidents. However, assuming a single failure and concurrent loss of all offsite or all onsite power is not required. The rationale for this is based on the fact that many Design Basis Accidents (DBAs) that are analyzed in MODES 1, 2, 3, and 4 have no specific analyses in MODES 5 and 6. Worst case bounding events are deemed not credible in MODES 5 and 6 because the energy contained within the reactor pressure boundary, reactor coolant temperature and pressure, and the corresponding stresses result in the probabilities of occurrence being significantly reduced or eliminated, and in minimal consequences. These deviations from DBA analysis assumptions and design requirements during shutdown conditions are allowed by the LCO for required systems.

BASES

APPLICABLE SAFETY ANALYSES (continued)

During MODES 1, 2, 3, and 4, various deviations from the analysis assumptions and design requirements are allowed within the Required Actions. This allowance is in recognition that certain testing and maintenance activities must be conducted provided an acceptable level of risk is not exceeded. During MODES 5 and 6, performance of a significant number of required testing and maintenance activities is also required. In MODES 5 and 6, the activities are generally planned and administratively controlled. Relaxations from MODE 1, 2, 3, and 4 LCO requirements are acceptable during shutdown modes based on:

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

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

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

d. Maintaining, to the extent practical, the ability to perform required functions (even if not meeting MODE 1, 2, 3, and 4 OPERABILITY requirements) with systems assumed to function during an event.

In the event of an accident during shutdown, this LCO ensures the capability to support systems necessary to avoid immediate difficulty, assuming either a loss of all offsite power or a loss of all onsite Diesel Generator (DG) power.

The AC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES

LCO

One qualified circuit capable of supplying the onsite Class 1E power distribution subsystem(s) of LCO 3.8.10, "Distribution Systems – Shutdown," ensures that all required loads are capable of being powered from offsite power. An OPERABLE DG, associated with one of the distribution subsystem division(s) required to be OPERABLE by LCO 3.8.10, ensures a diverse power source is available to provide electrical power support, assuming a loss of the offsite circuit. Together, OPERABILITY of the required qualified circuit and DG ensures the availability of sufficient AC sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents).

The qualified circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the Engineered Safety Feature (ESF) bus(es). Qualified circuits are those that are described in the UFSAR and are part of the licensing basis for the plant. A description of the qualified circuits is contained in the Bases for LCO 3.8.1, "AC Sources – Operating."

The DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage. This sequence must be accomplished within 10 seconds. The DG must be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as DG in normal standby with the engine hot and DG in standby at ambient conditions.

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

It is acceptable for divisions to be cross tied during shutdown conditions, allowing a single offsite power circuit to supply all required divisions.

BASES

APPLICABILITY

The AC sources required to be OPERABLE in MODES 5 and 6, and at all times during movement of irradiated fuel assemblies, provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core;

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

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

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

The AC power requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.1.

ACTIONS

LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Therefore, in either case, inability to suspend movement of irradiated fuel assemblies would not be sufficient reason to require a reactor shutdown.

BASES

ACTIONS (continued)

A.1

The qualified circuit would be considered inoperable if it were not available to one required ESF division. Since two divisions may be required by LCO 3.8.10, the one division with offsite power available may be capable of supporting sufficient required features (i.e., systems, subsystems, trains, components, and devices) to allow continuation of CORE ALTERATIONS and fuel movement. By the allowance of the option to declare required features inoperable, with no offsite power available, appropriate restrictions will be implemented in accordance with the affected required features LCO's ACTIONS.

BASES

ACTIONS (continued)

A.2.1, A.2.2, A.2.3, A.2.4, A.2.5, B.1, B.2, B.3, B.4, and B.5

With the offsite circuit not available to one or more required divisions, the option would still exist to declare all required features inoperable. Since this option may involve undesired administrative efforts, the allowance for sufficiently conservative actions is made. With the required DG inoperable, the minimum required diversity of AC power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, operations involving positive reactivity additions, and declare the affected Low Temperature Overpressure Protection (LTOP) features required by LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System" inoperable. The Required Action to declare the affected LTOP features inoperable allows the operator to evaluate the current unit conditions and to determine which (if any) of the LTOP features have been affected by the loss of power. The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory provided the required SDM is maintained. Suspension of these activities does not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability or the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC sources and to continue this action until restoration is accomplished in order to provide the necessary AC power to the plant safety systems.

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

BASES

ACTIONS (continued)

Pursuant to LCO 3.0.6, the Distribution System's ACTIONS would not be entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition A are modified by a Note to indicate that when Condition A is entered with no AC power to any required ESF bus, the ACTIONS for LCO 3.8.10 must be immediately entered. This Note allows Condition A to provide requirements for the loss of the offsite circuit, whether or not a division is de-energized. LCO 3.8.10 would provide the appropriate restrictions for the situation involving a de-energized division.

SURVEILLANCE REQUIREMENTS

SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, 3, and 4. SR 3.8.1.8 is not required to be met since only one offsite circuit is required to be OPERABLE. SR 3.8.1.17 is not required to be met because the required OPERABLE DG is not required to undergo periods of being synchronized to the offsite circuit. SR 3.8.1.20 is not required to be met because starting independence is not required with the DG that is not required to be operable.

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DG from being paralleled with the offsite power network or otherwise rendered inoperable during performance of SRs, and to preclude de-energizing a required 4160 V ESF bus or disconnecting a required offsite circuit during performance of SRs. With limited AC sources available, a single event could compromise both the required circuit and the DG. It is the intent that these SRs must still be capable of being met, but actual performance is not required during periods when the DG and offsite circuit is required to be OPERABLE. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR.

REFERENCES

None.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.3 Diesel Fuel Oil

BASES

BACKGROUND

Each Diesel Generator (DG) is provided with fuel oil capacity sufficient to operate that diesel for a period of 7 days while the DG is supplying maximum post loss of coolant accident load demand discussed in the UFSAR, Section 9.5.4.2 (Ref. 1). The station fuel oil system is comprised of two outside storage tanks (one 50,000 gal and one 125,000 gal) which are the source for all of the fuel oil needs for the station. These outside tanks are normally the source of "new" fuel oil. Each Unit 1 DG is provided with two 25,000 gallon inside storage tanks. Each Unit 2 DG is provided with one 50,000 gallon inside storage tank. These inside storage tanks are the source of the required "stored" fuel oil. This onsite fuel oil capacity is sufficient to operate the DGs for longer than the time to replenish the onsite supply from outside sources.

Fuel oil is transferred from the inside storage tank(s) to the day tank by either of two transfer pumps associated with each DG. Independence of pumps and piping precludes the failure of one pump, or the rupture of any pipe, valve or tank(s) to result in the loss of more than one DG.

For proper operation of the standby DGs, it is necessary to ensure the proper quality of the fuel oil. Regulatory Guide 1.137 (Ref. 2) addresses the recommended fuel oil practices as supplemented by ANSI N195 (Ref. 3). The fuel oil properties governed by these SRs are the water and sediment content, the kinematic viscosity, specific gravity (or API gravity), and particulate level.

BASES

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter 6 (Ref. 4), and in the UFSAR, Chapter 15 (Ref. 5), assume Engineered Safety Feature (ESF) systems are OPERABLE. The DGs are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that fuel, Reactor Coolant System and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

Since the diesel fuel oil supports the operation of the standby AC power sources, they satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

Stored diesel fuel oil is required to have sufficient supply for 7 days of maximum post accident load operation. It is also required to meet specific standards for quality. This requirement, in conjunction with an ability to obtain replacement supplies within 7 days, supports the availability of DGs required to shut down the reactor and to maintain it in a safe condition for an Anticipated Operational Occurrence (AOO) or a postulated DBA with loss of offsite power. DG day tank fuel requirements, as well as transfer capability from the storage tank to the day tank, are addressed in LCO 3.8.1, "AC Sources – Operating," and LCO 3.8.2, "AC Sources – Shutdown."

APPLICABILITY

The AC sources (LCO 3.8.1 and LCO 3.8.2) are required to ensure the availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an AOO or a postulated DBA. Since the stored diesel fuel oil supports LCO 3.8.1 and LCO 3.8.2, stored diesel fuel oil is required to be within limits when the associated DG is required to be OPERABLE.

BASES

ACTIONS

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

A.1

In this Condition, the 7 day fuel oil supply for a DG is not available. However, the Condition is restricted to fuel oil level reductions that maintain at least a 6 day supply. These circumstances may be caused by events, such as full load operation required after an inadvertent start while at minimum required level, or feed and bleed operations, which may be necessitated by increasing particulate levels or any number of other oil quality degradations. This restriction allows sufficient time for obtaining the requisite replacement volume and performing the analyses required prior to addition of fuel oil to the tank(s). A period of 48 hours is considered sufficient to complete restoration of the required level prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> 6 days), the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

BASES

ACTIONS (continued)

B.1

This Condition is entered as a result of a failure to meet the acceptance criterion of SR 3.8.3.2. Normally, trending of particulate levels allows sufficient time to correct high particulate levels prior to reaching the limit of acceptability. Poor sample procedures (bottom sampling), contaminated sampling equipment, and errors in laboratory analysis can produce failures that do not follow a trend. Since the presence of particulates does not mean failure of the fuel oil to burn properly in the diesel engine, and particulate concentration is unlikely to change significantly between Surveillance Frequency intervals, and proper engine performance has been recently demonstrated (within 31 days), it is prudent to allow a brief period prior to declaring the associated DG inoperable. The 7 day Completion Time allows for further evaluation, resampling and re-analysis of the DG fuel oil.

C.1

With the new fuel oil properties defined in the Bases for SR 3.8.3.2 not within the required limits (after having been added to the storage tank(s); thus making it part of the stored fuel), a period of 30 days is allowed for restoring the stored fuel oil properties. This period provides sufficient time to test the stored fuel oil to determine that the new fuel oil, when mixed with previously stored fuel oil, remains acceptable, or to restore the stored fuel oil properties. This restoration may involve feed and bleed procedures, filtering, or combinations of these procedures. Even if a DG start and load was required during this time interval and the fuel oil properties were outside limits, there is a high likelihood that the DG would still be capable of performing its intended function.

D.1

With a Required Action and associated Completion Time not met, or one or more DGs with fuel oil not within limits for reasons other than addressed by Conditions A through C, the associated DG may be incapable of performing its intended function and must be immediately declared inoperable.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.3.1

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

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

SR 3.8.3.2

The tests of fuel oil prior to addition to the storage tank(s) are a means of determining whether new fuel oil is of the appropriate grade and has not been contaminated with substances that would have an immediate, detrimental impact on diesel engine combustion. If results from these tests are within acceptable limits, the fuel oil may be added to the storage tanks without concern for contaminating the entire volume of fuel oil in the storage tanks. These tests are to be conducted prior to adding the new fuel to the storage tank(s), but in no case is the time between sampling (and associated results) of new fuel and addition of new fuel oil to the storage tank to exceed 30 days. The tests, limits, and applicable ASTM Standards for the tests listed in the Diesel Fuel Oil Testing Program of Specification 5.5.13 are as follows:

BASES

SURVEILLANCE REQUIREMENTS (continued)

a. Sample the new fuel oil in accordance with ASTM D4057 (Ref. 6);

b. Verify in accordance with the tests specified in ASTM D975-81 (Ref. 6) that the sample has an absolute specific gravity at 60°F of ≥ 0.83 and ≤ 0.89 or an API gravity at 60°F of ≥ 27° and ≤ 39°, a kinematic viscosity at 40°C of ≥ 1.9 centistokes and ≤ 4.1 centistokes, and a flash point of ≥ 125°F; and

c. Verify that the new fuel oil has a clear and bright appearance with proper color when tested in accordance with ASTM D4176-82 (Ref. 6).

Failure to meet any of the above limits is cause for rejecting the new fuel oil, but does not represent a failure to meet the LCO concern since the fuel oil is not added to the storage tanks.

Following the initial new fuel oil sample, the fuel oil is analyzed to establish that the other properties specified in Table 1 of ASTM D975-81 (Ref. 7) are met for new fuel oil when tested in accordance with ASTM D975-81 (Ref. 6), except that the analysis for sulfur may be performed in accordance with ASTM D1552-79 (Ref. 6) or ASTM D2622-82 (Ref. 6). These additional analyses are required by Specification 5.5.13, "Diesel Fuel Oil Testing Program," to be performed within 30 days following sampling and addition. This 30 day time period is intended to assure: 1) that the sample taken is not more than 30 days old at the time of adding the fuel oil to the storage tank, and 2) that the results of a new fuel oil sample (sample obtained prior to addition but not more than 30 days prior to) are obtained within 30 days after addition. The 30 day period is acceptable because the fuel oil properties of interest, even if they were not within stated limits, would not have an immediate effect on DG operation. This Surveillance ensures the availability of high quality fuel oil for the DGs.

BASES

SURVEILLANCE REQUIREMENTS (continued)

Fuel oil degradation during long term storage shows up as an increase in particulate, due mostly to oxidation. The presence of particulate does not mean the fuel oil will not burn properly in a diesel engine. The particulate can cause fouling of filters and fuel oil injection equipment, however, which can cause engine failure.

Particulate concentrations should be determined in accordance with ASTM D2276 (Ref. 6). This method involves a determination of total particulate concentration in the fuel oil and has a limit of 10 mg/l. It is acceptable to obtain a field sample for subsequent laboratory testing in lieu of field testing. Each tank must be considered and tested separately since the total stored fuel oil volume is contained in two or more interconnected tanks.

The Frequency of this test takes into consideration fuel oil degradation trends that indicate that particulate concentration is unlikely to change significantly between Frequency intervals.

SR 3.8.3.3

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel storage tanks once every 31 days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, and contaminated fuel oil, and from breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established consistent with the recommendations of Regulatory Guide 1.137 (Ref. 2). This SR is for preventive maintenance. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during performance of the Surveillance.

BASES

REFERENCES

1. UFSAR, Section 9.5.4.2.
2. Regulatory Guide 1.137.
3. ANSI N195-1976, Appendix B.
4. UFSAR, Chapter 6.
5. UFSAR, Chapter 15.
6. ASTM Standards: D4057; D975-81; D4176-82; D1552-79; D2622-82; D2276.
7. ASTM Standards, D975, Table 1.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.4 DC Sources – Operating

BASES

RAI 3.8.4-1

REV C

BACKGROUND

The station DC electrical power system provides the AC emergency power system with control power. It also provides both motive and control power to selected safety related equipment and AC instrument bus power (via inverters). As required by 10 CFR 50, Appendix A, GDC 17 (Ref. 1), the DC electrical power system is designed to have sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure. The DC electrical power system also conforms to the recommendations of Regulatory Guide 1.6 (Ref. 2) and IEEE-308 (Ref. 3).

The 125 VDC electrical power system for each unit consists of two independent and redundant safety related Class 1E DC electrical power subsystems (Division 11 (21) and Division 12 (22)). Each subsystem consists of one 125 VDC battery, the associated battery charger for each battery, and all the associated control equipment and interconnecting cabling.

During normal operation, the 125 VDC loads are powered from the battery chargers with the batteries floating on the system. In case of a loss of normal power to the battery charger, the DC load is automatically powered from the station battery.

The Division 11 (21) and Division 12 (22) DC electrical power subsystems provide the control power for its associated Class 1E AC power load group, 4.16 kV switchgear, and 480 V load centers. The DC electrical power subsystems also provide DC electrical power to the inverters, which in turn power the AC instrument buses. Additionally, the Class 1E 125 VDC electrical power subsystems provide power to the 6.9 kV Reactor Coolant Pump (RCP) breakers and the non-Class 1E 125 VDC buses. The connection between the Class 1E and non-Class 1E 125 VDC buses contains fuses to ensure that a fault on the non-Class 1E bus does not cause a loss of the Class 1E bus.

BASES

BACKGROUND (continued)

The DC power distribution system is described in more detail in Bases for LCO 3.8.9, "Distribution System - Operating," and LCO 3.8.10, "Distribution Systems - Shutdown."

Each battery was sized based upon supplying the design duty cycle in the event of a loss of offsite AC power concurrent with a Loss Of Coolant Accident (LOCA) and a single failure of a Diesel Generator (DG). Each battery has a nominal rating of 2320 ampere-hours at the 8 hour discharge rate to an end voltage of 1.75 volts per cell, and was sized based upon continuously carrying the various estimated loads. The batteries were sized in accordance with IEEE-485-1983 (Ref. 5).

Each 125 VDC battery is separately housed in a ventilated room apart from its charger and distribution centers. Each subsystem is located in an area separated physically and electrically from the other subsystem to ensure that a single failure in one subsystem does not cause a failure in a redundant subsystem. There is no sharing between redundant Class 1E subsystems, such as batteries, battery chargers, or distribution panels. While it is possible to interconnect the Unit 1 and Unit 2 DC electrical power subsystems, they normally remain disconnected, except when a DC source must be taken out of service for the purposes of maintenance and/or testing, or in the event of a failure of a DC source.

BASES

BACKGROUND (continued)

The crosstie between 125 VDC ESF buses 111 and 211 and the crosstie between 125 VDC ESF buses 112 and 212 are each provided with two normally locked open, manually operated circuit breakers. No interlocks are provided since the interconnected buses are not redundant. However, if one battery is inoperable, procedural and administrative controls are used to limit the connected load to 200 amps based on not exceeding the OPERABLE battery capacity. These controls ensure that combinations of maintenance and test operations will not preclude the system capabilities to supply power to the ESF DC loads. The provisions of administratively controlled, manually actuated, interconnections between the non-redundant Class 1E DC buses increases the overall reliability and availability of the DC systems for each unit in that it provides a means for manually providing power to a DC bus at a time when it would otherwise have to be out-of-service (e.g., to perform a battery discharge test during an outage, to replace a damaged cell, etc.). Crosstie breaker closed alarms are also provided to alert the operator when the units are crosstied.

RAI 3.8.4-2

Each Division 11 (21) and Division 12 (22) DC electrical power subsystem battery charger has ample power output capacity for the steady state operation of connected loads required during normal operation, while at the same time maintaining its battery bank fully charged. Each battery charger also has sufficient capacity to restore the battery from the design minimum charge to its fully charged state within 24 hours while supplying normal steady state loads discussed in the UFSAR, Chapter 8 (Ref. 4).

BASES

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter 6 (Ref. 6), and in the UFSAR, Chapter 15 (Ref. 7), assume that Engineered Safety Feature (ESF) systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the DGs, emergency auxiliaries, and control and switching during all MODES of operation.

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

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

b. A worst case single failure.

The DC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES

LCO

The DC electrical power subsystems, each subsystem consisting of:

a. a battery;

b. battery charger; and

c. the corresponding control equipment and interconnecting cabling supplying power to the associated bus within the division,

are required to be OPERABLE to ensure the availability of the required power to shut down the reactor and maintain it in a safe condition after an Anticipated Operational Occurrence (AOO) or a postulated DBA. Loss of any division DC electrical power subsystem does not prevent the minimum safety function from being performed (Ref. 4). Furthermore, at least one crosstie breaker between Division 11 and Division 21, and at least one crosstie breaker between Division 12 and Division 22, is required to be open to maintain independence between the units.

An OPERABLE DC electrical power subsystem requires the required battery and respective charger to be operating and connected to the associated DC bus.

APPLICABILITY

The DC electrical power sources are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure safe unit operation and to ensure that:

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

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

The DC electrical power requirements for MODES 5 and 6 are addressed in LCO 3.8.5, "DC Sources – Shutdown."

BASES

ACTIONS

A.1 and A.2

Condition A addresses the event of having one battery charger inoperable, and provides for restoration of electrical power to the associated DC bus by use of the crosstie capability to the opposite unit. The 2 hour Completion Time allows adequate time to evaluate the cause for battery charger failure, to determine whether the opposite unit's DC bus is available for support, and to perform the crosstie procedure. The battery charger is required to be restored to OPERABLE status within 24 hours in order to reestablish the independence of DC subsystems, while providing a reasonable amount of time for repairs. By limiting the crosstied conditions of operating units to 24 hours, the likelihood of an event occurring which could place either unit in jeopardy is minimized. (Note, there are no load restrictions applicable to the opposite unit's DC bus in this condition.)

B.1

Condition B addresses the situation of crosstieing the operating unit's DC bus to the opposite unit, which has an inoperable battery charger, when the opposite unit is operating in MODE 1, 2, 3, or 4. This provision is included to accommodate unexpected failures, maintenance, and/or testing of the opposite unit's DC subsystems. The Completion Time for Required Action B.1 of 60 hours is adequate to allow testing and restoration activities. In this Condition, the opposite unit's battery is assumed to remain OPERABLE. Therefore, the function of the crosstie is to maintain the opposite unit's battery fully charged and to supply the minimal opposite unit DC loads. The 60 hours is based on the 24 hours the opposite unit has to restore the inoperable charger and the 36 hours the opposite unit would have to reach MODE 5, if the charger is not restored to OPERABLE status. When the opposite unit reaches MODE 5, Condition C is entered. Requiring the associated crosstie breaker to be opened within 60 hours also ensures that independence of the DC subsystems is reestablished.

BASES

ACTIONS (continued)

RAI 3.8.4-3

C.1 and C.2

Condition C addresses an operating unit's DC bus that is crosstied to the opposite unit's associated DC bus, which has an inoperable source (i.e., battery or battery charger), when the opposite unit is shutdown. This provision is included to accommodate maintenance and/or testing of the shutdown unit's DC subsystems.

With the shutdown unit's battery inoperable, the operating unit will be required to supply all loads on the shutdown unit's crosstied bus should an event occur on the shutdown unit. Therefore, Required Action C.1 specifies that the possible loading on the shutdown unit's DC bus be verified to be ≤ 200 amps once per 12 hours. Limiting the load to 200 amps, ensures that the operating unit's DC subsystem will not be overloaded in the event of a concurrent event on the operating unit. Required Action C.1 is modified by a Note only requiring Required Action C.1 when the opposite unit has an inoperable battery.

RAI 3.8.4-3

Required Action C.2 requires the associated crosstie breaker to be opened within 7 days and ensures that measures are being taken to restore the inoperable battery or battery charger and reestablish independence of the DC subsystems.

BASES

ACTIONS (continued)

D.1

Condition D represents one division with a loss of ability to completely respond to an event, and a potential loss of ability for the DC division to remain energized during normal operation. It is, therefore, imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for complete loss of DC power to the affected division. The 2 hour limit is consistent with the allowed time for an inoperable DC distribution system division.

If one of the required DC electrical power subsystems is inoperable (e.g., inoperable battery or one DC division crosstied to the opposite-unit DC division that does not have an inoperable battery charger), the remaining DC electrical power subsystem has the capacity to support a safe shutdown and to mitigate an accident condition. Since a subsequent worst case single failure would, however, result in the complete loss of the remaining 125 VDC electrical power subsystems with attendant loss of ESF functions, continued power operation should not exceed 2 hours. The 2 hour Completion Time is based on Regulatory Guide 1.93 (Ref. 8) and reflects a reasonable time to assess unit status as a function of the inoperable DC electrical power subsystem and, if the DC electrical power subsystem is not restored to OPERABLE status, to prepare to effect an orderly and safe unit shutdown.

E.1 and E.2

If the inoperable DC electrical power subsystem cannot be restored to OPERABLE status, or the crosstie breaker(s) cannot be opened, within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems. The Completion Time to bring the unit to MODE 5 is consistent with the time required in Regulatory Guide 1.93 (Ref. 8).

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1

Verifying battery terminal voltage while on float charge helps to ensure the effectiveness of the charging system and the ability of the batteries to perform their intended function. Float charge is the condition in which the charger is supplying the connected loads and the continuous charge required to overcome the internal losses of a battery and maintain the battery in a fully charged state. The voltage requirements are based on the nominal design voltage of the battery and are consistent with the initial voltages assumed in the battery sizing calculations. The 7 day Frequency is consistent with manufacturer recommendations and IEEE-450 (Ref. 9).

SR 3.8.4.2

Visual inspection to detect corrosion of the battery cells and connections, or measurement of the resistance of each intercell, interrack, intertier, and terminal connection, provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance.

The limits established for this SR must not be above the ceiling value established by the manufacturer.

Connection resistance is obtained by subtracting the normal resistance of the interrack (cross room rack) connector or the intertier (bi-level rack) connector from the measured intercell (cell-to-cell) connection resistance.

The Surveillance Frequency for these inspections, which can detect conditions that can cause power losses due to resistance heating, is 92 days. This Frequency is considered acceptable based on operating experience related to detecting corrosion trends.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.3

Visual inspection of the battery cells, cell plates, and battery racks provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance. The presence of physical damage or deterioration does not necessarily represent a failure of this SR, provided an evaluation determines that the physical damage or deterioration does not affect the OPERABILITY of the battery (its ability to perform its design function).

SR 3.8.4.4 and SR 3.8.4.5

Visual inspection and resistance measurements of intercell, interrack, intertier, and terminal connections provide an indication of physical damage or abnormal deterioration that could indicate degraded battery condition. The anticorrosion material is used to help ensure good electrical connections and to reduce terminal deterioration. The visual inspection for corrosion is not intended to require removal of and inspection under each terminal connection. The removal of visible corrosion is a preventive maintenance SR. The presence of visible corrosion does not necessarily represent a failure of this SR provided visible corrosion is removed during performance of SR 3.8.4.4.

The connection resistance limits for SR 3.8.4.5 shall not be above the ceiling value established by the manufacturer.

Connection resistance is obtained by subtracting the normal resistance of the interrack (cross room rack) connector or the intertier (bi-level rack) connector from the measured intercell (cell-to-cell) connection resistance.

RAI 3.8.4-7

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.6

This SR requires that each battery charger be capable of supplying 400 amps and 125 V for ≥ 8 hours. These requirements are based on the design capacity of the chargers (Ref. 4). According to Regulatory Guide 1.32 (Ref. 10), the battery charger output capacity is required to be based on the largest combined demands of the various steady state loads and the charging demands to restore the battery from the design minimum charge state to the fully charged state, irrespective of the status of the unit during these demand occurrences. The minimum required amperes and duration ensures that these requirements can be satisfied.

The Surveillance Frequency is acceptable, given the unit conditions required to perform the test and the other administrative controls existing to ensure adequate charger performance during these 18 month intervals. In addition, this Frequency is intended to be consistent with expected fuel cycle lengths.

This Surveillance is required to be performed during MODES 5 and 6 since it would require the DC electrical power subsystem to be inoperable during performance of the test.

REV C

SR 3.8.4.7

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

The Surveillance Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.32 (Ref. 10) and Regulatory Guide 1.129 (Ref. 11), which state that the battery service test should be performed during refueling operations or at some other outage, with intervals between tests, not to exceed 18 months.

This SR is modified by two Notes. Note 1 allows the performance of a modified performance discharge test in lieu of a service test.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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

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

The reason for Note 2 is that performing the Surveillance would perturb the electrical distribution system and challenge safety systems.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.8

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

A battery modified performance discharge test is described in the Bases for SR 3.8.4.7. Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.4.8, however, only the modified performance discharge test may be used to satisfy SR 3.8.4.8 while satisfying the requirements of SR 3.8.4.7 at the same time.

The acceptance criteria for this Surveillance are consistent with IEEE-450 (Ref. 9) and IEEE-485 (Ref. 5). These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The Surveillance Frequency for this test is normally 60 months. If the battery shows degradation, or if the battery has reached 85% of its expected life and capacity is < 100% of the manufacturer's rating, the Surveillance Frequency is reduced to 12 months. However, if the battery shows no degradation but has reached 85% of its expected life, the Surveillance Frequency is only reduced to 24 months for batteries that retain capacity ≥ 100% of the manufacturer's rating. Degradation is indicated, according to IEEE-450 (Ref. 9), when the battery capacity drops by more than 10% relative to its capacity on the previous performance test or when it is > 10% below the manufacturer's rating. These Frequencies are consistent with the recommendations in IEEE-450 (Ref. 9).

RWC

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would perturb the electrical distribution system and challenge safety systems.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.
2. Regulatory Guide 1.6, March 10, 1971.
3. IEEE-308-1978.
4. UFSAR, Section 8.3.2.1.
5. IEEE-485-1983, June 1983.
6. UFSAR, Chapter 6.
7. UFSAR, Chapter 15.
8. Regulatory Guide 1.93, December 1974.
9. IEEE-450-1995.
10. Regulatory Guide 1.32, February 1977.
11. Regulatory Guide 1.129, December 1974.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.5 DC Sources – Shutdown

BASES

BACKGROUND

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

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident and transient analyses in the UFSAR, Chapter 6 (Ref. 1) and Chapter 15 (Ref. 2), assume that Engineered Safety Feature systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the diesel generators, emergency auxiliaries, and control and switching during all MODES of operation.

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

The OPERABILITY of the minimum DC electrical power sources during MODES 5 and 6 and during movement of irradiated fuel assemblies ensures that:

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

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

c. Adequate DC electrical power is provided to mitigate events postulated during shutdown, such as a fuel handling accident.

The DC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES

LCO

The DC electrical power subsystems with:

a. at least one subsystem consisting of a battery and battery charger;

b. when the redundant division of the Class 1E DC electrical power distribution subsystem is required by LCO 3.8.10, the other subsystem consisting of either a battery or a charger; and

c. the corresponding control equipment, and interconnecting cabling within the division(s)

are required to be OPERABLE to support required division(s) of the distribution systems required OPERABLE by LCO 3.8.10, "Distribution Systems – Shutdown." This ensures the availability of sufficient DC electrical power sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents). Furthermore, at least one unit crosstie breaker per division is required to be open to maintain independence between the units.

LCO 3.8.5 is modified by a Note which allows one division to be crosstied to the opposite unit, when the opposite unit is in MODE 1, 2, 3, or 4 with an inoperable charger. No load restrictions are placed on the bus loading, when the one division is crosstied.

BASES

APPLICABILITY

The DC electrical power sources required to be OPERABLE in MODES 5 and 6, and at all times during movement of irradiated fuel assemblies, provide assurance that:

a. Required features to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core;

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

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

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

The DC electrical power requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.4.

ACTIONS

LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Therefore, in either case, inability to suspend movement of irradiated fuel assemblies would not be sufficient reason to require a reactor shutdown.

BASES

ACTIONS (continued)

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

If two divisions are required by LCO 3.8.10, the remaining division with DC power available may be capable of supporting sufficient systems to allow continuation of CORE ALTERATIONS and fuel movement. By allowing the option to declare required features inoperable with the associated DC power source(s) inoperable, appropriate restrictions will be implemented in accordance with the affected required features' LCO ACTIONS. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, operations involving positive reactivity additions, and declare the affected Low Temperature Overpressure Protection (LTOP) features, required by LCO 3.4.12, inoperable). The Required Action to declare the associated LTOP features inoperable allows the operator to evaluate the current unit conditions and to determine which (if any) of the LTOP features have been affected by the loss of power. The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory, provided the required SDM is maintained. Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required DC electrical power subsystems and to continue this action until restoration is accomplished in order to provide the necessary DC electrical power to the unit safety systems.

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

BASES

ACTIONS (continued)

B.1 and B.2

Condition B addresses a shutdown unit's DC bus that is crosstied to the opposite unit's associated DC bus, which has an inoperable source, when the opposite unit is also shutdown. This provision is included to accommodate maintenance and/or testing of the opposite unit's DC subsystems.

With the opposite unit's battery inoperable, the unit-specific DC subsystem will be required to supply all loads on the opposite unit's crosstied bus should an event occur on the opposite unit. Therefore, Required Action B.1 specifies that the possible loading on the opposite unit's DC bus be verified to be ≤ 200 amps once per 12 hours. Limiting the load to 200 amps, ensures that the unit-specific DC subsystem will not be overloaded in the event of a concurrent event on the unit. Required Action B.1 is modified by a Note requiring Required Action B.1 when the opposite unit has an inoperable battery.

Required Action B.2 requires the associated crosstie breaker to be opened within 7 days ensures that measures are being taken to reestablish independence of the DC subsystems.

SURVEILLANCE REQUIREMENTS

SR 3.8.5.1

SR 3.8.5.1 requires application of all Surveillances required by SR 3.8.4.1 through SR 3.8.4.8. Therefore, see the corresponding Bases for LCO 3.8.4 for a discussion of each SR.

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

BASES

REFERENCES
1. UFSAR, Chapter 6.
2. UFSAR, Chapter 15.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.6 Battery Cell Parameters

BASES

BACKGROUND

This LCO delineates the limits on electrolyte temperature, level, float voltage, and specific gravity for the DC power source batteries. A discussion of these batteries and their OPERABILITY requirements is provided in the Bases for LCO 3.8.4, "DC Sources - Operating," and LCO 3.8.5, "DC Sources - Shutdown."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter 6 (Ref. 1) and Chapter 15 (Ref. 2), assume Engineered Safety Feature systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the diesel generators, emergency auxiliaries, and control and switching during all MODES of operation.

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

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

b. A worst case single failure.

Battery cell parameters satisfy the Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

Battery cell parameters must remain within acceptable limits to ensure availability of the required DC power to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence or a postulated DBA. Electrolyte limits are conservatively established, allowing continued DC electrical system function even with Category A and B limits not met.

BASES

APPLICABILITY

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

ACTIONS

The ACTIONS Table is modified by a Note which indicates that separate Condition entry is allowed for each battery. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each affected battery. Complying with the Required Actions for one battery may allow for continued operation, and subsequent battery parameters out of limits are governed by separate Condition entry and application of associated Required Actions.

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

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

The pilot cell electrolyte level and float voltage are required to be verified to meet the Category C limits within 1 hour (Required Action A.1). This check will provide a quick indication of the status of the remainder of the battery cells. One hour provides time to inspect the electrolyte level and to confirm the float voltage of the pilot cell. One hour is considered a reasonable amount of time to perform the required verification.

BASES

ACTIONS (continued)

Rev C

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

RAI 3.8.7-1

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

Rev C

B.1

With one or more batteries with one or more battery cell parameters outside the Category C limit for any connected cell, sufficient capacity to supply the maximum expected load requirement is not assured and the corresponding DC electrical power subsystem must be declared inoperable. Additionally, other potentially extreme conditions, such as not completing the Required Actions of Condition A within the required Completion Time or average electrolyte temperature of representative cells falling below 60°F, are also cause for immediately declaring the associated DC electrical power subsystem inoperable.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.6.1

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

SR 3.8.6.2

The quarterly inspection of specific gravity and voltage is consistent with IEEE-450 (Ref. 3). In addition, within 7 days of a battery discharge < 110 V or a battery overcharge > 145 V, the battery must be demonstrated to meet Category B limits. Transients, such as motor starting transients, which may momentarily cause battery voltage to drop to < 110 V, do not constitute a battery discharge provided the battery terminal voltage and float current return to pre-transient values. This inspection is also consistent with IEEE-450 (Ref. 3), which recommends special inspections following a severe discharge or overcharge, to ensure that no significant degradation of the battery occurs as a consequence of such discharge or overcharge.

SR 3.8.6.3

This Surveillance verification that the average temperature of representative cells is ≥ 60°F, is consistent with a recommendation of IEEE-450 (Ref. 3), that states that the temperature of electrolytes in representative cells should be determined on a quarterly basis.

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

BASES

SURVEILLANCE REQUIREMENTS (continued)

Table 3.8.6-1

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

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

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

The Category A limit specified for float voltage is ≥ 2.13 V per cell. This value is based on the recommendations of IEEE-450 (Ref. 3), which states that prolonged operation of cells < 2.13 V can reduce the life expectancy of cells.

The Category A limit specified for specific gravity for each pilot cell is ≥ 1.200 (0.015 below the manufacturer fully charged nominal specific gravity or a battery charging current that had stabilized at a low value). This value is characteristic of a charged cell with adequate capacity. According to IEEE-450 (Ref. 3), the specific gravity readings are based on a temperature of 77°F (25°C).

BASES

SURVEILLANCE REQUIREMENTS (continued)

Rev C

The specific gravity readings are corrected for actual electrolyte temperature. For each 3°F (1.67°C) above 77°F (25°C), 1 point (0.001) is added to the reading; 1 point is subtracted for each 3°F below 77°F.

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

The Category B limits specified for electrolyte level and float voltage are the same as those specified for Category A and have been discussed above. Footnote (b) to Table 3.8.6-1 requires the float voltage correction for average electrolyte temperature. The Category B limit specified for specific gravity for each connected cell is ≥ 1.195 (0.020 below the manufacturer fully charged, nominal specific gravity) with the average of all connected cells > 1.205 (0.010 below the manufacturer fully charged, nominal specific gravity). These values are based on manufacturer's recommendations. The minimum specific gravity value required for each cell ensures that the effects of a highly charged or newly installed cell will not mask overall degradation of the battery.

Rev L

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

BASES

SURVEILLANCE REQUIREMENTS (continued)

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

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

The footnotes to Table 3.8.6-1 are applicable to Category A, B, and C specific gravity. Footnote (c) to Table 3.8.6-1 requires the above mentioned correction for electrolyte temperature.

Because of specific gravity gradients that are produced during the recharging process, delays of several days may occur while waiting for the specific gravity to stabilize. A stabilized charger current is an acceptable alternative to specific gravity measurement for determining the state of charge. This phenomenon is discussed in IEEE-450 (Ref. 3). Footnote (d) to Table 3.8.6-1 allows the float charge current to be used as an alternate to specific gravity for up to 7 days following a battery recharge. Within 7 days, each connected cell's specific gravity must be measured to confirm the state of charge. Following a minor battery recharge (such as equalizing charge that does not follow a deep discharge) specific gravity gradients are not significant, and confirming measurements may be made in less than 7 days.

BASES

REFERENCES

1. UFSAR, Chapter 6.
2. UFSAR, Chapter 15.
3. IEEE-450-1995.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.7 Inverters – Operating

BASES

BACKGROUND

The inverters are the preferred source of power for the AC instrument buses because of the stability and reliability they provide. Each of the four AC instrument buses (2 per division) is normally supplied AC electrical power by a dedicated inverter. The inverters can be powered from an AC source/rectifier or from an associated 125 VDC battery. The battery provides an uninterruptible power source for the instrumentation and controls for the Reactor Protective System (RPS) and the Engineered Safety Feature Actuation System (ESFAS). Specific details on inverters and their operating characteristics are found in the UFSAR, Chapter 8 (Ref. 1).

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter 6 (Ref. 2) and Chapter 15 (Ref. 3), assume Engineered Safety Feature Systems are OPERABLE. The inverters are designed to provide the required capacity, capability, redundancy, and reliability to ensure the availability of necessary power to the RPS and ESFAS instrumentation and controls so that the fuel, Reactor Coolant System, and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

BASES

APPLICABLE SAFETY ANALYSES (continued)

The OPERABILITY of the inverters is consistent with the initial assumptions of the accident analyses and is based on meeting the design basis of the plant. This includes maintaining required AC instrument buses OPERABLE during accident conditions in the event of:

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

b. A worst case single failure.

Inverters are a part of the distribution system and, as such, satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The inverters ensure the availability of AC electrical power for the systems instrumentation required to shut down the reactor and maintain it in a safe condition after an Anticipated Operational Occurrence (AOO) or a postulated DBA.

Maintaining the required inverters OPERABLE ensures that the redundancy incorporated into the design of the RPS and ESFAS instrumentation and controls is maintained. The four inverters ensure an uninterruptible supply of AC electrical power to the AC instrument buses even if the 4.16 kV safety buses are de-energized.

OPERABLE inverters require the associated instrument bus to be powered by the inverter with output voltage within tolerances, and power input to the inverter from the associated 125 VDC battery. The power supply may be from an AC source via rectifier as long as the battery is connected as the uninterruptible power supply.

BASES

APPLICABILITY

The inverters are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

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

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

Inverter requirements for MODES 5 and 6 are covered in LCO 3.8.8, "Inverters – Shutdown."

ACTIONS

A.1

With a required inverter inoperable, its associated AC instrument bus may be inoperable unless it is manually re-energized from its Class 1E constant voltage source transformer.

For this reason a Note has been included in Condition A requiring the entry into the Conditions and Required Actions of LCO 3.8.9, "Distribution Systems – Operating" for any de-energized instrument bus. This ensures that the instrument bus is re-energized within 2 hours.

Required Action A.1 allows 24 hours to fix the inoperable inverter and return it to service. The 24 hour limit is based upon engineering judgment, taking into consideration the time required to repair an inverter and the additional risk to which the unit is exposed because of the inverter inoperability. This has to be balanced against the risk of an immediate shutdown, along with the potential challenges to safety systems such a shutdown might entail. When the AC instrument bus is powered from its constant voltage source, it is relying upon interruptible AC electrical power sources (offsite and onsite). The uninterruptible inverter source to the AC instrument buses is the preferred source for powering instrumentation trip setpoint devices.

BASES

ACTIONS (continued)

B.1 and B.2

If the inoperable devices or components cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.8.7.1

This Surveillance verifies that the inverters are functioning properly with all required circuit breakers closed and AC instrument buses energized from the inverter. The verification of proper voltage output ensures that the required power is readily available for the instrumentation of the RPS and ESFAS connected to the AC instrument buses. The 7 day Frequency takes into account the redundant capability of the inverters and other indications available in the control room that alert the operator to inverter malfunctions.

REFERENCES

1. UFSAR, Chapter 8.

2. UFSAR, Chapter 6.

3. UFSAR, Chapter 15.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.8 Inverters - Shutdown

BASES

BACKGROUND

A description of the inverters is provided in the Bases for LCO 3.8.7, "Inverters - Operating."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter 6 (Ref. 1) and Chapter 15 (Ref. 2), assume Engineered Safety Feature systems are OPERABLE. The DC to AC inverters are designed to provide the required capacity, capability, redundancy, and reliability to ensure the availability of necessary power to the Reactor Protective System and Engineered Safety Features Actuation System instrumentation and controls so that the fuel, Reactor Coolant System, and containment design limits are not exceeded.

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

The OPERABILITY of the inverter to each required AC instrument bus during MODES 5 and 6 ensures that:

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

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

c. Adequate power is available to mitigate events postulated during shutdown, such as a fuel handling accident.

The inverters were previously identified as part of the distribution system and, as such, satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES

LCO

The inverters ensure the availability of electrical power for the instrumentation for systems required to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence or a postulated DBA. One AC instrument bus division energized by two battery powered inverters provides uninterruptible supply of AC electrical power to at least one AC instrument bus division even if the 4.16 kV safety buses are de-energized. OPERABILITY of these two inverters requires that the associated AC instrument buses be powered by the inverters. When the redundant division of the Class 1E AC instrument bus electrical power distribution subsystem is required by LCO 3.8.10, the power source for the AC instrument buses may consist of:

a. one inverter powered by its associated battery;

b. one inverter powered by its internal AC source; or

c. one Class 1E constant voltage source transformer.

This ensures the availability of sufficient inverter power sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents).

APPLICABILITY

The inverters required to be OPERABLE in MODES 5 and 6, and at all times during movement of irradiated fuel assemblies, provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel in the core;

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

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

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

BASES

APPLICABILITY (continued)

Inverter requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.7.

ACTIONS

LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Therefore, in either case, inability to suspend movement of irradiated fuel assemblies would not be sufficient reason to require a reactor shutdown.

BASES

ACTIONS (continued)

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

With one or more required AC instrument bus power sources inoperable when two divisions are required by LCO 3.8.10, "Distribution Systems – Shutdown," the remaining OPERABLE AC instrument bus power sources may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, or operations with a potential for positive reactivity additions. By the allowance of the option to declare required features inoperable with the associated inverter(s) inoperable, appropriate restrictions will be implemented in accordance with the affected required features LCOs' Required Actions. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, operations involving positive reactivity additions, and declare the associated Low Temperature Overpressure Protection (LTOP) features inoperable). The Required Action to declare the associated LTOP features inoperable allows the operator to evaluate the current unit conditions and to determine which (if any) of the LTOP features have been affected by the loss of power. If the LTOP features have not been affected, then unnecessarily restrictive actions may be averted. The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory, provided the required SDM is maintained. Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required inverters and to continue this action until restoration is accomplished in order to provide the necessary inverter power to the unit safety systems.

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

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.8.1

This Surveillance verifies that the inverters are functioning properly with all required circuit breakers closed and required AC instrument buses energized. The verification of proper voltage output ensures that the required power is readily available for the instrumentation connected to the AC instrument buses. The 7 day Frequency takes into account the reliability of the instrument bus power sources and other indications available in the control room that alert the operator to malfunctions.

REFERENCES

1. UFSAR, Chapter 6.
2. UFSAR, Chapter 15.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.9 Distribution Systems - Operating

BASES

BACKGROUND

The onsite Class 1E AC, DC, and AC instrument bus electrical power distribution systems are divisionalized into two redundant and independent AC, DC, and AC instrument bus electrical power distribution subsystems.

The AC electrical power subsystem for each division consists of a primary 4.16 kV Engineered Safety Feature (ESF) bus and two primary 480 V ESF buses. The division also includes (but is not included in the subsystem required to be OPERABLE by LCO 3.8.9) secondary 480 and 120 V buses, motor control centers, and distribution panels. Each 4.16 kV ESF bus has at least one separate and independent offsite source of power as well as a dedicated onsite Diesel Generator (DG) source. Each 4.16 kV ESF bus is normally connected to a normal offsite source. After a loss of the normal offsite power source to a 4.16 kV ESF bus the onsite emergency DG supplies power to the 4.16 kV ESF bus. A transfer to the reserve offsite source can be accomplished manually. Control power for the 4.16 kV breakers is supplied from the Class 1E 125 VDC electrical power distribution subsystem. Additional description of this system may be found in the Bases for LCO 3.8.1, "AC Sources - Operating," and the Bases for LCO 3.8.4, "DC Sources - Operating."

The four 120 VAC instrument buses (considered distinct from the AC electrical power distribution subsystem) are arranged in two load groups per division and are normally powered from the inverters. The alternate power supply for the instrument buses are Class 1E constant voltage source transformers powered from the same division as the associated inverter, and its use is governed by LCO 3.8.7, "Inverters - Operating." Each constant voltage source transformer is powered from a Class 1E AC bus.

There are two independent 125 VDC electrical power distribution subsystems (one for each division).

BASES

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter 6 (Ref. 1), and in the UFSAR, Chapter 15 (Ref. 2), assume ESF systems are OPERABLE. The AC, DC, and AC instrument bus electrical power distribution systems are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

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

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

b. A worst case single failure.

The distribution systems satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The required power distribution subsystems ensure the availability of AC, DC, and AC instrument bus electrical power for the systems required to shut down the reactor and maintain it in a safe condition after an Anticipated Operational Occurrence (AOO) or a postulated DBA. The AC, DC, and AC instrument bus electrical power distribution subsystems are required to be OPERABLE.

BASES

LCO (continued)

Maintaining the Division 1 and Division 2 AC, DC, and AC instrument bus electrical power distribution subsystems OPERABLE ensures that the redundancy incorporated into the design of ESF is not defeated. Therefore, a single failure within any system or within the electrical power distribution subsystems will not prevent safe shutdown of the reactor.

OPERABLE AC electrical power distribution subsystems require the associated buses to be energized to their proper voltages. The division also includes (but is not included in the subsystem required to be OPERABLE by LCO 3.8.9) secondary 480 and 120 V buses, motor control centers, and distribution panels. OPERABLE DC electrical power distribution subsystems require the associated buses to be energized to their proper voltage from either the associated battery or charger. OPERABLE instrument bus electrical power distribution subsystems require the associated buses to be energized to their proper voltage from the associated inverter via inverted DC voltage, inverter using AC source, or Class 1E constant voltage transformer.

APPLICABILITY

The electrical power distribution subsystems are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

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

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

Electrical power distribution subsystem requirements for MODES 5 and 6 are covered in LCO 3.8.10, "Distribution Systems – Shutdown."

BASES

RAI 3.8.9-2

ACTIONS

A.1

With one AC bus, except AC instrument buses, inoperable, the remaining AC electrical power distribution subsystem is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. The overall reliability is reduced, however, because a single failure in the remaining power distribution subsystem could result in the minimum required ESF functions not being supported. Therefore, the required AC bus must be restored to OPERABLE status within 8 hours.

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

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

b. The low probability for an event in conjunction with a single failure of a redundant component in the division with AC power.

BASES

ACTIONS (continued)

The second Completion Time for Required Action A.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition A is entered while, for instance, a DC bus is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 2 hours. This could lead to a total of 10 hours, since initial failure of the LCO, to restore the AC distribution system. At this time, a DC circuit could again become inoperable, and AC distribution restored OPERABLE. This could continue indefinitely.

The Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time the LCO was initially not met, instead of the time Condition A was entered. The 16 hour Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely.

B.1

RAI 3.8.9-2

With one AC instrument bus inoperable, the remaining OPERABLE AC instrument buses are capable of supporting the minimum safety functions necessary to shut down the unit and maintain it in the safe shutdown condition. Overall reliability is reduced, however, since an additional single failure could result in the minimum required ESF functions not being supported. Therefore, the required AC instrument bus must be restored to OPERABLE status within 2 hours by powering the bus from the associated inverter via inverted DC, inverter using AC source, or Class 1E constant voltage transformer.

BASES

ACTIONS (continued)

RAI 3.8.9-02

Condition B represents one AC instrument bus without power; potentially both the DC source and the associated AC source are nonfunctioning. In this situation, the unit is significantly more vulnerable to a complete loss of all noninterruptible power. It is, therefore, imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for loss of power to the remaining instrument buses and restoring power to the affected instrument bus.

This 2 hour limit is more conservative than Completion Times allowed for the vast majority of components that are without adequate AC instrument power. Taking exception to LCO 3.0.2 for components without adequate AC instrument power, that would have the Required Action Completion Times shorter than 2 hours if declared inoperable, is acceptable because of:

a. The potential for decreased safety by requiring a change in unit conditions (i.e., requiring a shutdown) and not allowing stable operations to continue;

b. The potential for decreased safety by requiring entry into numerous Applicable Conditions and Required Actions for components without adequate AC instrument power and not providing sufficient time for the operators to perform the necessary evaluations and actions for restoring power to the affected bus(es); and

c. The low probability for an event in conjunction with a single failure of a redundant component.

The 2 hour Completion Time takes into account the importance to safety of restoring the AC instrument bus(es) to OPERABLE status, the redundant capability afforded by the other OPERABLE instrument buses, and the low probability of a DBA occurring during this period.

BASES

ACTIONS (continued)

The second Completion Time for Required Action B.1 establishes a limit on the maximum allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition B is entered while, for instance, an AC bus is inoperable and subsequently returned OPERABLE, the LCO may already have been not met for up to 8 hours. This could lead to a total of 10 hours, since initial failure of the LCO, to restore the instrument bus distribution system. At this time, an AC bus could again become inoperable, and instrument bus distribution restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time the LCO was initially not met, instead of the time Condition B was entered. The 16 hour Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely.

C.1

With one DC bus inoperable, the remaining DC electrical power distribution subsystem is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. The overall reliability is reduced, however, because a single failure in the remaining DC electrical power distribution subsystem could result in the minimum required ESF functions not being supported. Therefore, the DC bus must be restored to OPERABLE status within 2 hours by powering the bus from the associated battery or charger.

BASES

ACTIONS (continued)

Condition C represents one division without adequate DC power; potentially both with the battery significantly degraded and the associated charger nonfunctioning and not crosstied to the other unit. In this situation, the unit is significantly more vulnerable to a complete loss of all DC power. It is, therefore, imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for loss of power to the remaining divisions and restoring power to the affected division.

This 2 hour limit is more conservative than Completion Times allowed for the vast majority of components that would be without power. Taking exception to LCO 3.0.2 for components without adequate DC power, which would have Required Action Completion Times shorter than 2 hours, is acceptable because of:

a. The potential for decreased safety by requiring a change in unit conditions (i.e., requiring a shutdown) while allowing stable operations to continue;

b. The potential for decreased safety by requiring entry into numerous applicable Conditions and Required Actions for components without DC power and not providing sufficient time for the operators to perform the necessary evaluations and actions for restoring power to the affected division; and

c. The low probability for an event in conjunction with a single failure of a redundant component.

The 2 hour Completion Time for DC buses is consistent with Regulatory Guide 1.93 (Ref. 3).

BASES

ACTIONS (continued)

The second Completion Time for Required Action C.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition C is entered while, for instance, an AC bus is inoperable and subsequently returned OPERABLE, the LCO may already have been not met for up to 8 hours. This could lead to a total of 10 hours, since initial failure of the LCO, to restore the DC distribution system. At this time, an AC bus could again become inoperable, and DC distribution restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time the LCO was initially not met, instead of the time Condition C was entered. The 16 hour Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely.

D.1 and D.2

If the inoperable distribution subsystem cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

E.1

RAI 3.8.9-2

With two electrical power distribution subsystems inoperable that result in a loss of safety function, adequate core cooling, containment OPERABILITY and other vital functions for DBA mitigation would be compromised, and immediate plant shutdown in accordance with LCO 3.0.3 is required.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.9.1

This Surveillance verifies that the required AC, DC, and AC instrument bus electrical power distribution systems are functioning properly, with the correct circuit breaker alignment. The correct breaker alignment ensures the appropriate separation and independence of the electrical divisions is maintained, and the appropriate voltage is available to each required bus. The verification of proper voltage availability on the buses ensures that the required voltage is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the redundant capability of the AC, DC, and AC instrument bus electrical power distribution subsystems, and other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. UFSAR, Chapter 6.
2. UFSAR, Chapter 15.
3. Regulatory Guide 1.93, December 1974.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.10 Distribution Systems – Shutdown

BASES

BACKGROUND	A description of the AC, DC, and AC instrument bus electrical power distribution systems is provided in the Bases for LCO 3.8.9, "Distribution Systems – Operating."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident and transient analyses in the UFSAR, Chapter 6 (Ref. 1) and Chapter 15 (Ref. 2), assume Engineered Safety Feature (ESF) systems are OPERABLE. The AC, DC, and AC instrument bus electrical power distribution systems are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded.

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

The OPERABILITY of the minimum AC, DC, and AC instrument bus electrical power distribution subsystems during MODES 5 and 6, and during movement of irradiated fuel assemblies ensures that:

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

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

c. Adequate power is provided to mitigate events postulated during shutdown, such as a fuel handling accident.

The AC and DC electrical power distribution systems satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES

LCO

Various subsystems, equipment, and components are required OPERABLE by other LCOs, depending on the specific unit condition. Implicit in those requirements is the OPERABILITY of necessary support features (i.e. systems, subsystems, trains, components, and devices). This LCO explicitly requires energization of the portions of the electrical distribution system necessary to support OPERABILITY of required subsystems, equipment, and components – whether specifically addressed in an LCO or implicitly required via the definition of OPERABILITY.

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

APPLICABILITY

The AC and DC electrical power distribution subsystems required to be OPERABLE in MODES 5 and 6, and at all times during movement of irradiated fuel assemblies, provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel in the core;

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

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

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

The AC, DC, and AC instrument bus electrical power distribution subsystems requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.9.

BASES

ACTIONS

LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Therefore, in either case, inability to suspend movement of irradiated fuel assemblies would not be sufficient reason to require a reactor shutdown.

A.1, A.2.1, A.2.2, A.2.3, A.2.4, A.2.5, and A.2.6

Although redundant required features may require redundant divisions of electrical power distribution subsystems to be OPERABLE, one OPERABLE distribution subsystem division may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS and fuel movement. By allowing the option to declare required features associated with an inoperable distribution subsystem inoperable (Required Action A.1), appropriate restrictions are implemented in accordance with the affected required feature LCO's Required Actions. In many instances, however, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions of Required Actions A.2.1 through A.2.4 is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions). Suspension of these activities does not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC and DC electrical power distribution subsystems and to continue this action until restoration is accomplished in order to provide the necessary power to the unit safety systems.

BASES

ACTIONS (continued)

Notwithstanding performance of the above conservative Required Actions, a required Residual Heat Removal (RHR) train and/or a required Low Temperature Overpressure Protection (LTOP) feature, may be inoperable. In this case, Required Actions A.2.1 through A.2.4 do not adequately address the concerns relating to coolant circulation and heat removal. Pursuant to LCO 3.0.6, the RHR or LTOP ACTIONS would not be entered. Therefore, Required Actions A.2.5 and A.2.6 are provided to direct declaring RHR and LTOP features inoperable and declaring the associated RHR train "not in operation" (note, this does not require the RHR train to be shut down if operating, only that the associated RHR train not be credited as the required operating train), which results in taking the appropriate actions.

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

SURVEILLANCE REQUIREMENTS

SR 3.8.10.1

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

REFERENCES

1. UFSAR, Chapter 6.

2. UFSAR, Chapter 15.

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources - Operating

LCO 3.8.1 The following AC electrical sources shall be OPERABLE:

a. Two qualified circuits per bus between the offsite transmission network and the onsite Class 1E AC Electrical Power Distribution System; and

b. Two Diesel Generators (DGs) capable of supplying the onsite Class 1E AC Electrical Power Distribution System.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more buses with one required qualified circuit inoperable.	A.1	Perform SR 3.8.1.1 for the required OPERABLE qualified circuits.	1 hour AND Once per 8 hours thereafter
	AND		
	A.2	Restore required qualified circuit(s) to OPERABLE status.	72 hours AND 6 days from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. One required DG inoperable.	B.1	Perform SR 3.8.1.1 for the required qualified circuits.	1 hour AND Once per 8 hours thereafter
	AND		
	B.2	Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	AND		
	B.3.1	Determine OPERABLE DG is not inoperable due to common cause failure.	24 hours
	OR		
	B.3.2	Perform SR 3.8.1.2 for OPERABLE DG.	24 hours
	AND		
	B.4	Restore DG to OPERABLE status.	72 hours AND 6 days from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

RAI 3.8.1-22

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One or more buses with two required qualified circuits inoperable.	C.1 Restore one required qualified circuit per bus to OPERABLE status.	24 hours
D. One DG inoperable and one or more buses with one required qualified circuit inoperable. OR One DG inoperable and one bus with two required qualified circuits inoperable.	-------------NOTE------------- Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems – Operating," when Condition D is entered with no AC power source to a division. ------------------------------	
	D.1 Restore required qualified circuit(s) to OPERABLE status.	12 hours
	OR	
	D.2 Restore DG to OPERABLE status.	12 hours
E. Two DGs inoperable.	E.1 Restore one DG to OPERABLE status.	2 hours
F. Required Action and associated Completion Time of Condition A, B, C, D, or E not met.	F.1 Be in MODE 3.	6 hours
	AND	
	F.2 Be in MODE 5.	36 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
G. Two DGs inoperable, and one or more buses with one or more required qualified circuits inoperable. OR One DG inoperable, one bus with two required qualified circuits inoperable, and the second bus with one or more required qualified circuits inoperable.	G.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.1.1	Verify correct breaker alignment and indicated power availability for each required qualified circuit.	7 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.2	-------------------NOTE------------------- A modified DG start involving idling and gradual acceleration to synchronous speed may be used for this SR. When modified start procedures are not used, the time, voltage, and frequency tolerances of SR 3.8.1.7 must be met. Performance of SR 3.8.1.7 satisfies this SR. -- Verify each DG starts from standby condition and achieves steady state voltage ≥ 3950 V and ≤ 4580 V and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	 31 days
SR 3.8.1.3	-------------------NOTES------------------- 1. DG loadings may include gradual loading as recommended by the manufacturer. 2. Momentary transients outside the load range do not invalidate this test. 3. This Surveillance shall be conducted on only one DG at a time. 4. This SR shall be preceded by and immediately follow without shutdown a successful performance of SR 3.8.1.2 or SR 3.8.1.7. -- Verify each DG is synchronized and loaded and operates for ≥ 60 minutes at a load ≥ 4950 kW and ≤ 5500 kW.	 31 days
SR 3.8.1.4	Verify each day tank contains ≥ 450 gal of fuel oil.	31 days

RAI 3.8.1-17

(continued)

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.5	Check for and remove accumulated water from each day tank.	31 days
SR 3.8.1.6	Verify the fuel oil transfer system operates to automatically transfer fuel oil from storage tank(s) to the day tank.	31 days
SR 3.8.1.7	Verify each DG starts from normal standby condition and achieves in ≤ 10 seconds, voltage ≥ 3950 V and ≤ 4580 V, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	184 days
SR 3.8.1.8	Verify manual transfer of AC power sources from the required normal qualified circuit(s) to the reserve required qualified circuit(s).	18 months

Rev C

(continued)

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.9	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1 or 2. --- Verify each DG rejects a load greater than or equal to its associated single largest post-accident load, and: a. Following load rejection, the frequency is ≤ 64.5 Hz; b. Following load rejection, the steady state voltage is maintained ≥ 3950 V and ≤ 4580 V; and c. Following load rejection, the steady state frequency is maintained ≥ 58.8 Hz and ≤ 61.2 Hz.	18 months
SR 3.8.1.10	-------------------NOTES------------------- 1. Momentary transients above the voltage limit immediately following a load rejection do not invalidate this test. 2. This Surveillance shall not be performed in MODE 1 or 2. --- Verify each DG does not trip and voltage is maintained ≤ 4784 V during and following a load rejection of ≥ 4950 kW and ≤ 5500 kW.	18 months

Rev C / RAI 3.8.1-21

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.11	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. -- Verify on an actual or simulated loss of offsite power signal: a. De-energization of ESF buses; b. Load shedding from ESF buses; and c. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤ 10 seconds, 2. energizes auto-connected shutdown loads through the shutdown load sequence timers, 3. maintains steady state voltage ≥ 3950 V and ≤ 4580 V, 4. maintains steady state frequency ≥ 58.8 Hz and ≤ 61.2 Hz, and 5. supplies permanently connected and auto-connected shutdown loads for ≥ 5 minutes.	18 months

RAI 3.8.1-17

(continued)

Rev C ___ RAI 3.8.1-17

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.12	Verify on an actual or simulated Engineered Safety Feature (ESF) actuation signal each DG auto-starts from standby condition and: a. In ≤ 10 seconds achieves voltage ≥ 3950 V and ≤ 4580 V; b. In ≤ 10 seconds achieves frequency ≥ 58.8 Hz and ≤ 61.2 Hz; and c. Operates for ≥ 5 minutes.	18 months
SR 3.8.1.13	Verify each DG's automatic trips are bypassed on actual or simulated loss of voltage signal on the emergency bus concurrent with an actual or simulated ESF actuation signal except: a. Engine overspeed; and b. Generator differential current.	18 months
SR 3.8.1.14	-------------------NOTES------------------- 1. Momentary transients outside the load range do not invalidate this test. 2. This Surveillance shall not be performed in MODE 1 or 2. --- Verify each DG operates for ≥ 24 hours: a. For ≥ 2 hours loaded ≥ 5775 kW and ≤ 6050 kW; and b. For the remaining hours of the test loaded ≥ 4950 kW and ≤ 5500 kW.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.15	-------------------NOTES------------------- 1. This Surveillance shall be performed within 5 minutes of shutting down the DG after the DG has operated ≥ 2 hours loaded ≥ 4950 kW and ≤ 5500 kW or until operating temperature has stabilized. 2. Momentary transients outside of load range do not invalidate this test. --- Verify each DG starts and achieves in ≤ 10 seconds voltage ≥ 3950 V and ≤ 4580 V, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	18 months
SR 3.8.1.16	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. --- Verify each DG: a. Synchronizes with offsite power source while loaded with emergency loads upon a simulated restoration of offsite power; b. Transfers loads to offsite power source; and c. Returns to ready-to-load operation.	18 months

(continued)

Rev C

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.17	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. -- Verify, with a DG operating in test mode and connected to its bus, an actual or simulated ESF actuation signal overrides the test mode by: a. Returning DG to ready-to-load operation; and b. Automatically energizing the emergency load from offsite power.	18 months
SR 3.8.1.18	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. -- Verify interval between each sequenced load block is within ± 10% of design interval for each safeguards and shutdown sequence timer.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.19	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. -- Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ESF actuation signal: a. De-energization of ESF buses; b. Load shedding from ESF buses; and c. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤ 10 seconds, 2. energizes auto-connected emergency loads through the safeguards sequence timers, 3. achieves steady state voltage ≥ 3950 V and ≤ 4580 V, 4. achieves steady state frequency ≥ 58.8 Hz and ≤ 61.2 Hz, and 5. supplies permanently connected and auto-connected emergency loads for ≥ 5 minutes.	18 months
SR 3.8.1.20	Verify when started simultaneously from standby condition, each DG achieves, in ≤ 10 seconds, frequency ≥ 58.8 Hz.	10 years

RAI 3.8.1-17

RAI 3.8.1-17

3.8 ELECTRICAL POWER SYSTEMS

3.8.2 AC Sources – Shutdown

LCO 3.8.2 The following AC electrical power sources shall be OPERABLE:

a. One qualified circuit between the offsite transmission network and the onsite Class 1E AC electrical power distribution subsystem(s) required by LCO 3.8.10. "Distribution Systems – Shutdown"; and

b. One Diesel Generator (DG) capable of supplying one division of the onsite Class 1E AC electrical power distribution subsystem(s) required by LCO 3.8.10.

RAI 3.8.2-2

APPLICABILITY: MODES 5 and 6.
During movement of irradiated fuel assemblies.

ACTIONS

-----NOTE-----
LCO 3.0.3 is not applicable.

RAI 3.8.1-22

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required qualified circuit inoperable.	-----NOTE----- Enter applicable Conditions and Required Actions of LCO 3.8.10. with one required division de-energized as a result of Condition A.	
	A.1 Declare affected required feature(s) with no offsite power available inoperable.	Immediately
	<u>OR</u>	
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.2.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	A.2.2	Suspend movement of irradiated fuel assemblies.	Immediately
	AND		
	A.2.3	Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND		
	A.2.4	Initiate action to restore required qualified circuit to OPERABLE status.	Immediately
	AND		
	A.2.5	Declare affected Low Temperature Overpressure Protection (LTOP) feature(s) inoperable.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. Required DG inoperable.	B.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	B.2	Suspend movement of irradiated fuel assemblies.	Immediately
	AND		
	B.3	Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND		
	B.4	Initiate action to restore required DG to OPERABLE status.	Immediately
	AND		
	B.5	Declare affected LTOP feature(s) inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.2.1	-------------------NOTE------------------- The following SRs are not required to be performed: SR 3.8.1.3 SR 3.8.1.14 SR 3.8.1.9 SR 3.8.1.15 SR 3.8.1.10 SR 3.8.1.16 SR 3.8.1.11 SR 3.8.1.18 SR 3.8.1.13 SR 3.8.1.19 -- For AC sources required to be OPERABLE, the following SRs are applicable: SR 3.8.1.1 SR 3.8.1.11 SR 3.8.1.2 SR 3.8.1.12 SR 3.8.1.3 SR 3.8.1.13 SR 3.8.1.4 SR 3.8.1.14 SR 3.8.1.5 SR 3.8.1.15 SR 3.8.1.6 SR 3.8.1.16 SR 3.8.1.7 SR 3.8.1.18 SR 3.8.1.9 SR 3.8.1.19. SR 3.8.1.10	In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.3 Diesel Fuel Oil

LCO 3.8.3 The stored diesel fuel oil shall be within limits for each required Diesel Generator (DG).

APPLICABILITY: When associated DG is required to be OPERABLE.

ACTIONS

---------------------------------NOTE---------------------------------
Separate Condition entry is allowed for each DG.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more DGs with stored fuel volume < 44,000 gal and > 41,138 gal in storage tank(s).	A.1 Restore stored fuel oil volume to within limits.	48 hours
B. One or more DGs with stored fuel oil total particulates not within limit.	B.1 Restore fuel oil total particulates within limit.	7 days
C. One or more DGs with new fuel oil properties not within limits.	C.1 Restore stored fuel oil properties to within limits.	30 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Conditions A, B, or C not met. OR One or more DGs with diesel fuel oil not within limits for reasons other than Condition A, B, or C.	D.1 Declare associated DG inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.3.1	Verify each DG fuel oil storage tank(s) contains ≥ 44,000 gal of fuel.	31 days
SR 3.8.3.2	Verify fuel oil properties of new and stored fuel oil are tested in accordance with, and maintained within the limits of, the Diesel Fuel Oil Testing Program.	In accordance with the Diesel Fuel Oil Testing Program
SR 3.8.3.3	Check for and remove accumulated water from each fuel oil storage tank.	31 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources – Operating

LCO 3.8.4 Division 11(21) and Division 12(22) DC electrical power subsystems shall be OPERABLE and not crosstied to the opposite unit.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One battery charger inoperable.	A.1 Crosstie opposite-unit bus with associated OPERABLE battery charger to the affected division. AND A.2 Restore battery charger to OPERABLE status.	2 hours 24 hours
B. One DC electrical power division crosstied to opposite-unit DC electrical power subsystem that has an inoperable battery charger, while opposite unit is in MODE 1, 2, 3, or 4.	B.1 Open at least one crosstie breaker between the crosstied divisions.	60 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. One DC electrical power division crosstied to opposite-unit DC electrical power subsystem with an inoperable source, while opposite unit is in MODE 5, 6, or defueled.	C.1	----------NOTE--------- Only required when opposite unit has an inoperable battery. ----------------------- Verify opposite-unit DC bus load $\leq$ 100 amps for AT&T ($\leq$ 200 amps for C&D).	Once per 12 hours
	AND		
	C.2	Open at least one crosstie breaker between the crosstied divisions.	7 days
D. One DC electrical power subsystem inoperable for reasons other than Condition A, B, or C.	D.1	Restore DC electrical power subsystem to OPERABLE status.	2 hours
E. Required Action and Associated Completion Time not met.	E.1	Be in MODE 3.	6 hours
	AND		
	E.2	Be in MODE 5.	36 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE		FREQUENCY
	SR 3.8.4.1	Verify battery terminal voltage is ≥ 130.5 V for AT&T (≥ 127.6 V for C&D) on float charge.	7 days
REV C	SR 3.8.4.2	Verify no visible corrosion at battery terminals and connectors. <u>OR</u> Verify battery connection resistance is ≤ 1.5E-4 ohm for inter-cell connections, ≤ 1.5E-4 ohm for inter-rack connections, ≤ 1.5E-4 ohm for inter-tier connections, and ≤ 1.5E-4 ohm for terminal connections.	92 days
REV C	SR 3.8.4.3	Verify battery cells, cell plates, and racks show no visual indication of physical damage or abnormal deterioration that could degrade battery performance.	18 months
REV C	SR 3.8.4.4	Remove visible terminal corrosion, verify battery cell to cell and terminal connections are clean and tight, and are coated with anti-corrosion material.	18 months
REV C	SR 3.8.4.5	Verify battery connection resistance is ≤ 1.5E-4 ohm for inter-cell connections, ≤ 1.5E-4 ohm for inter-rack connections, ≤ 1.5E-4 ohm for inter-tier connections, and ≤ 1.5E-4 ohm for terminal connections.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.6	Verify each battery charger supplies a load equal to the manufacturer's rating for ≥ 8 hours.	18 months
SR 3.8.4.7	-------------------NOTES------------------- 1. The modified performance discharge test in SR 3.8.4.8 may be performed in lieu of the service test in SR 3.8.4.7. 2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. --- Verify battery capacity is adequate to supply, and maintain OPERABLE status, the required emergency loads for the design duty cycle when subjected to a battery service test.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.8	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. -- Verify battery capacity is ≥ 95% for AT&T (≥ 80% for C&D) of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.	60 months <u>AND</u> 12 months when battery shows degradation or has reached 85% of the expected life with capacity < 100% of manufacturer's rating <u>AND</u> 24 months when battery has reached 85% of the expected life with capacity ≥ 100% of manufacturer's rating

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3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources – Shutdown

LCO 3.8.5 The following shall be OPERABLE, with at least one unit crosstie breaker per division open:

a. One DC electrical power subsystem capable of supplying one division of the onsite Class 1E DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution System – Shutdown"; and

b. One source of DC electrical power, other than that required by LCO 3.8.5.a, capable of supplying the remaining onsite Class 1E DC electrical power distribution subsystem(s) when required by LCO 3.8.10.

-------------------------NOTE-------------------------
One division may be crosstied to the opposite unit, when the opposite unit is in MODE 1, 2, 3, or 4 with an inoperable battery charger.

RAI 3.8.2-2

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

-------------------------NOTE-------------------------
LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required DC electrical power subsystems inoperable for reasons other than Condition B.	A.1.1 Declare affected required feature(s) inoperable. OR	Immediately (continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND	
	A.2.4 Initiate action to restore required DC electrical power subsystems to OPERABLE status.	Immediately
	AND	
	A.2.5 Declare affected Low Temperature Overpressure Protection feature(s) inoperable.	Immediately

(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. One DC electrical power division crosstied to opposite-unit DC electrical power subsystem with an inoperable source, while opposite unit is in MODE 5, 6, or defueled.	B.1	---------NOTE-------- Only required when opposite unit has an inoperable battery. --------------------- Verify opposite-unit DC bus load is ≤ 100 amps for AT&T (≤ 200 amps for C&D).	Once per 12 hours
	<u>AND</u>		
	B.2	Open at least one crosstie breaker between the crosstied divisions.	7 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.5.1	-------------------NOTE------------------- The following SRs are not required to be performed: SR 3.8.4.6, SR 3.8.4.7, and SR 3.8.4.8. -- For DC sources required to be OPERABLE, the following SRs are applicable: SR 3.8.4.1 SR 3.8.4.5 SR 3.8.4.2 SR 3.8.4.6 SR 3.8.4.3 SR 3.8.4.7 SR 3.8.4.4 SR 3.8.4.8.	In accordance with applicable SRs

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3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Cell Parameters

LCO 3.8.6 Battery cell parameters for Division 11(21) and Division 12(22) batteries shall be within limits of Table 3.8.6-1.

APPLICABILITY: When associated DC electrical power subsystems are required to be OPERABLE.

ACTIONS

-----------------------------------NOTE-----------------------------------
Separate Condition entry is allowed for each battery.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more batteries with one or more battery cell parameters not within Category A or B limits.	A.1 Verify pilot cell electrolyte level and float voltage meet Table 3.8.6-1 Category C limits.	1 hour
	<u>AND</u>	
	A.2 Verify battery cell parameters meet Table 3.8.6-1 Category C limits.	24 hours <u>AND</u> Once per 7 days thereafter
	<u>AND</u>	
	A.3 Restore battery cell parameters to Category A and B limits of Table 3.8.6-1.	31 days

continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time of Condition A not met. OR One or more batteries with average electrolyte temperature of the representative cells < 60°F. OR One or more batteries with one or more battery cell parameters not within Category C values.	B.1 Declare associated battery inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

RAI 3.8.7-1

SURVEILLANCE	FREQUENCY
SR 3.8.6.1 Verify battery cell parameters meet Table 3.8.6-1 Category A limits.	7 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.6.2	Verify battery cell parameters meet Table 3.8.6-1 Category B limits.	92 days AND Once within 7 days after a battery discharge < 110 V AND Once within 7 days after a battery overcharge > 145 V
SR 3.8.6.3	Verify average electrolyte temperature of representative cells is ≥ 60°F	92 days

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Table 3.8.6-1 (page 1 of 1)
Battery Cell Parameters Requirements

PARAMETER	CATEGORY A: LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B: LIMITS FOR EACH CONNECTED CELL	CATEGORY C: ALLOWABLE LIMITS FOR EACH CONNECTED CELL
Electrolyte Level	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark[a]	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark[a]	Above top of plates, and not overflowing
Float Voltage	≥ 2.18 V (AT&T) ≥ 2.13 V (C&D)	≥ 2.18 V[b] (AT&T) ≥ 2.13 V[b] (C&D)	> 2.14 V (AT&T) > 2.07 V (C&D)
Specific Gravity[c][d]	≥ 1.285 (AT&T) ≥ 1.200 (C&D)	≥ 1.280 (AT&T) ≥ 1.195 (C&D) AND Average of all connected cells > 1.290 (AT&T) > 1.205 (C&D)	Not more than 0.020 below average of all connected cells AND Average of all connected cells ≥ 1.280 (AT&T) ≥ 1.195 (C&D)

(a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum during equalizing charges provided it is not overflowing.

(b) Corrected for average electrolyte temperature.

(c) Corrected for electrolyte temperature and level for AT&T. Corrected for electrolyte temperature for C&D. For AT&T, level correction is not required, however, when battery charging is < 2 amps when on float charge.

(d) A battery charging current of < 2 amps for AT&T (< 3 amps for C&D) when on float charge is acceptable for meeting specific gravity limits following a battery recharge, for a maximum of 7 days. When charging current is used to satisfy specific gravity requirements, specific gravity of each connected cell shall be measured prior to expiration of the 7 day allowance.

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Inverters – Operating

LCO 3.8.7 Four instrument bus inverters shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One instrument bus inverter inoperable.	A.1	---------NOTE--------- Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating" with any instrument bus de-energized. -------------------- Restore inverter to OPERABLE status.	24 hours
B. Required Action and associated Completion Time not met.	B.1 <u>AND</u> B.2	Be in MODE 3. Be in MODE 5.	6 hours 36 hours

RAI 3.8.1-22

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.7.1	Verify correct inverter voltage and breaker alignment to AC instrument buses.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.8 Inverters – Shutdown

LCO 3.8.8 The following shall be OPERABLE:

a. Two inverters capable of supplying one division of the onsite Class 1E AC instrument bus electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution System – Shutdown"; and

b. One source of instrument bus power, other than that required by LCO 3.8.8.a, capable of supplying the remaining onsite Class 1E AC instrument bus electrical power distribution subsystem(s) when required by LCO 3.8.10.

RAI 3.8.2-2

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

-----------------------------------NOTE-----------------------------------
LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required AC instrument bus power sources inoperable.	A.1 Declare affected required feature(s) inoperable. OR	Immediately (continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.9 Distribution Systems – Operating

LCO 3.8.9 The following AC, DC, and AC instrument bus electrical power distribution subsystems shall be OPERABLE for the applicable unit:

Unit 1	Unit 2
A. Division 11 AC Subsystem	A. Division 21 AC Subsystem
4.16 kV Bus 141 480 volt Bus 131X	4.16 kV Bus 241 480 volt Bus 231X
Division 11 AC Instrument Bus Subsystem	Division 21 AC Instrument Bus Subsystem
Instrument Bus 111 Instrument Bus 113	Instrument Bus 211 Instrument Bus 213
Division 11 DC Subsystem	Division 21 DC Subsystem
125 VDC Bus 111	125 VDC Bus 211
B. Division 12 AC Subsystem	B. Division 22 AC Subsystem
4.16 kV Bus 142 480 volt Bus 132X	4.16 kV Bus 242 480 volt Bus 232X
Division 12 AC Instrument Bus Subsystem	Division 22 AC Instrument Bus Subsystem
Instrument Bus 112 Instrument Bus 114	Instrument Bus 212 Instrument Bus 214
Division 12 DC Subsystem	Division 22 DC Subsystem
125 VDC Bus 112	125 VDC Bus 212

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One AC electrical power distribution subsystem inoperable.	A.1	Restore AC electrical power distribution subsystem to OPERABLE status.	8 hours AND 16 hours from discovery of failure to meet LCO
B. One AC instrument bus electrical power distribution subsystem inoperable.	B.1	Restore AC instrument bus electrical power distribution subsystem to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO
C. One DC electrical power distribution subsystem inoperable.	C.1	Restore DC electrical power distribution subsystem to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO
D. Required Action and associated Completion Time of Condition A. B. or C not met.	D.1 AND D.2	Be in MODE 3. Be in MODE 5.	6 hours 36 hours

RAI 3.8.9-2

(continued)

RAI 3.8.9-2

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Two electrical power distribution subsystems inoperable that result in a loss of safety function.	E.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.9.1 Verify correct breaker alignments and voltage to AC, DC, and AC instrument bus electrical power distribution subsystems.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems – Shutdown

LCO 3.8.10 The necessary portions of the following AC, DC, and AC instrument bus electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE for the applicable unit.

Unit 1	Unit 2
A. Division 11 AC Subsystem	A. Division 21 AC Subsystem
4.16 kV Bus 141 480 volt Bus 131X	4.16 kV Bus 241 480 volt Bus 231X
Division 11 AC Instrument Bus Subsystem	Division 21 AC Instrument Bus Subsystem
Instrument Bus 111 Instrument Bus 113	Instrument Bus 211 Instrument Bus 213
Division 11 DC Subsystem	Division 21 DC Subsystem
125 VDC Bus 111	125 VDC Bus 211
B. Division 12 AC Subsystem	B. Division 22 AC Subsystem
4.16 kV Bus 142 480 volt Bus 132X	4.16 kV Bus 242 480 volt Bus 232X
Division 12 AC Instrument Bus Subsystem	Division 22 AC Instrument Bus Subsystem
Instrument Bus 112 Instrument Bus 114	Instrument Bus 212 Instrument Bus 214
Division 12 DC Subsystem	Division 22 DC Subsystem
125 VDC Bus 112	125 VDC Bus 212

RAI 3.8.2-2

APPLICABILITY: MODES 5 and 6.
During movement of irradiated fuel assemblies.

ACTIONS

-----NOTE-----
LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required AC, DC, or AC instrument bus electrical power distribution subsystems inoperable.	A.1	Declare associated supported required feature(s) inoperable.	Immediately
	OR		(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.2.1	Suspend CORE ALTERATIONS.	Immediately
		<u>AND</u>	
	A.2.2	Suspend movement of irradiated fuel assemblies.	Immediately
		<u>AND</u>	
	A.2.3	Initiate action to suspend operations involving positive reactivity additions.	Immediately
		<u>AND</u>	
	A.2.4	Initiate actions to restore required AC, DC, and AC instrument bus electrical power distribution subsystem(s) to OPERABLE status.	Immediately
		<u>AND</u>	
	A.2.5	Declare associated required residual heat removal train(s) inoperable and not in operation.	Immediately
		<u>AND</u>	
	A.2.6	Declare affected Low Temperature Overpressure Protection feature(s) inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.10.1 Verify correct breaker alignments and voltage to required AC, DC, and AC instrument bus electrical power distribution subsystems.	7 days

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources - Operating

BASES

BACKGROUND

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

The onsite Class 1E AC Distribution System is divided into redundant load groups (divisions) so that the loss of any one group does not prevent the minimum safety functions from being performed. Each division has connections to two offsite power sources and a single DG.

RAI 3.8.1-8

Offsite power is supplied to the station switchyard from the transmission network. From the switchyard, two electrically and physically separated lines (i.e., independent transmission circuits) provide AC power through their associated System Auxiliary Transformer (SAT) banks (SATs 142-1 and 142-2 from one line, and SATs 242-1 and 242-2 from the second line), to the 4.16 kV ESF buses. Normally, SATs 142-1 and 142-2 feed Unit 1 4.16 kV ESF buses, and SATs 242-1 and 242-2 feed Unit 2 4.16 kV ESF buses. Additionally, each 4.16 kV ESF bus has a reserve feed via its associated crosstie to an opposite-unit 4.16 kV ESF bus. Each unit is required to have qualified normal and reserve circuits to each 4.16 kV bus (detailed in the LCO Bases for this Specification). The transmission network and switchyard are maintained in accordance with UFSAR, and are not governed by the requirements of Technical Specifications. A detailed description of the offsite power network and the circuits to the Class 1E ESF buses is found in the UFSAR, Chapter 8 (Ref. 2).

BASES

BACKGROUND (continued)

The onsite standby power source for each 4.16 kV ESF bus is a dedicated DG. DGs 1A (2A) and 1B (2B) are dedicated to ESF buses 141 (241) and 142 (242), respectively. A DG starts automatically on a Safety Injection (SI) signal (i.e., manual SI, low steam line pressure, low pressurizer pressure or high-1 containment pressure signals) or on an ESF bus degraded voltage or undervoltage signal (refer to LCO 3.3.5, "Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation"). After the DG has started, it will automatically tie to its respective bus after offsite power is tripped as a consequence of ESF bus undervoltage or degraded voltage, independent of or coincident with an SI signal. The DGs will also start and operate in the standby mode without tying to the ESF bus on an SI signal alone. Following the trip of offsite power, an undervoltage signal strips nonpermanent loads from the ESF bus. When the DG is tied to the ESF bus, loads are then sequentially connected to its respective ESF bus by automatic load sequencing. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading the DG by automatic load application.

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

Certain required unit loads are automatically connected to the DGs in a predetermined sequence in order to prevent overloading the DG in the process. Within 1 minute after the initiating signal is received, all loads needed to recover the unit or maintain it in a safe condition are automatically connected to the DGs.

Continuous service ratings for Train A and Train B DGs satisfy the requirements of Regulatory Guide 1.9 (Ref. 3). The continuous service rating of each DG is 5500 kW with 10% overload permissible for up to 2 hours in any 24 hour period. The ESF loads that are powered from the 4.16 kV ESF buses are listed in Reference 2.

BASES

APPLICABLE SAFETY ANALYSES

The initial conditions of DBA and transient analyses in the UFSAR, Chapter 6 (Ref. 4) and Chapter 15 (Ref. 5), assume ESF systems are OPERABLE. The AC electrical power sources are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

The OPERABILITY of the AC electrical power sources is consistent with the initial assumptions of the Accident analyses and is based upon meeting the design basis of the plant. This results in maintaining at least one division of the onsite or offsite AC sources OPERABLE during Accident conditions in the event of:

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

b. A worst case single failure.

The AC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

Two qualified circuits per 4.16 kV bus between the offsite transmission network and the onsite Class 1E Electrical Power System and separate and independent DGs for each division ensure availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an Anticipated Operational Occurrence (AOO) or a postulated DBA.

Qualified circuits are those that are described in the UFSAR and are part of the licensing basis for the plant.

Each qualified circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the ESF buses.

BASES

LCO (continued)

For Unit 1 (Unit 2), the two qualified circuits (a normal circuit and a reserve circuit) per ESF bus between the offsite transmission network and the onsite 4.16 kV ESF buses are as follows:

a. NORMAL

ESF bus 141 (241)	345 kV system through system auxiliary transformer (SAT) 142-1 (242-1) or by use of disconnect links via SAT 142-2 (242-2); and
ESF bus 142 (242)	345 kV system through SAT 142-2 (242-2) or by use of disconnect links via SAT 142-1 (242-1); and

b. RESERVE

ESF bus 141 (241)	345 kV system through SAT 242-1 (142-1) or by use of disconnect links via SAT 242-2 (142-2), to 4.16 kV ESF bus 241 (141) crosstied to 4.16 kV ESF bus 141 (241); and
ESF bus 142 (242)	345 kV system through SAT 242-2 (142-2) or by use of disconnect links via SAT 242-1 (142-1), to 4.16 kV ESF bus 242 (142) crosstied to 4.16 kV ESF bus 142 (242).

A standby (onsite) source to the 4.16 kV ESF buses is provided by DG 1A (2A) for 4.16 kV ESF bus 141 (241) and DG 1B (2B) for 4.16 kV ESF bus 142 (242).

BASES

LCO (continued)

RAI 3.8.1-17

Each DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage. This will be accomplished within 10 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as DG engine hot and DG engine at ambient conditions. Additional DG capabilities must be demonstrated to meet required Surveillances (e.g., capability of the DG to revert to standby status on an Emergency Core Cooling System (ECCS) signal while operating in parallel test mode).

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

The AC sources in one division must be separate and independent (to the extent possible) of the AC sources in the other division. For the DGs, separation and independence are complete. For the qualified circuits, separation and independence are to the extent practical.

APPLICABILITY

The AC sources are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

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

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

The AC power requirements for MODES 5 and 6 are covered in LCO 3.8.2, "AC Sources – Shutdown."

BASES

ACTIONS

A.1

To ensure a highly reliable power source remains with one required qualified circuit inoperable, it is necessary to verify the OPERABILITY of the remaining required qualified circuit on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action not met. However, if another required circuit fails SR 3.8.1.1, this qualified circuit is inoperable, and additional Conditions and Required Actions may be appropriate. If the additional inoperability results in a bus with two required qualified circuits inoperable Condition C is entered. If the additional inoperability results in the second bus with one required qualified circuit inoperable Condition A is still applicable.

A.2

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition A for a period that should not exceed 72 hours. With one or more buses with one required qualified circuit inoperable, the reliability of the offsite system is degraded, and the potential for a loss of offsite power is increased, with attendant potential for a challenge to the plant safety systems. In this Condition, however, the remaining OPERABLE required qualified circuits and DGs are adequate to supply electrical power to the onsite Class 1E Distribution System.

The 72 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

BASES

ACTIONS (continued)

The second Completion Time for Required Action A.2 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition A is entered while, for instance, a DG is inoperable and that DG is subsequently returned OPERABLE, the LCO may already have been not met for up to 72 hours. This could lead to a total of 144 hours, since initial failure to meet the LCO, to restore the required qualified circuit(s). At this time, a DG could again become inoperable, the circuit(s) restored OPERABLE, and an additional 72 hours (for a total of 9 days) allowed prior to complete restoration of the LCO. The 6 day Completion Time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "AND" connector between the 72 hour and 6 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

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

B.1

To ensure a highly reliable power source remains with an inoperable DG, it is necessary to verify the availability of the required qualified circuits on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action being not met. However, if a required qualified circuit fails to pass SR 3.8.1.1, it is inoperable, and additional Conditions and Required Actions apply.

BASES

ACTIONS (continued)

B.2

Required Action B.2 is intended to provide assurance that a loss of offsite power, during the period that a DG is inoperable, does not result in a complete loss of safety function of critical systems. These features (i.e., systems, subsystems, trains, components, and devices) are designed with redundant safety related trains. This includes the diesel driven auxiliary feedwater pump. Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has an inoperable DG.

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

a. An inoperable DG exists; and

b. A required feature on the other division is inoperable.

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

RAI 3.8.1-6

Discovering one required DG inoperable coincident with one or more inoperable required redundant feature(s) results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

BASES

ACTIONS (continued)

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

B.3.1 and B.3.2

Required Action B.3.1 provides an allowance to avoid unnecessary testing of OPERABLE DG(s). If it can be determined that the cause of the inoperable DG does not exist on the OPERABLE DG, SR 3.8.1.2 does not have to be performed. If the cause of inoperability exists on the other DG, the other DG would be declared inoperable upon discovery and Condition E of LCO 3.8.1 would be entered. Once the failure is repaired, the common cause failure no longer exists, and Required Action B.3.1 is satisfied. If the cause of the initial inoperable DG cannot be confirmed not to exist on the remaining DG, performance of SR 3.8.1.2 suffices to provide assurance of continued OPERABILITY of that DG.

In the event the inoperable DG is restored to OPERABLE status prior to completing either B.3.1 or B.3.2, the Problem Identification and Investigation Procedure will continue to evaluate the common cause possibility and determine the need for any additional DG testing. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in Condition B.

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

BASES

ACTIONS (continued)

B.4

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition B for a period that should not exceed 72 hours.

In Condition B, the remaining OPERABLE DG and required qualified circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The 72 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

The second Completion Time for Required Action B.4 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition B is entered while, for instance, a required qualified circuit is inoperable and that circuit is subsequently restored OPERABLE, the LCO may already have been not met for up to 72 hours. This could lead to a total of 144 hours, since initial failure to meet the LCO, to restore the DG. At this time, a required qualified circuit could again become inoperable, the DG restored OPERABLE, and an additional 72 hours (for a total of 9 days) allowed prior to complete restoration of the LCO. The 6 day Completion Time provides a limit on time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "AND" connector between the 72 hour and 6 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

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

BASES

ACTIONS (continued)

C.1

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

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

D.1 and D.2

In Condition D, with one DG inoperable and one or more buses with one qualified circuit inoperable or with one DG and one bus with both qualified circuits inoperable, individual redundancy is lost in both the offsite electrical power system and the onsite AC electrical power system. Since power system redundancy is provided by two diverse sources of power, however, the reliability of the power systems in this Condition may appear higher than that in Condition C. This difference in reliability is offset by the susceptibility of this power system configuration to a single bus or switching failure. The 12 hour Completion Time to restore the DG or the required qualified circuit(s) takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

BASES

ACTIONS (continued)

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it were inoperable, resulting in de-energization. Therefore, the Required Actions of Condition D are modified by a Note to indicate that when Condition D is entered with no AC source to any division (one or more divisions de-energized), the Conditions and Required Actions for LCO 3.8.9, "Distribution Systems – Operating," must be immediately entered. This allows Condition D to provide requirements for the loss of one DG and one required qualified circuit on one or more buses, without regard to whether a division is de-energized. LCO 3.8.9 provides the appropriate restrictions for a de-energized division.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition D for a period that should not exceed 12 hours.

E.1

With Train A and Train B DGs inoperable, there are no remaining standby AC sources. Thus, with an assumed loss of offsite electrical power, insufficient standby AC sources are available to power the minimum required ESF functions. Since the offsite electrical power system is the only source of AC power for this level of degradation, the risk associated with continued operation for a very short time could be less than that associated with an immediate controlled shutdown (the immediate shutdown could cause grid instability, which could result in a total loss of AC power). Since any inadvertent generator trip could also result in a total loss of offsite AC power, the time allowed for continued operation is severely restricted. The intent here is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

According to Reference 6, with both DGs inoperable, operation may continue for a period that should not exceed 2 hours.

BASES

ACTIONS (continued)

F.1 and F.2

If the inoperable AC electric power sources cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

G.1

Condition G corresponds to a level of degradation in which all redundancy in the AC electrical power supplies may be lost. At this severely degraded level, any further losses in the AC electrical power system may cause a loss of function. Therefore, no additional time is justified for continued operation. The unit is required by LCO 3.0.3 to commence a controlled shutdown. Examples of inoperabilities that require entry into Condition G are: 1) both DGs inoperable and both qualified circuits inoperable on one bus, and 2) one DG inoperable and both qualified circuits inoperable on one bus and one qualified circuit inoperable on the second bus.

BASES

SURVEILLANCE REQUIREMENTS

The AC sources are designed to permit inspection and testing of all important areas and features, especially those that have a standby function, in accordance with 10 CFR 50, Appendix A, GDC 18 (Ref. 8). Periodic component tests are supplemented by extensive functional tests during refueling outages (under simulated accident conditions). The SRs for demonstrating the OPERABILITY of the DGs are in general conformance with the recommendations of Regulatory Guide 1.9 (Ref. 3), and Regulatory Guide 1.137 (Ref. 10), as addressed in the UFSAR.

Where the SRs discussed herein specify voltage and frequency tolerances, the following is applicable. The minimum steady state output voltage of 3950 V is 95% of the nominal 4160 V output voltage. This value allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage is specified as 90% or 3600 V. It also allows for voltage drops to motors and other equipment down through the 120 V level where minimum operating voltage is also usually specified as 90% of name plate rating. The specified maximum steady state output voltage of 4580 V is equal to the maximum operating voltage specified for 4000 V motors. It ensures that for a lightly loaded distribution system, the voltage at the terminals of 4000 V motors is no more than the maximum rated operating voltages. The specified minimum and maximum frequencies of the DG are 58.8 Hz and 61.2 Hz, respectively. These values are equal to ± 2% of the 60 Hz nominal frequency and are derived from the recommendations given in Regulatory Guide 1.9 (Ref. 3).

SR 3.8.1.1

This SR ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. The breaker alignment verifies that each breaker is in its correct position to ensure that distribution buses and loads are connected to their preferred power source, and that appropriate independence of offsite circuits is maintained. The 7 day Frequency is adequate since breaker position is not likely to change without the operator being aware of it and because its status is displayed in the control room.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.2 and SR 3.8.1.7

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

Each SR 3.8.1.2 and SR 3.8.1.7 DG start requires the DG to achieve and maintain a steady state voltage and frequency range. The start signals used for this test may consist of one of the following signals:

a. Manual;

b. Simulated loss of ESF bus voltage by itself;

c. Simulated loss of ESF bus voltage in conjunction with an ESF actuation test signal; or

d. An ESF actuation test signal by itself.

RAI 3.8.1-17

For the purpose of SR 3.8.1.2 testing, the DGs are started from standby conditions once per 31 days. Standby conditions for a DG mean that the diesel engine coolant and oil are being continuously circulated and temperature is being maintained consistent with manufacturer's recommended operating range (low lube oil and jacket water temperature alarm settings to the high lube oil and jacket water temperature alarm settings).

For the purposes of SR 3.8.1.7 testing, the DGs are started from normal standby conditions once per 184 days. Normal standby conditions for a DG mean that the diesel engine coolant and oil are being continuously circulated and temperature is being maintained within the prescribed temperature bands of these subsystems when the diesel generator has been at rest for an extended period of time with the prelube oil and jacket water circulating systems operational. The prescribed temperature band is 115°F - 135°F which accounts for instrument tolerances. DG starts for these Surveillances are followed by a warmup period prior to loading.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.3

This Surveillance verifies that the DGs are capable of synchronizing with the offsite electrical system and accepting loads greater than or equal to the equivalent of the maximum expected accident loads. A minimum run time of 60 minutes is required to stabilize engine temperatures.

Although no power factor requirements are established by this SR, the DG is normally operated between 0 and 1000 kVARs. The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

The 31 day Frequency for this Surveillance is consistent with Regulatory Guide 1.9 (Ref. 3).

RAI 3.8.1-23

This SR is modified by four Notes. Note 1 indicates that diesel engine runs for this Surveillance may include gradual loading, as recommended by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized. Note 2 states that momentary transients (e.g., changing bus loads) do not invalidate this test. Similarly, momentary kVAR transients outside of the specified range do not invalidate the test. Note 3 indicates that this Surveillance should be conducted on only one DG at a time in order to avoid common cause failures that might result from offsite circuit or grid perturbations. Note 4 stipulates a prerequisite requirement for performance of this SR. A successful DG start must precede this test to credit satisfactory performance.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.4

This SR provides verification that the level of fuel oil in the day tank is at or above the level at which fuel oil is automatically added. The level is expressed as an equivalent volume in gallons, and is selected to ensure adequate fuel oil for a minimum of 1 hour of DG operation at full load plus 10%.

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

SR 3.8.1.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel oil day tanks once every 31 days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 10). This SR is for preventative maintenance. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during the performance of this Surveillance.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.6

This Surveillance demonstrates that each required (one of two transfer pumps per DG is "required" to support DG OPERABILITY) fuel oil transfer pump operates and transfers fuel oil from its associated storage tank(s) to its associated day tank. This is required to support continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oil piping system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer systems are OPERABLE.

The design of fuel transfer systems is such that one pump will operate automatically in order to maintain an adequate volume of fuel oil in the day tank during or following DG testing. Therefore, a 31 day Frequency is appropriate.

SR 3.8.1.8

Transfer of each 4.16 kV ESF bus power supply from the normal offsite circuit to the alternate offsite circuit demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The 18 month Frequency of the Surveillance is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.9

Each DG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by the loss of a large load could cause diesel engine overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. The single largest post-accident load associated with each DG is the Essential Service Water (SX) pump (1290 brake horsepower, 1034 kW at full load conditions). This Surveillance is accomplished by simultaneously tripping loads supplied by the DG which have a minimum combined load equivalent to the single largest post-accident load. This method is employed due to the difficulty of attaining SX full load conditions during normal plant operations.

As required by IEEE-308 (Ref. 9), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint (64.5 Hz), or 15% above synchronous speed (69 Hz), whichever is lower.

The voltage and frequency tolerances specified in this SR are derived from Regulatory Guide 1.9 (Ref. 3) recommendations for response during load sequence intervals. The voltage and frequency specified are consistent with the design range of the equipment powered by the DG. SR 3.8.1.9.a corresponds to the maximum frequency excursion, while SR 3.8.1.9.b and SR 3.8.1.9.c are steady state voltage and frequency values to which the system must recover following load rejection. The 18 month Frequency is consistent with the recommendation of Regulatory Guide 1.9 (Ref. 3).

This SR is modified by a Note. The reason for the Note is that during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, plant safety systems.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.10

This Surveillance demonstrates the DG capability to reject a full load without overspeed tripping or exceeding the predetermined voltage limits. The DG full load rejection may occur because of a system fault or inadvertent breaker tripping. This Surveillance ensures proper engine/generator response under the simulated test conditions. This test simulates a full load rejection and verifies that the DG does not trip upon loss of the load. These acceptance criteria provide for DG damage protection. While the DG is not expected to experience this transient during an event and continues to be available, this response ensures that the DG is not degraded for future application, including reconnection to the bus if the trip initiator can be corrected or isolated.

The 18 month Frequency is consistent with the recommendation of Regulatory Guide 1.9 (Ref. 3) and is intended to be consistent with expected fuel cycle lengths.

Rev.C Rev.C RAI 3.8.1-21

This SR has been modified by two Notes. Note 1 states that momentary transients above the stated voltage limit immediately following a load rejection (i.e., the DG full load rejection) do not invalidate this test. The reason for Note 2 is that during operation with the reactor critical, performance of this SR could cause perturbation to the electrical distribution systems that could challenge continued steady state operation and, as a result, plant safety systems.

SR 3.8.1.11

In general conformance with the recommendations of Regulatory Guide 1.9 (Ref. 3), paragraph 2.2.4, this Surveillance demonstrates the as designed operation of the standby power sources during loss of the offsite source. This test verifies all actions encountered from the loss of offsite power, including shedding of the nonessential loads and energization of the emergency buses and respective loads from the DG. It further demonstrates the capability of the DG to automatically achieve the required voltage and frequency within the specified time, and maintain a steady state voltage and frequency range.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The DG autostart time of 10 seconds is derived from requirements of the accident analysis to respond to a design basis large break LOCA. The Surveillance should be continued for a minimum of 5 minutes in order to demonstrate that all starting transients have decayed and stability is achieved.

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

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.12

This Surveillance demonstrates that the DG automatically starts and achieves the required voltage and frequency within the specified time (10 seconds) from the design basis actuation signal (LOCA signal) and operates for ≥ 5 minutes. The 5 minute period provides sufficient time to demonstrate stability.

The Frequency of 18 months takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with the expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.8.1.13

This Surveillance demonstrates that DG noncritical protective functions (e.g., high jacket water temperature) are bypassed on a loss of voltage signal concurrent with an ESF actuation test signal. The noncritical trips are bypassed during DBAs and provide an alarm on an abnormal engine condition. This alarm provides the operator with sufficient time to react appropriately. The DG availability to mitigate the DBA is more critical than protecting the engine against minor problems that are not immediately detrimental to emergency operation of the DG.

The 18 month Frequency is based on engineering judgment, taking into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.14

RAI 3.8.1-17

Regulatory Guide 1.9 (Ref. 3), paragraph 2.2.9, recommends demonstration once per 18 months that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours, ≥ 2 hours of which is at a load band equivalent to 105% to 110% of the continuous duty rating and the remainder of the time at a load equivalent to the continuous duty rating of the DG. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are also applicable to this SR.

Although no power factor requirements are established by this SR, a portion of the testing is performed between 0 and 1000 kVARs. The practice of performing this entire test at rated power factor has been determined to be unjustified, potentially destructive, testing due to exceeding the vendors recommendation for maximum voltage of the generator if the DG output breaker should open during testing. Therefore, the DG is to be operated at rated power factor for only a short duration during the performance of this surveillance in accordance with the following guidance:

During the period that the DG is loaded at ≥ 5500 kW and ≤ 1000 kVAR, the following shall be performed once to verify DG operability at rated power factor:

a. Over a two minute period, raise kVAR loading to 4125 kVAR;

b. Operate the DG at 4125 kVAR for 1 minute or until kVAR and kW loading has stabilized; and

c. Reduce kVAR loading to ≤ 1000 kVAR.

The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This Surveillance is modified by two Notes. Note 1 states that momentary transients (e.g., due to changing bus loads) do not invalidate this test. The reason for Note 2 is that during operation with the reactor critical, performance of this Surveillance could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, plant safety systems.

SR 3.8.1.15

This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within 10 seconds. The 10 second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3).

This SR is modified by two Notes. Note 1 ensures that the test is performed with the diesel sufficiently hot. The load band is provided to avoid routine overloading of the DG. Routine overloads may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. The requirement that the diesel has operated for at least 2 hours at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. Alternatively, the DG can be operated until operating temperatures have stabilized. Note 2 states that momentary transients (e.g., due to changing bus loads) do not invalidate this test.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.16

RAI 3.8.1-18

As required by Regulatory Guide 1.9 (Ref. 3), paragraph 2.2.11, this Surveillance ensures that the manual synchronization and load transfer from the DG to the offsite source can be made and the DG can be returned to ready to load status when offsite power is restored. It also ensures that the autostart logic is reset to allow the DG to reload if a subsequent loss of offsite power occurs. The DG is considered to be in ready to load status when the DG is at rated speed and voltage, the output breaker is open and can receive an autoclose signal on bus undervoltage, and the load sequence timers are reset.

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), and takes into consideration unit conditions required to perform the Surveillance.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.17

Demonstration of the test mode override ensures that the DG availability under accident conditions will not be compromised as the result of testing and the DG will automatically reset to ready to load operation if a LOCA actuation signal is received during operation in the test mode. Ready to load operation is defined as the DG running at rated speed and voltage with the DG output breaker open. These provisions for automatic switchover are required by IEEE-308 (Ref. 9), paragraph 6.2.6(2).

The intent in the requirement associated with SR 3.8.1.17.b is to show that the emergency loading was not affected by the DG operation in test mode. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the emergency loads to perform these functions is acceptable.

This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.18

Under accident and loss of offsite power conditions, loads are sequentially connected to the bus by the automatic load sequence timers. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. The 10% load sequence time interval tolerance ensures that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Reference 2 provides a summary of the automatic loading of ESF buses.

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.19

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

This Surveillance demonstrates the DG operation, as discussed in the Bases for SR 3.8.1.11, during a loss of offsite power actuation test signal in conjunction with an ESF actuation signal. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

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

This SR is modified by a Note. The reason for the Note is that the performance of the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems.

SR 3.8.1.20

This Surveillance demonstrates that the DG starting independence has not been compromised. Also, this Surveillance demonstrates that each engine can achieve proper speed within the specified time when the DGs are started simultaneously.

The 10 year Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3).

BASES

REFERENCES

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

2. UFSAR, Chapter 8.

3. Regulatory Guide 1.9, Rev. 3, July 1993.

4. UFSAR, Chapter 6.

5. UFSAR, Chapter 15.

6. Regulatory Guide 1.93, Rev. 0, December 1974.

7. Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," July 2, 1984.

8. 10 CFR 50, Appendix A, GDC 18.

9. IEEE Standard 308-1978.

10. Regulatory Guide 1.137, Rev. 1, October 1979.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.2 AC Sources – Shutdown

BASES

BACKGROUND	A description of the AC sources is provided in the Bases for LCO 3.8.1, "AC Sources – Operating."
APPLICABLE SAFETY ANALYSES	The OPERABILITY of the minimum AC sources during MODES 5 and 6, and during movement of irradiated fuel assemblies ensures that:

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

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

c. Adequate AC electrical power is provided to mitigate events postulated during shutdown, such as a fuel handling accident.

In general, when the unit is shut down, the Technical Specifications requirements ensure that the unit has the capability to mitigate the consequences of postulated accidents. However, assuming a single failure and concurrent loss of all offsite or all onsite power is not required. The rationale for this is based on the fact that many Design Basis Accidents (DBAs) that are analyzed in MODES 1, 2, 3, and 4 have no specific analyses in MODES 5 and 6. Worst case bounding events are deemed not credible in MODES 5 and 6 because the energy contained within the reactor pressure boundary, reactor coolant temperature and pressure, and the corresponding stresses result in the probabilities of occurrence being significantly reduced or eliminated, and in minimal consequences. These deviations from DBA analysis assumptions and design requirements during shutdown conditions are allowed by the LCO for required systems.

BASES

APPLICABLE SAFETY ANALYSES (continued)

During MODES 1, 2, 3, and 4, various deviations from the analysis assumptions and design requirements are allowed within the Required Actions. This allowance is in recognition that certain testing and maintenance activities must be conducted provided an acceptable level of risk is not exceeded. During MODES 5 and 6, performance of a significant number of required testing and maintenance activities is also required. In MODES 5 and 6, the activities are generally planned and administratively controlled. Relaxations from MODE 1, 2, 3, and 4 LCO requirements are acceptable during shutdown modes based on:

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

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

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

d. Maintaining, to the extent practical, the ability to perform required functions (even if not meeting MODE 1, 2, 3, and 4 OPERABILITY requirements) with systems assumed to function during an event.

In the event of an accident during shutdown, this LCO ensures the capability to support systems necessary to avoid immediate difficulty, assuming either a loss of all offsite power or a loss of all onsite Diesel Generator (DG) power.

The AC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES

LCO

One qualified circuit capable of supplying the onsite Class 1E power distribution subsystem(s) of LCO 3.8.10, "Distribution Systems – Shutdown," ensures that all required loads are capable of being powered from offsite power. An OPERABLE DG, associated with one of the distribution subsystem division(s) required to be OPERABLE by LCO 3.8.10, ensures a diverse power source is available to provide electrical power support, assuming a loss of the offsite circuit. Together, OPERABILITY of the required qualifi[ed] circuit and DG ensures the availability of sufficient AC sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents).

The qualified circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the Engineered Safety Feature (ESF) bus(es). Qualified circuits are those that are described in the UFSAR and are part of the licensing basis for the plant. A description of the qualified circuits is contained in the Bases for LCO 3.8.1, "AC Sources – Operating."

The DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage. This sequence must be accomplished within 10 seconds. The DG must be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as DG in normal standby with the engine hot and DG in standby at ambient conditions.

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

It is acceptable for divisions to be cross tied during shutdown conditions, allowing a single offsite power circuit to supply all required divisions.

BASES

APPLICABILITY

The AC sources required to be OPERABLE in MODES 5 and 6, and at all times during movement of irradiated fuel assemblies, provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core;

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

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

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

The AC power requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.1.

ACTIONS

LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Therefore, in either case, inability to suspend movement of irradiated fuel assemblies would not be sufficient reason to require a reactor shutdown.

BASES

ACTIONS (continued)

A.1

The qualified circuit would be considered inoperable if it were not available to one required ESF division. Since two divisions may be required by LCO 3.8.10, the one division with offsite power available may be capable of supporting sufficient required features (i.e., systems, subsystems, trains, components, and devices) to allow continuation of CORE ALTERATIONS and fuel movement. By the allowance of the option to declare required features inoperable, with no offsite power available, appropriate restrictions will be implemented in accordance with the affected required features LCO's ACTIONS.

BASES

ACTIONS (continued)

A.2.1, A.2.2, A.2.3, A.2.4, A.2.5, B.1, B.2, B.3, B.4, and B.5

With the offsite circuit not available to one or more required divisions, the option would still exist to declare all required features inoperable. Since this option may involve undesired administrative efforts, the allowance for sufficiently conservative actions is made. With the required DG inoperable, the minimum required diversity of AC power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, operations involving positive reactivity additions, and declare the affected Low Temperature Overpressure Protection (LTOP) features required by LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System" inoperable. The Required Action to declare the affected LTOP features inoperable allows the operator to evaluate the current unit conditions and to determine which (if any) of the LTOP features have been affected by the loss of power. The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory provided the required SDM is maintained. Suspension of these activities does not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability or the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC sources and to continue this action until restoration is accomplished in order to provide the necessary AC power to the plant safety systems.

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

BASES

ACTIONS (continued)

Pursuant to LCO 3.0.6, the Distribution System's ACTIONS would not be entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition A are modified by a Note to indicate that when Condition A is entered with no AC power to any required ESF bus, the ACTIONS for LCO 3.8.10 must be immediately entered. This Note allows Condition A to provide requirements for the loss of the offsite circuit, whether or not a division is de-energized. LCO 3.8.10 would provide the appropriate restrictions for the situation involving a de-energized division.

SURVEILLANCE REQUIREMENTS

SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, 3, and 4. SR 3.8.1.8 is not required to be met since only one offsite circuit is required to be OPERABLE. SR 3.8.1.17 is not required to be met because the required OPERABLE DG is not required to undergo periods of being synchronized to the offsite circuit. SR 3.8.1.20 is not required to be met because starting independence is not required with the DG that is not required to be operable.

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DG from being paralleled with the offsite power network or otherwise rendered inoperable during performance of SRs, and to preclude de-energizing a required 4160 V ESF bus or disconnecting a required offsite circuit during performance of SRs. With limited AC sources available, a single event could compromise both the required circuit and the DG. It is the intent that these SRs must still be capable of being met, but actual performance is not required during periods when the DG and offsite circuit is required to be OPERABLE. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR.

REFERENCES

None

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.3 Diesel Fuel Oil

BASES

BACKGROUND

Each Diesel Generator (DG) is provided with fuel oil capacity sufficient to operate that diesel for a period of 7 days while the DG is supplying maximum post loss of coolant accident load demand discussed in the UFSAR, Section 9.5.4.2 (Ref. 1). The station fuel oil system is comprised of two outside storage tanks (one 50,000 gal and one 125,000 gal) which are the source for all of the fuel oil needs for the station. These outside tanks are normally the source of "new" fuel oil. Each Unit 1 DG is provided with two 25,000 gallon inside storage tanks. Each Unit 2 DG is provided with one 50,000 gallon inside storage tank. These inside storage tanks are the source of the required "stored" fuel oil. This onsite fuel oil capacity is sufficient to operate the DGs for longer than the time to replenish the onsite supply from outside sources.

Fuel oil is transferred from the inside storage tank(s) to the day tank by either of two transfer pumps associated with each DG. Independence of pumps and piping precludes the failure of one pump, or the rupture of any pipe, valve or tank(s) to result in the loss of more than one DG.

For proper operation of the standby DGs, it is necessary to ensure the proper quality of the fuel oil. Regulatory Guide 1.137 (Ref. 2) addresses the recommended fuel oil practices as supplemented by ANSI N195 (Ref. 3). The fuel oil properties governed by these SRs are the water and sediment content, the kinematic viscosity, specific gravity (or API gravity), and particulate level.

BASES

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter 6 (Ref. 4), and in the UFSAR, Chapter 15 (Ref. 5), assume Engineered Safety Feature (ESF) systems are OPERABLE. The DGs are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that fuel, Reactor Coolant System and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

Since the diesel fuel oil supports the operation of the standby AC power sources, they satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

Stored diesel fuel oil is required to have sufficient supply for 7 days of maximum post accident load operation. It is also required to meet specific standards for quality. This requirement, in conjunction with an ability to obtain replacement supplies within 7 days, supports the availability of DGs required to shut down the reactor and to maintain it in a safe condition for an Anticipated Operational Occurrence (AOO) or a postulated DBA with loss of offsite power. DG day tank fuel requirements, as well as transfer capability from the storage tank to the day tank, are addressed in LCO 3.8.1, "AC Sources - Operating," and LCO 3.8.2, "AC Sources - Shutdown."

APPLICABILITY

The AC sources (LCO 3.8.1 and LCO 3.8.2) are required to ensure the availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an AOO or a postulated DBA. Since the stored diesel fuel oil supports LCO 3.8.1 and LCO 3.8.2, stored diesel fuel oil is required to be within limits when the associated DG is required to be OPERABLE.

BASES

ACTIONS

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

A.1

In this Condition, the 7 day fuel oil supply for a DG is not available. However, the Condition is restricted to fuel oil level reductions that maintain at least a 6 day supply. These circumstances may be caused by events, such as full load operation required after an inadvertent start while at minimum required level, or feed and bleed operations, which may be necessitated by increasing particulate levels or any number of other oil quality degradations. This restriction allows sufficient time for obtaining the requisite replacement volume and performing the analyses required prior to addition of fuel oil to the tank(s). A period of 48 hours is considered sufficient to complete restoration of the required level prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> 6 days), the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

BASES

ACTIONS (continued)

B.1

This Condition is entered as a result of a failure to meet the acceptance criterion of SR 3.8.3.2. Normally, trending of particulate levels allows sufficient time to correct high particulate levels prior to reaching the limit of acceptability. Poor sample procedures (bottom sampling), contaminated sampling equipment, and errors in laboratory analysis can produce failures that do not follow a trend. Since the presence of particulates does not mean failure of the fuel oil to burn properly in the diesel engine, and particulate concentration is unlikely to change significantly between Surveillance Frequency intervals, and proper engine performance has been recently demonstrated (within 31 days), it is prudent to allow a brief period prior to declaring the associated DG inoperable. The 7 day Completion Time allows for further evaluation, resampling and re-analysis of the DG fuel oil.

C.1

With the new fuel oil properties defined in the Bases for SR 3.8.3.2 not within the required limits (after having been added to the storage tank(s); thus making it part of the stored fuel), a period of 30 days is allowed for restoring the stored fuel oil properties. This period provides sufficient time to test the stored fuel oil to determine that the new fuel oil, when mixed with previously stored fuel oil, remains acceptable, or to restore the stored fuel oil properties. This restoration may involve feed and bleed procedures, filtering, or combinations of these procedures. Even if a DG start and load was required during this time interval and the fuel oil properties were outside limits, there is a high likelihood that the DG would still be capable of performing its intended function.

D.1

With a Required Action and associated Completion Time not met, or one or more DGs with fuel oil not within limits for reasons other than addressed by Conditions A through C, the associated DG may be incapable of performing its intended function and must be immediately declared inoperable.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.3.1

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

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

SR 3.8.3.2

The tests of fuel oil prior to addition to the storage tank(s) are a means of determining whether new fuel oil is of the appropriate grade and has not been contaminated with substances that would have an immediate, detrimental impact on diesel engine combustion. If results from these tests are within acceptable limits, the fuel oil may be added to the storage tanks without concern for contaminating the entire volume of fuel oil in the storage tanks. These tests are to be conducted prior to adding the new fuel to the storage tank(s), but in no case is the time between sampling (and associated results) of new fuel and addition of new fuel oil to the storage tank to exceed 30 days. The tests, limits, and applicable ASTM Standards for the tests listed in the Diesel Fuel Oil Testing Program of Specification 5.5.13 are as follows:

BASES

SURVEILLANCE REQUIREMENTS (continued)

a. Sample the new fuel oil in accordance with ASTM D4057 (Ref. 6);

b. Verify in accordance with the tests specified in ASTM D975-81 (Ref. 6) that the sample has an absolute specific gravity at 60°F of ≥ 0.83 and ≤ 0.89 or an API gravity at 60°F of ≥ 27° and ≤ 39°, a kinematic viscosity at 40°C of ≥ 1.9 centistokes and ≤ 4.1 centistokes, and a flash point of ≥ 125°F; and

c. Verify that the new fuel oil has a clear and bright appearance with proper color when tested in accordance with ASTM D4176-82 (Ref. 6).

Failure to meet any of the above limits is cause for rejecting the new fuel oil, but does not represent a failure to meet the LCO concern since the fuel oil is not added to the storage tanks.

Following the initial new fuel oil sample, the fuel oil is analyzed to establish that the other properties specified in Table 1 of ASTM D975-81 (Ref. 7) are met for new fuel oil when tested in accordance with ASTM D975-81 (Ref. 6), except that the analysis for sulfur may be performed in accordance with ASTM D1552-79 (Ref. 6) or ASTM D2622-82 (Ref. 6). These additional analyses are required by Specification 5.5.13, "Diesel Fuel Oil Testing Program," to be performed within 30 days following sampling and addition. This 30 day time period is intended to assure: 1) that the sample taken is not more than 30 days old at the time of adding the fuel oil to the storage tank, and 2) that the results of a new fuel oil sample (sample obtained prior to addition but not more than 30 days prior to) are obtained within 30 days after addition. The 30 day period is acceptable because the fuel oil properties of interest, even if they were not within stated limits, would not have an immediate effect on DG operation. This Surveillance ensures the availability of high quality fuel oil for the DGs.

BASES

SURVEILLANCE REQUIREMENTS (continued)

Fuel oil degradation during long term storage shows up as an increase in particulate, due mostly to oxidation. The presence of particulate does not mean the fuel oil will not burn properly in a diesel engine. The particulate can cause fouling of filters and fuel oil injection equipment, however, which can cause engine failure.

Particulate concentrations should be determined in accordance with ASTM D2276 (Ref. 6). This method involves a determination of total particulate concentration in the fuel oil and has a limit of 10 mg/l. It is acceptable to obtain a field sample for subsequent laboratory testing in lieu of field testing. Each tank must be considered and tested separately since the total stored fuel oil volume is contained in two or more interconnected tanks.

The Frequency of this test takes into consideration fuel oil degradation trends that indicate that particulate concentration is unlikely to change significantly between Frequency intervals.

SR 3.8.3.3

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel storage tanks once every 31 days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, and contaminated fuel oil, and from breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established consistent with the recommendations of Regulatory Guide 1.137 (Ref. 2). This SR is for preventive maintenance. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during performance of the Surveillance.

BASES

REFERENCES

1. UFSAR, Section 9.5.4.2.
2. Regulatory Guide 1.137.
3. ANSI N195-1976, Appendix B.
4. UFSAR, Chapter 6.
5. UFSAR, Chapter 15.
6. ASTM Standards: D4057; D975-81; D4176-82; D1552-79; D2622-82; D2276.
7. ASTM Standards, D975, Table 1.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.4 DC Sources - Operating

BASES

BACKGROUND

RAI 3.8.4-1

The station DC electrical power system provides the AC emergency power system with control power. It also provides both motive and control power to selected safety related equipment and AC instrument bus power (via inverters). As required by 10 CFR 50, Appendix A, GDC 17 (Ref. 1), the DC electrical power system is designed to have sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure. The DC electrical power system also conforms to the recommendations of Regulatory Guide 1.6 (Ref. 2) and IEEE-308 (Ref. 3).

The 125 VDC electrical power system for each unit consists of two independent and redundant safety related Class 1E DC electrical power subsystems (Division 11 (21) and Division 12 (22)). Each subsystem consists of one 125 VDC battery, the associated battery charger for each battery, and all the associated control equipment and interconnecting cabling.

RAI C

During normal operation, the 125 VDC loads are powered from the battery chargers with the batteries floating on the system. In case of a loss of normal power to the battery charger, the DC load is automatically powered from the station battery.

The Division 11 (21) and Division 12 (22) DC electrical power subsystems provide the control power for its associated Class 1E AC power load group, 4.16 kV switchgear, and 480 V load centers. The DC electrical power subsystems also provide DC electrical power to the inverters, which in turn power the AC instrument buses. Additionally, the Class 1E 125 VDC electrical power subsystems provide power to the 6.9 kV Reactor Coolant Pump (RCP) breakers and the non-Class 1E 125 VDC buses. The connection between the Class 1E and non-Class 1E 125 VDC buses contains fuses to ensure that a fault on the non-Class 1E bus does not cause a loss of the Class 1E bus.

BASES

BACKGROUND (continued)

The DC power distribution system is described in more detail in Bases for LCO 3.8.9, "Distribution System - Operating," and LCO 3.8.10, "Distribution Systems - Shutdown."

Each battery was sized based upon supplying the design duty cycle in the event of a loss of offsite AC power concurrent with a Loss Of Coolant Accident (LOCA) and a single failure of a Diesel Generator (DG). Each battery has a nominal rating of 1760 ampere-hours for AT&T (2320 ampere-hours for C&D) at the 8 hour discharge rate to an end voltage of 1.75 volts per cell, and was sized based upon continuously carrying the various estimated loads. The batteries were sized in accordance with IEEE-485-1983 (Ref. 5).

Each 125 VDC battery is separately housed in a ventilated room apart from its charger and distribution centers. Each subsystem is located in an area separated physically and electrically from the other subsystem to ensure that a single failure in one subsystem does not cause a failure in a redundant subsystem. There is no sharing between redundant Class 1E subsystems, such as batteries, battery chargers, or distribution panels. While it is possible to interconnect the Unit 1 and Unit 2 DC electrical power subsystems, they normally remain disconnected, except when a DC source must be taken out of service for the purposes of maintenance and/or testing, or in the event of a failure of a DC source.

BASES

BACKGROUND (continued)

The crosstie between 125 VDC ESF buses 111 and 211 and the crosstie between 125 VDC ESF buses 112 and 212 are each provided with two normally locked open, manually operated circuit breakers. No interlocks are provided since the interconnected buses are not redundant. However, if one battery is inoperable, procedural and administrative controls are used to limit the connected load to 100 amps for AT&T (200 amps for C&D) based on not exceeding the OPERABLE battery capacity. These controls ensure that combinations of maintenance and test operations will not preclude the system capabilities to supply power to the ESF DC loads. The provisions of administratively controlled, manually actuated, interconnections between the non-redundant Class 1E DC buses increases the overall reliability and availability of the DC systems for each unit in that it provides a means for manually providing power to a DC bus at a time when it would otherwise have to be out-of-service (e.g., to perform a battery discharge test during an outage, to replace a damaged cell, etc.). Crosstie breaker closed alarms are also provided to alert the operator when the units are crosstied.

RAI 3.8.4-2

Each Division 11 (21) and Division 12 (22) DC electrical power subsystem battery charger has ample power output capacity for the steady state operation of connected loads required during normal operation, while at the same time maintaining its battery bank fully charged. Each battery charger also has sufficient capacity to restore the battery from the design minimum charge to its fully charged state within 24 hours while supplying normal steady state loads discussed in the UFSAR, Chapter 8 (Ref. 4).

BASES

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter 6 (Ref. 6), and in the UFSAR, Chapter 15 (Ref. 7), assume that Engineered Safety Feature (ESF) systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the DGs, emergency auxiliaries, and control and switching during all MODES of operation.

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

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

b. A worst case single failure.

The DC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES

LCO

The DC electrical power subsystems, each subsystem consisting of:

a. a battery;

b. battery charger; and

c. the corresponding control equipment and interconnecting cabling supplying power to the associated bus within the division,

are required to be OPERABLE to ensure the availability of the required power to shut down the reactor and maintain it in a safe condition after an Anticipated Operational Occurrence (AOO) or a postulated DBA. Loss of any division DC electrical power subsystem does not prevent the minimum safety function from being performed (Ref. 4). Furthermore, at least one crosstie breaker between Division 11 and Division 21, and at least one crosstie breaker between Division 12 and Division 22, is required to be open to maintain independence between the units.

An OPERABLE DC electrical power subsystem requires the required battery and respective charger to be operating and connected to the associated DC bus.

APPLICABILITY

The DC electrical power sources are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure safe unit operation and to ensure that:

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

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

The DC electrical power requirements for MODES 5 and 6 are addressed in LCO 3.8.5, "DC Sources - Shutdown."

BASES

ACTIONS

A.1 and A.2

Condition A addresses the event of having one battery charger inoperable, and provides for restoration of electrical power to the associated DC bus by use of the crosstie capability to the opposite unit. The 2 hour Completion Time allows adequate time to evaluate the cause for battery charger failure, to determine whether the opposite unit's DC bus is available for support, and to perform the crosstie procedure. The battery charger is required to be restored to OPERABLE status within 24 hours in order to reestablish the independence of DC subsystems, while providing a reasonable amount of time for repairs. By limiting the crosstied conditions of operating units to 24 hours, the likelihood of an event occurring which could place either unit in jeopardy is minimized. (Note, there are no load restrictions applicable to the opposite unit's DC bus in this condition.)

B.1

Condition B addresses the situation of crosstieing the operating unit's DC bus to the opposite unit, which has an inoperable battery charger, when the opposite unit is operating in MODE 1, 2, 3, or 4. This provision is included to accommodate unexpected failures, maintenance, and/or testing of the opposite unit's DC subsystems. The Completion Time for Required Action B.1 of 60 hours is adequate to allow testing and restoration activities. In this Condition, the opposite unit's battery is assumed to remain OPERABLE. Therefore, the function of the crosstie is to maintain the opposite unit's battery fully charged and to supply the minimal opposite unit DC loads. The 60 hours is based on the 24 hours the opposite unit has to restore the inoperable charger and the 36 hours the opposite unit would have to reach MODE 5, if the charger is not restored to OPERABLE status. When the opposite unit reaches MODE 5, Condition C is entered. Requiring the associated crosstie breaker to be opened within 60 hours also ensures that independence of the DC subsystems is reestablished.

BASES

ACTIONS (continued)

RAI 3.8.4.3

C.1 and C.2

Condition C addresses an operating unit's DC bus that is crosstied to the opposite unit's associated DC bus, which has an inoperable source (i.e., battery or battery charger), when the opposite unit is shutdown. This provision is included to accommodate maintenance and/or testing of the shutdown unit's DC subsystems.

With the shutdown unit's battery inoperable, the operating unit will be required to supply all loads on the shutdown unit's crosstied bus should an event occur on the shutdown unit. Therefore, Required Action C.1 specifies that the possible loading on the shutdown unit's DC bus be verified to be ≤ 100 amps for AT&T (≤ 200 amps for C&D) once per 12 hours. Limiting the load to 100 amps for AT&T (200 amps for C&D) ensures that the operating unit's DC subsystem will not be overloaded in the event of a concurrent event on the operating unit. Required Action C.1 is modified by a Note only requiring Required Action C.1 when the opposite unit has an inoperable battery.

RAI 3.8.4.3

Required Action C.2 requires the associated crosstie breaker to be opened within 7 days and ensures that measures are being taken to restore the inoperable battery or battery charger and reestablish independence of the DC subsystems.

BASES

ACTIONS (continued)

D.1

Condition D represents one division with a loss of ability to completely respond to an event, and a potential loss of ability for the DC division to remain energized during normal operation. It is, therefore, imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for complete loss of DC power to the affected division. The 2 hour limit is consistent with the allowed time for an inoperable DC distribution system division.

If one of the required DC electrical power subsystems is inoperable (e.g., inoperable battery or one DC division crosstied to the opposite-unit DC division that does not have an inoperable battery charger), the remaining DC electrical power subsystem has the capacity to support a safe shutdown and to mitigate an accident condition. Since a subsequent worst case single failure would, however, result in the complete loss of the remaining 125 VDC electrical power subsystems with attendant loss of ESF functions, continued power operation should not exceed 2 hours. The 2 hour Completion Time is based on Regulatory Guide 1.93 (Ref. 8) and reflects a reasonable time to assess unit status as a function of the inoperable DC electrical power subsystem and, if the DC electrical power subsystem is not restored to OPERABLE status, to prepare to effect an orderly and safe unit shutdown.

E.1 and E.2

If the inoperable DC electrical power subsystem cannot be restored to OPERABLE status, or the crosstie breaker(s) cannot be opened, within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems. The Completion Time to bring the unit to MODE 5 is consistent with the time required in Regulatory Guide 1.93 (Ref. 8).

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1

Verifying battery terminal voltage while on float charge helps to ensure the effectiveness of the charging system and the ability of the batteries to perform their intended function. Float charge is the condition in which the charger is supplying the connected loads and the continuous charge required to overcome the internal losses of a battery and maintain the battery in a fully charged state. The voltage requirements are based on the nominal design voltage of the battery and are consistent with the initial voltages assumed in the battery sizing calculations. The 7 day Frequency is consistent with manufacturer recommendations and IEEE-450 (Ref. 9).

SR 3.8.4.2

Visual inspection to detect corrosion of the battery cells and connections, or measurement of the resistance of each intercell, interrack, intertier, and terminal connection, provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance.

The limits established for this SR must not be above the ceiling value established by the manufacturer.

Connection resistance is obtained by subtracting the normal resistance of the interrack (cross room rack) connector or the intertier (bi-level rack) connector from the measured intercell (cell-to-cell) connection resistance.

The Surveillance Frequency for these inspections, which can detect conditions that can cause power losses due to resistance heating, is 92 days. This Frequency is considered acceptable based on operating experience related to detecting corrosion trends.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.3

Visual inspection of the battery cells, cell plates, and battery racks provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance. The presence of physical damage or deterioration does not necessarily represent a failure of this SR, provided an evaluation determines that the physical damage or deterioration does not affect the OPERABILITY of the battery (its ability to perform its design function).

SR 3.8.4.4 and SR 3.8.4.5

Visual inspection and resistance measurements of intercell, interrack, intertier, and terminal connections provide an indication of physical damage or abnormal deterioration that could indicate degraded battery condition. The anticorrosion material is used to help ensure good electrical connections and to reduce terminal deterioration. The visual inspection for corrosion is not intended to require removal of and inspection under each terminal connection. The removal of visible corrosion is a preventive maintenance SR. The presence of visible corrosion does not necessarily represent a failure of this SR provided visible corrosion is removed during performance of SR 3.8.4.4.

The connection resistance limits for SR 3.8.4.5 shall not be above the ceiling value established by the manufacturer.

Connection resistance is obtained by subtracting the normal resistance of the interrack (cross room rack) connector or the intertier (bi-level rack) connector from the measured intercell (cell-to-cell) connection resistance.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.6

This SR requires that each battery charger be capable of supplying 400 amps and 125 V for ≥ 8 hours. These requirements are based on the design capacity of the chargers (Ref. 4). According to Regulatory Guide 1.32 (Ref. 10), the battery charger output capacity is required to be based on the largest combined demands of the various steady state loads and the charging demands to restore the battery from the design minimum charge state to the fully charged state, irrespective of the status of the unit during these demand occurrences. The minimum required amperes and duration ensures that these requirements can be satisfied.

The Surveillance Frequency is acceptable, given the unit conditions required to perform the test and the other administrative controls existing to ensure adequate charger performance during these 18 month intervals. In addition, this Frequency is intended to be consistent with expected fuel cycle lengths.

This Surveillance is required to be performed during MODES 5 and 6 since it would require the DC electrical power subsystem to be inoperable during performance of the test.

SR 3.8.4.7

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

The Surveillance Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.32 (Ref. 10) and Regulatory Guide 1.129 (Ref. 11), which state that the battery service test should be performed during refueling operations or at some other outage, with intervals between tests, not to exceed 18 months.

This SR is modified by two Notes. Note 1 allows the performance of a modified performance discharge test in lieu of a service test.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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

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

The reason for Note 2 is that performing the Surveillance would perturb the electrical distribution system and challenge safety systems.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.8

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

A battery modified performance discharge test is described in the Bases for SR 3.8.4.7. Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.4.8, however, only the modified performance discharge test may be used to satisfy SR 3 8.4.8 while satisfying the requirements of SR 3.8.4.7 at the same time.

AT&T Batteries: AT&T battery manufacturer's data indicates that the capacity of the battery actually increases over its service life. The NRC has concurred that the battery meets acceptable operating criteria if it can be shown that battery capacity for the AT&T batteries is at least 95% of the manufacturer's rating when subjected to a performance discharge test every 60 months.

C&D Batteries: The acceptance criteria for this Surveillance are consistent with IEEE-450 (Ref. 9) and IEEE-485 (Ref. 5). These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements.

BASES

SURVEILLANCE REQUIREMENTS (continued)

RWC

The Surveillance Frequency for this test is normally 60 months. If the battery shows degradation, or if the battery has reached 85% of its expected life and capacity is < 100% of the manufacturer's rating, the Surveillance Frequency is reduced to 12 months. However, if the battery shows no degradation but has reached 85% of its expected life, the Surveillance Frequency is only reduced to 24 months for batteries that retain capacity ≥ 100% of the manufacturer's rating. Degradation is indicated, according to IEEE-450 (Ref. 9), when the battery capacity drops by more than 5% for AT&T (10% for C&D) relative to its capacity on the previous performance test or when it is > 0% for AT&T (> 10% for C&D) below the manufacturer's rating. These Frequencies are consistent with the recommendations in IEEE-450 (Ref. 9).

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would perturb the electrical distribution system and challenge safety systems.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.
2. Regulatory Guide 1.6, March 10, 1971.
3. IEEE-3[illegible]978.
4. UFSAR, Section 8.3.2.1.
5. IEEE-485-1983, June 1983.
6. UFSAR, Chapter 6.
7. UFSAR, Chapter 15.
8. Regulatory Guide 1.93, December 1974.
9. IEEE-450-1995.
10. Regulatory Guide 1.32, February 1977.
11. Regulatory Guide 1.129, December 1974.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.5 DC Sources – Shutdown

BASES

BACKGROUND

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

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident and transient analyses in the UFSAR, Chapter 6 (Ref. 1) and Chapter 15 (Ref. 2), assume that Engineered Safety Feature systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the diesel generators, emergency auxiliaries, and control and switching during all MODES of operation.

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

The OPERABILITY of the minimum DC electrical power sources during MODES 5 and 6 and during movement of irradiated fuel assemblies ensures that:

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

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

c. Adequate DC electrical power is provided to mitigate events postulated during shutdown, such as a fuel handling accident.

The DC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES

LCO

The DC electrical power subsystems with:

a. at least one subsystem consisting of a battery and battery charger;

b. when the redundant division of the Class 1E DC electrical power distribution subsystem is required by LCO 3.8.10, the other subsystem consisting of either a battery or a charger; and

c. the corresponding control equipment, and interconnecting cabling within the division(s)

are required to be OPERABLE to support required division(s) of the distribution systems required OPERABLE by LCO 3.8.10, "Distribution Systems - Shutdown." This ensures the availability of sufficient DC electrical power sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents). Furthermore, at least one unit crosstie breaker per division is required to be open to maintain independence between the units.

LCO 3.8.5 is modified by a Note which allows one division to be crosstied to the opposite unit, when the opposite unit is in MODE 1, 2, 3, or 4 with an inoperable charger. No load restrictions are placed on the bus loading, when the one division is crosstied.

BASES

APPLICABILITY

The DC electrical power sources required to be OPERABLE in MODES 5 and 6, and at all times during movement of irradiated fuel assemblies, provide assurance that:

a. Required features to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core;

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

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

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

The DC electrical power requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.4.

ACTIONS

LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Therefore, in either case, inability to suspend movement of irradiated fuel assemblies would not be sufficient reason to require a reactor shutdown.

BASES

ACTIONS (continued)

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

If two divisions are required by LCO 3.8.10, the remaining division with DC power available may be capable of supporting sufficient systems to allow continuation of CORE ALTERATIONS and fuel movement. By allowing the option to declare required features inoperable with the associated DC power source(s) inoperable, appropriate restrictions will be implemented in accordance with the affected required features' LCO ACTIONS. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, operations involving positive reactivity additions, and declare the affected Low Temperature Overpressure Protection (LTOP) features, required by LCO 3.4.12, inoperable). The Required Action to declare the associated LTOP features inoperable allows the operator to evaluate the current unit conditions and to determine which (if any) of the LTOP features have been affected by the loss of power. The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory, provided the required SDM is maintained. Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required DC electrical power subsystems and to continue this action until restoration is accomplished in order to provide the necessary DC electrical power to the unit safety systems.

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

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.5 DC Sources - Shutdown

BASES

BACKGROUND

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

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident and transient analyses in the UFSAR, Chapter 6 (Ref. 1) and Chapter 15 (Ref. 2), assume that Engineered Safety Feature systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the diesel generators, emergency auxiliaries, and control and switching during all MODES of operation.

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

The OPERABILITY of the minimum DC electrical power sources during MODES 5 and 6 and during movement of irradiated fuel assemblies ensures that:

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

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

c. Adequate DC electrical power is provided to mitigate events postulated during shutdown, such as a fuel handling accident.

The DC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES

LCO

The DC electrical power subsystems with:

a. at least one subsystem consisting of a battery and battery charger;

b. when the redundant division of the Class 1E DC electrical power distribution subsystem is required by LCO 3.8.10, the other subsystem consisting of either a battery or a charger; and

c. the corresponding control equipment, and interconnecting cabling within the division(s)

are required to be OPERABLE to support required division(s) of the distribution systems required OPERABLE by LCO 3.8.10, "Distribution Systems - Shutdown." This ensures the availability of sufficient DC electrical power sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents). Furthermore, at least one unit crosstie breaker per division is required to be open to maintain independence between the units.

LCO 3.8.5 is modified by a Note which allows one division to be crosstied to the opposite unit, when the opposite unit is in MODE 1, 2, 3, or 4 with an inoperable charger. No load restrictions are placed on the bus loading, when the one division is crosstied.

BASES

APPLICABILITY

The DC electrical power sources required to be OPERABLE in MODES 5 and 6, and at all times during movement of irradiated fuel assemblies, provide assurance that:

a. Required features to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core;

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

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

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

The DC electrical power requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.4.

ACTIONS

LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Therefore, in either case, inability to suspend movement of irradiated fuel assemblies would not be sufficient reason to require a reactor shutdown.

BASES

ACTIONS (continued)

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

If two divisions are required by LCO 3.8.10, the remaining division with DC power available may be capable of supporting sufficient systems to allow continuation of CORE ALTERATIONS and fuel movement. By allowing the option to declare required features inoperable with the associated DC power source(s) inoperable, appropriate restrictions will be implemented in accordance with the affected required features' LCO ACTIONS. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, operations involving positive reactivity additions, and declare the affected Low Temperature Overpressure Protection (LTOP) features, required by LCO 3.4.12, inoperable). The Required Action to declare the associated LTOP features inoperable allows the operator to evaluate the current unit conditions and to determine which (if any) of the LTOP features have been affected by the loss of power. The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory, provided the required SDM is maintained. Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required DC electrical power subsystems and to continue this action until restoration is accomplished in order to provide the necessary DC electrical power to the unit safety systems.

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

BASES

ACTIONS (continued)

B.1 and B.2

Condition B addresses a shutdown unit's DC bus that is crosstied to the opposite unit's associated DC bus, which has an inoperable source, when the opposite unit is also shutdown. This provision is included to accommodate maintenance and/or testing of the opposite unit's DC subsystems.

With the opposite unit's battery inoperable, the unit-specific DC subsystem will be required to supply all loads on the opposite unit's crosstied bus should an event occur on the opposite unit. Therefore, Required Action B.1 specifies that the possible loading on the opposite unit's DC bus be verified to be ≤ 100 amps for AT&T (≤ 200 amps for C&D) once per 12 hours. Limiting the load to 100 amps for AT&T (200 amps for C&D), ensures that the unit-specific DC subsystem will not be overloaded in the event of a concurrent event on the unit. Required Action B.1 is modified by a Note requiring Required Action B.1 when the opposite unit has an inoperable battery.

Required Action B.2 requires the associated crosstie breaker to be opened within 7 days ensures that measures are being taken to reestablish independence of the DC subsystems.

SURVEILLANCE REQUIREMENTS

SR 3.8.5.1

Rev L

SR 3.8.5.1 requires application of all Surveillances required by SR 3.8.4.1 through SR 3.8.4.8. Therefore, see the corresponding Bases for LCO 3.8.4 for a discussion of each SR.

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

BASES

REFERENCES

1. UFSAR, Chapter 6.
2. UFSAR, Chapter 15.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.6 Battery Cell Parameters

BASES

BACKGROUND	This LCO delineates the limits on electrolyte temperature, level, float voltage, and specific gravity for the DC power source batteries. A discussion of these batteries and their OPERABILITY requirements is provided in the Bases for LCO 3.8.4, "DC Sources - Operating," and LCO 3.8.5, "DC Sources - Shutdown."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter 6 (Ref. 1) and Chapter 15 (Ref. 2), assume Engineered Safety Feature systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the diesel generators, emergency auxiliaries, and control and switching during all MODES of operation.

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

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

b. A worst case single failure.

Battery cell parameters satisfy the Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

Battery cell parameters must remain within acceptable limits to ensure availability of the required DC power to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence or a postulated DBA. Electrolyte limits are conservatively established, allowing continued DC electrical system function even with Category A and B limits not met.

BASES

APPLICABILITY

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

ACTIONS

The ACTIONS Table is modified by a Note which indicates that separate Condition entry is allowed for each battery. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each affected battery. Complying with the Required Actions for one battery may allow for continued operation, and subsequent battery parameters out of limits are governed by separate Condition entry and application of associated Required Actions.

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

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

The pilot cell electrolyte level and float voltage are required to be verified to meet the Category C limits within 1 hour (Required Action A.1). This check will provide a quick indication of the status of the remainder of the battery cells. One hour provides time to inspect the electrolyte level and to confirm the float voltage of the pilot cell. One hour is considered a reasonable amount of time to perform the required verification.

BASES

ACTIONS (continued)

Rev C

RAI 3.8.7-1

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

Rev C

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

B.1

With one or more batteries with one or more battery cell parameters outside the Category C limit for any connected cell, sufficient capacity to supply the maximum expected load requirement is not assured and the corresponding DC electrical power subsystem must be declared inoperable. Additionally, other potentially extreme conditions, such as not completing the Required Actions of Condition A within the required Completion Time or average electrolyte temperature of representative cells falling below 60°F, are also cause for immediately declaring the associated DC electrical power subsystem inoperable.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.6.1

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

SR 3.8.6.2

The quarterly inspection of specific gravity and voltage is consistent with IEEE-450 (Ref. 3). In addition, within 7 days of a battery discharge < 110 V or a battery overcharge > 145 V, the battery must be demonstrated to meet Category B limits. Transients, such as motor starting transients, which may momentarily cause battery voltage to drop to < 110 V, do not constitute a battery discharge provided the battery terminal voltage and float current return to pre-transient values. This inspection is also consistent with IEEE-450 (Ref. 3), which recommends special inspections following a severe discharge or overcharge, to ensure that no significant degradation of the battery occurs as a consequence of such discharge or overcharge.

SR 3.8.6.3

This Surveillance verification that the average temperature of representative cells is ≥ 60°F, is consistent with a recommendation of IEEE-450 (Ref. 3), that states that the temperature of electrolytes in representative cells should be determined on a quarterly basis.

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

BASES

SURVEILLANCE REQUIREMENTS (continued)

<u>Table 3.8.6-1</u>

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

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

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

The Category A limit specified for float voltage is ≥ 2.18 V for AT&T (≥ 2.13 V for C&D) per cell. This value is based on the recommendations of IEEE-450 (Ref. 3), which states that prolonged operation of cells < 2.18 V for AT&T (< 2.13 V for C&D) can reduce the life expectancy of cells.

The Category A limit specified for specific gravity for each pilot cell is ≥ 1.285 for AT&T (≥ 1.200 for C&D) (0.015 below the manufacturer fully charged nominal specific gravity or a battery charging current that had stabilized at a low value). This value is characteristic of a charged cell with adequate capacity. According to IEEE-450 (Ref. 3), the specific gravity readings are based on a temperature of 77°F (25°C).

BASES

SURVEILLANCE REQUIREMENTS (continued)

Rev J

The specific gravity readings are corrected for actual electrolyte temperature and level for AT&T (for actual electrolyte temperature for C&D). For each 3°F (1.67°C) above 77°F (25°C), 1 point (0.001) is added to the reading; 1 point is subtracted for each 3°F below 77°F.

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

Rev J

The Category B limits specified for electrolyte level and float voltage are the same as those specified for Category A and have been discussed above. Footnote (b) to Table 3.8.6-1 requires the float voltage correction for average electrolyte temperature. The Category B limit specified for specific gravity for each connected cell is ≥ 1.280 for AT&T (≥ 1.195 for C&D) (0.020 below the manufacturer fully charged, nominal specific gravity) with the average of all connected cells > 1.290 for AT&T (> 1.205 for C&D) (0.010 below the manufacturer fully charged, nominal specific gravity). These values are based on manufacturer's recommendations. The minimum specific gravity value required for each cell ensures that the effects of a highly charged or newly installed cell will not mask overall degradation of the battery.

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

BASES

SURVEILLANCE REQUIREMENTS (continued)

The Category C limits specified for electrolyte level (above the top of the plates and not overflowing) ensure that the plates suffer no physical damage and maintain adequate electron transfer capability. The Category C limits for float voltage is based on IEEE-450 (Ref. 3), which states that a cell voltage of 2.14 V for AT&T (2.07 V for C&D) or below, under float conditions and not caused by elevated temperature of the cell, indicates internal cell problems and may require cell replacement.

Rev J

The Category C limit of average specific gravity ≥ 1.280 for AT&T (≥ 1.195 for C&D) is based on manufacturer recommendations (0.020 below the manufacturer recommended fully charged, nominal specific gravity). In addition to that limit, it is required that the specific gravity for each connected cell must be no less than 0.020 below the average of all connected cells. This limit ensures that the effect of a highly charged or new cell does not mask overall degradation of the battery.

The footnotes to Table 3.8.6-1 are applicable to Category A, B, and C specific gravity. Footnote (c) to Table 3.8.6-1 requires the above mentioned correction for electrolyte level and temperature for AT&T (for electrolyte temperature for C&D), with the exception that level correction (for AT&T) is not required when battery charging current is < 2 amps on float charge. This current provides, in general, an indication of overall (AT&T) battery condition.

Rev J

Because of specific gravity gradients that are produced during the recharging process, delays of several days may occur while waiting for the specific gravity to stabilize. A stabilized charger current is an acceptable alternative to specific gravity measurement for determining the state of charge. This phenomenon is discussed in IEEE-450 (Ref. 3). Footnote (d) to Table 3.8.6-1 allows the float charge current to be used as an alternate to specific gravity for up to 7 days following a battery recharge. Within 7 days, each connected cell's specific gravity must be measured to confirm the state of charge. Following a minor battery recharge (such as equalizing charge that does not follow a deep discharge) specific gravity gradients are not significant, and confirming measurements may be made in less than 7 days.

BASES

REFERENCES

1. UFSAR, Chapter 6.
2. UFSAR, Chapter 15.
3. IEEE-450-1995.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.7 Inverters – Operating

BASES

BACKGROUND	The inverters are the preferred source of power for the AC instrument buses because of the stability and reliability they provide. Each of the four AC instrument buses (2 per division) is normally supplied AC electrical power by a dedicated inverter. The inverters can be powered from an AC source/rectifier or from an associated 125 VDC battery. The battery provides an uninterruptible power source for the instrumentation and controls for the Reactor Protective System (RPS) and the Engineered Safety Feature Actuation System (ESFAS). Specific details on inverters and their operating characteristics are found in the UFSAR, Chapter 8 (Ref. 1).
APPLICABLE SAFETY ANALYSES	The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter 6 (Ref. 2) and Chapter 15 (Ref. 3), assume Engineered Safety Feature Systems are OPERABLE. The inverters are designed to provide the required capacity, capability, redundancy, and reliability to ensure the availability of necessary power to the RPS and ESFAS instrumentation and controls so that the fuel, Reactor Coolant System, and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

BASES

APPLICABLE SAFETY ANALYSES (continued)

The OPERABILITY of the inverters is consistent with the initial assumptions of the accident analyses and is based on meeting the design basis of the plant. This includes maintaining required AC instrument buses OPERABLE during accident conditions in the event of:

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

b. A worst case single failure.

Inverters are a part of the distribution system and, as such, satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The inverters ensure the availability of AC electrical power for the systems instrumentation required to shut down the reactor and maintain it in a safe condition after an Anticipated Operational Occurrence (AOO) or a postulated DBA.

Maintaining the required inverters OPERABLE ensures that the redundancy incorporated into the design of the RPS and ESFAS instrumentation and controls is maintained. The four inverters ensure an uninterruptible supply of AC electrical power to the AC instrument buses even if the 4.16 kV safety buses are de-energized.

OPERABLE inverters require the associated instrument bus to be powered by the inverter with output voltage within tolerances, and power input to the inverter from the associated 125 VDC battery. The power supply may be from an AC source via rectifier as long as the battery is connected as the uninterruptible power supply.

BASES

APPLICABILITY

The inverters are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

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

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

Inverter requirements for MODES 5 and 6 are covered in LCO 3.8.8, "Inverters - Shutdown."

ACTIONS

A.1

With a required inverter inoperable, its associated AC instrument bus may be inoperable unless it is manually re-energized from its Class 1E constant voltage source transformer.

For this reason a Note has been included in Condition A requiring the entry into the Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating" for any de-energized instrument bus. This ensures that the instrument bus is re-energized within 2 hours.

Required Action A.1 allows 24 hours to fix the inoperable inverter and return it to service. The 24 hour limit is based upon engineering judgment, taking into consideration the time required to repair an inverter and the additional risk to which the unit is exposed because of the inverter inoperability. This has to be balanced against the risk of an immediate shutdown, along with the potential challenges to safety systems such a shutdown might entail. When the AC instrument bus is powered from its constant voltage source, it is relying upon interruptible AC electrical power sources (offsite and onsite). The uninterruptible inverter source to the AC instrument buses is the preferred source for powering instrumentation trip setpoint devices.

BASES

ACTIONS (continued)

B.1 and B.2

If the inoperable devices or components cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.8.7.1

This Surveillance verifies that the inverters are functioning properly with all required circuit breakers closed and AC instrument buses energized from the inverter. The verification of proper voltage output ensures that the required power is readily available for the instrumentation of the RPS and ESFAS connected to the AC instrument buses. The 7 day Frequency takes into account the redundant capability of the inverters and other indications available in the control room that alert the operator to inverter malfunctions.

REFERENCES

1. UFSAR, Chapter 8.
2. UFSAR, Chapter 6.
3. UFSAR, Chapter 15.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.8 Inverters - Shutdown

BASES

BACKGROUND

A description of the inverters is provided in the Bases for LCO 3.8.7, "Inverters - Operating."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter 6 (Ref. 1) and Chapter 15 (Ref. 2), assume Engineered Safety Feature systems are OPERABLE. The DC to AC inverters are designed to provide the required capacity, capability, redundancy, and reliability to ensure the availability of necessary power to the Reactor Protective System and Engineered Safety Features Actuation System instrumentation and controls so that the fuel, Reactor Coolant System, and containment design limits are not exceeded.

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

The OPERABILITY of the inverter to each required AC instrument bus during MODES 5 and 6 ensures that:

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

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

c. Adequate power is available to mitigate events postulated during shutdown, such as a fuel handling accident.

The inverters were previously identified as part of the distribution system and, as such, satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES

LCO

The inverters ensure the availability of electrical power for the instrumentation for systems required to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence or a postulated DBA. One AC instrument bus division energized by two battery powered inverters provides uninterruptible supply of AC electrical power to at least one AC instrument bus division even if the 4.16 kV safety buses are de-energized. OPERABILITY of these two inverters requires that the associated AC instrument buses be powered by the inverters. When the redundant division of the Class 1E AC instrument bus electrical power distribution subsystem is required by LCO 3.8.10, the power source for the AC instrument buses may consist of:

a. one inverter powered by its associated battery;

b. one inverter powered by its internal AC source; or

c. one Class 1E constant voltage source transformer.

This ensures the availability of sufficient inverter power sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents).

APPLICABILITY

The inverters required to be OPERABLE in MODES 5 and 6, and at all times during movement of irradiated fuel assemblies, provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel in the core;

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

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

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

BASES

APPLICABILITY (continued)

Inverter requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.7.

ACTIONS

LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Therefore, in either case, inability to suspend movement of irradiated fuel assemblies would not be sufficient reason to require a reactor shutdown.

BASES

ACTIONS (continued)

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

With one or more required AC instrument bus power sources inoperable when two divisions are required by LCO 3.8.10, "Distribution Systems – Shutdown," the remaining OPERABLE AC instrument bus power sources may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, or operations with a potential for positive reactivity additions. By the allowance of the option to declare required features inoperable with the associated inverter(s) inoperable, appropriate restrictions will be implemented in accordance with the affected required features LCOs' Required Actions. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, operations involving positive reactivity additions, and declare the associated Low Temperature Overpressure Protection (LTOP) features inoperable). The Required Action to declare the associated LTOP features inoperable allows the operator to evaluate the current unit conditions and to determine which (if any) of the LTOP features have been affected by the loss of power. If the LTOP features have not been affected, then unnecessarily restrictive actions may be averted. The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory, provided the required SDM is maintained. Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required inverters and to continue this action until restoration is accomplished in order to provide the necessary inverter power to the unit safety systems.

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

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.8.1

This Surveillance verifies that the inverters are functioning properly with all required circuit breakers closed and required AC instrument buses energized. The verification of proper voltage output ensures that the required power is readily available for the instrumentation connected to the AC instrument buses. The 7 day Frequency takes into account the reliability of the instrument bus power sources and other indications available in the control room that alert the operator to malfunctions.

REFERENCES

1. UFSAR, Chapter 6.

2. UFSAR, Chapter 15.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.9 Distribution Systems - Operating

BASES

BACKGROUND

The onsite Class 1E AC, DC, and AC instrument bus electrical power distribution systems are divisionalized into two redundant and independent AC, DC, and AC instrument bus electrical power distribution subsystems.

The AC electrical power subsystem for each division consists of a primary 4.16 kV Engineered Safety Feature (ESF) bus and a primary 480 V ESF bus. The division also includes (but is not included in the subsystem required to be OPERABLE by LCO 3.8.9) secondary 480 and 120 V buses, motor control centers, and distribution panels. Each 4.16 kV ESF bus has at least one separate and independent offsite source of power as well as a dedicated onsite Diesel Generator (DG) source. Each 4.16 kV ESF bus is normally connected to a normal offsite source. After a loss of the normal offsite power source to a 4.16 kV ESF bus the onsite emergency DG supplies power to the 4.16 kV ESF bus. A transfer to the reserve offsite source can be accomplished manually. Control power for the 4.16 kV breakers is supplied from the Class 1E 125 VDC electrical power distribution subsystem. Additional description of this system may be found in the Bases for LCO 3.8.1, "AC Sources - Operating," and the Bases for LCO 3.8.4, "DC Sources - Operating."

The four 120 VAC instrument buses (considered distinct from the AC electrical power distribution subsystem) are arranged in two load groups per division and are normally powered from the inverters. The alternate power supply for the instrument buses are Class 1E constant voltage source transformers powered from the same division as the associated inverter, and its use is governed by LCO 3.8.7, "Inverters - Operating." Each constant voltage source transformer is powered from a Class 1E AC bus.

There are two independent 125 VDC electrical power distribution subsystems (one for each division).

BASES

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter 6 (Ref. 1), and in the UFSAR, Chapter 15 (Ref. 2), assume ESF systems are OPERABLE. The AC, DC, and AC instrument bus electrical power distribution systems are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

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

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

b. A worst case single failure.

The distribution systems satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The required power distribution subsystems ensure the availability of AC, DC, and AC instrument bus electrical power for the systems required to shut down the reactor and maintain it in a safe condition after an Anticipated Operational Occurrence (AOO) or a postulated DBA. The AC, DC, and AC instrument bus electrical power distribution subsystems are required to be OPERABLE.

BASES

LCO (continued)

Maintaining the Division 1 and Division 2 AC, DC, and AC instrument bus electrical power distribution subsystems OPERABLE ensures that the redundancy incorporated into the design of ESF is not defeated. Therefore, a single failure within any system or within the electrical power distribution subsystems will not prevent safe shutdown of the reactor.

OPERABLE AC electrical power distribution subsystems require the associated buses to be energized to their proper voltages. The division also includes (but is not included in the subsystem required to be OPERABLE by LCO 3.8.9) secondary 480 and 120 V buses, motor control centers, and distribution panels. OPERABLE DC electrical power distribution subsystems require the associated buses to be energized to their proper voltage from either the associated battery or charger. OPERABLE instrument bus electrical power distribution subsystems require the associated buses to be energized to their proper voltage from the associated inverter via inverted DC voltage, inverter using AC source, or Class 1E constant voltage transformer.

APPLICABILITY

The electrical power distribution subsystems are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

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

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

Electrical power distribution subsystem requirements for MODES 5 and 6 are covered in LCO 3.8.10, "Distribution Systems - Shutdown."

BASES

ACTIONS

A.1

RAI 3.8.9-2

With one AC bus, except AC instrument buses, inoperable, the remaining AC electrical power distribution subsystem is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. The overall reliability is reduced, however, because a single failure in the remaining power distribution subsystem could result in the minimum required ESF functions not being supported. Therefore, the required AC bus must be restored to OPERABLE status within 8 hours.

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

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

b. The low probability for an event in conjunction with a single failure of a redundant component in the division with AC power.

BASES

ACTIONS (continued)

The second Completion Time for Required Action A.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition A is entered while, for instance, a DC bus is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 2 hours. This could lead to a total of 10 hours, since initial failure of the LCO, to restore the AC distribution system. At this time, a DC circuit could again become inoperable, and AC distribution restored OPERABLE. This could continue indefinitely.

The Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time the LCO was initially not met, instead of the time Condition A was entered. The 16 hour Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely.

B.1

RAI 3.8.9-2

With one AC instrument bus inoperable, the remaining OPERABLE AC instrument buses are capable of supporting the minimum safety functions necessary to shut down the unit and maintain it in the safe shutdown condition. Overall reliability is reduced, however, since an additional single failure could result in the minimum required ESF functions not being supported. Therefore, the required AC instrument bus must be restored to OPERABLE status within 2 hours by powering the bus from the associated inverter via inverted DC, inverter using AC source, or Class 1E constant voltage transformer.

BASES

ACTIONS (continued)

RAI 3.8.9-2

Condition B represents one AC instrument bus without power; potentially both the DC source and the associated AC source are nonfunctioning. In this situation, the unit is significantly more vulnerable to a complete loss of all noninterruptible power. It is, therefore, imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for loss of power to the remaining instrument buses and restoring power to the affected instrument bus.

This 2 hour limit is more conservative than Completion Times allowed for the vast majority of components that are without adequate AC instrument power. Taking exception to LCO 3.0.2 for components without adequate AC instrument power, that would have the Required Action Completion Times shorter than 2 hours if declared inoperable, is acceptable because of:

a. The potential for decreased safety by requiring a change in unit conditions (i.e., requiring a shutdown) and not allowing stable operations to continue;

b. The potential for decreased safety by requiring entry into numerous Applicable Conditions and Required Actions for components without adequate AC instrument power and not providing sufficient time for the operators to perform the necessary evaluations and actions for restoring power to the affected bus(es); and

c. The low probability for an event in conjunction with a single failure of a redundant component.

The 2 hour Completion Time takes into account the importance to safety of restoring the AC instrument bus(es) to OPERABLE status, the redundant capability afforded by the other OPERABLE instrument buses, and the low probability of a DBA occurring during this period.

BASES

ACTIONS (continued)

The second Completion Time for Required Action B.1 establishes a limit on the maximum allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition B is entered while, for instance, an AC bus is inoperable and subsequently returned OPERABLE, the LCO may already have been not met for up to 8 hours. This could lead to a total of 10 hours, since initial failure of the LCO, to restore the instrument bus distribution system. At this time, an AC bus could again become inoperable, and instrument bus distribution restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time the LCO was initially not met, instead of the time Condition B was entered. The 16 hour Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely.

C.1

With one DC bus inoperable, the remaining DC electrical power distribution subsystem is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. The overall reliability is reduced, however, because a single failure in the remaining DC electrical power distribution subsystem could result in the minimum required ESF functions not being supported. Therefore, the DC bus must be restored to OPERABLE status within 2 hours by powering the bus from the associated battery or charger.

BASES

ACTIONS (continued)

Condition C represents one division without adequate DC power; potentially both with the battery significantly degraded and the associated charger nonfunctioning and not crosstied to the other unit. In this situation, the unit is significantly more vulnerable to a complete loss of all DC power. It is, therefore, imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for loss of power to the remaining divisions and restoring power to the affected division.

This 2 hour limit is more conservative than Completion Times allowed for the vast majority of components that would be without power. Taking exception to LCO 3.0.2 for components without adequate DC power, which would have Required Action Completion Times shorter than 2 hours, is acceptable because of:

a. The potential for decreased safety by requiring a change in unit conditions (i.e., requiring a shutdown) while allowing stable operations to continue;

b. The potential for decreased safety by requiring entry into numerous applicable Conditions and Required Actions for components without DC power and not providing sufficient time for the operators to perform the necessary evaluations and actions for restoring power to the affected division; and

c. The low probability for an event in conjunction with a single failure of a redundant component.

The 2 hour Completion Time for DC buses is consistent with Regulatory Guide 1.93 (Ref. 3).

BASES

ACTIONS (continued)

The second Completion Time for Required Action C.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition C is entered while, for instance, an AC bus is inoperable and subsequently returned OPERABLE, the LCO may already have been not met for up to 8 hours. This could lead to a total of 10 hours, since initial failure of the LCO, to restore the DC distribution system. At this time, an AC bus could again become inoperable, and DC distribution restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time the LCO was initially not met, instead of the time Condition C was entered. The 16 hour Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely.

D.1 and D.2

If the inoperable distribution subsystem cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

E.1

RAI 3.8.9-2

With two electrical power distribution subsystems inoperable that result in a loss of safety function, adequate core cooling, containment OPERABILITY and other vital functions for DBA mitigation would be compromised, and immediate plant shutdown in accordance with LCO 3.0.3 is required.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.9.1

This Surveillance verifies that the required AC, DC, and AC instrument bus electrical power distribution systems are functioning properly, with the correct circuit breaker alignment. The correct breaker alignment ensures the appropriate separation and independence of the electrical divisions is maintained, and the appropriate voltage is available to each required bus. The verification of proper voltage availability on the buses ensures that the required voltage is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the redundant capability of the AC, DC, and AC instrument bus electrical power distribution subsystems, and other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. UFSAR, Chapter 6.
2. UFSAR, Chapter 15.
3. Regulatory Guide 1.93, December 1974.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.10 Distribution Systems - Shutdown

BASES

BACKGROUND	A description of the AC, DC, and AC instrument bus electrical power distribution systems is provided in the Bases for LCO 3.8.9, "Distribution Systems - Operating."
APPLICABLE SAFETY ANALYSES	The initial conditions of Design Basis Accident and transient analyses in the UFSAR, Chapter 6 (Ref. 1) and Chapter 15 (Ref. 2), assume Engineered Safety Feature (ESF) systems are OPERABLE. The AC, DC, and AC instrument bus electrical power distribution systems are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded. The OPERABILITY of the AC, DC, and AC instrument bus electrical power distribution system is consistent with the initial assumptions of the accident analyses and the requirements for the supported systems' OPERABILITY. The OPERABILITY of the minimum AC, DC, and AC instrument bus electrical power distribution subsystems during MODES 5 and 6, and during movement of irradiated fuel assemblies ensures that: a. The unit can be maintained in the shutdown or refueling condition for extended periods; b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and c. Adequate power is provided to mitigate events postulated during shutdown, such as a fuel handling accident. The AC and DC electrical power distribution systems satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES

LCO

Various subsystems, equipment, and components are required OPERABLE by other LCOs, depending on the specific unit condition. Implicit in those requirements is the OPERABILITY of necessary support features (i.e. systems, subsystems, trains, components, and devices). This LCO explicitly requires energization of the portions of the electrical distribution system necessary to support OPERABILITY of required subsystems, equipment, and components - whether specifically addressed in an LCO or implicitly required via the definition of OPERABILITY.

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

APPLICABILITY

The AC and DC electrical power distribution subsystems required to be OPERABLE in MODES 5 and 6, and at all times during movement of irradiated fuel assemblies, provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel in the core;

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

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

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

The AC, DC, and AC instrument bus electrical power distribution subsystems requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.9.

BASES

ACTIONS

LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Therefore, in either case, inability to suspend movement of irradiated fuel assemblies would not be sufficient reason to require a reactor shutdown.

A.1, A.2.1, A.2.2, A.2.3, A.2.4, A.2.5, and A.2.6

Although redundant required features may require redundant divisions of electrical power distribution subsystems to be OPERABLE, one OPERABLE distribution subsystem division may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS and fuel movement. By allowing the option to declare required features associated with an inoperable distribution subsystem inoperable (Required Action A.1), appropriate restrictions are implemented in accordance with the affected required feature LCO's Required Actions. In many instances, however, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions of Required Actions A.2.1 through A.2.4 is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions). Suspension of these activities does not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC and DC electrical power distribution subsystems and to continue this action until restoration is accomplished in order to provide the necessary power to the unit safety systems.

BASES

ACTIONS (continued)

Notwithstanding performance of the above conservative Required Actions, a required Residual Heat Removal (RHR) train and/or a required Low Temperature Overpressure Protection (LTOP) feature, may be inoperable. In this case, Required Actions A.2.1 through A.2.4 do not adequately address the concerns relating to coolant circulation and heat removal. Pursuant to LCO 3.0.6, the RHR or LTOP ACTIONS would not be entered. Therefore, Required Actions A.2.5 and A.2.6 are provided to direct declaring RHR and LTOP features inoperable and declaring the associated RHR train "not in operation" (note, this does not require the RHR train to be shut down if operating, only that the associated RHR train not be credited as the required operating train), which results in taking the appropriate actions.

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

SURVEILLANCE REQUIREMENTS

SR 3.8.10.1

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

REFERENCES

1. UFSAR, Chapter 6.

2. UFSAR, Chapter 15.

INSERT 3.8-2D (A_2)

RAI 3.8.1-01

CONDITION	REQUIRED ACTION	COMPLETION TIME
G. Two DGs inoperable, and one or more buses with one or more required qualified circuits inoperable. OR One DG inoperable, one bus with two required qualified circuits inoperable, and the second bus with one or more required qualified circuits inoperable.	G.1 Enter LCO 3.0.3.	Immediately

INSERT 3.8-2E (A_9)

RAI 3.8.1-22

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. ...	------------NOTE------------ Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems – Operating," when Condition D is entered with no AC power source to a division. ---------------------------- ...	

~~4.8.1.1.1~~ Each of the above required independent circuits between the offsite transmission network and the Onsite Class 1E Distribution System shall be:

SR 3.8.1.1 ~~a.~~ Determined OPERABLE at least once per 7 days by verifying correct breaker alignments, indicated power availability, and

SR 3.8.1.8 ~~b.~~ Demonstrated OPERABLE at least once per 18 months ~~during shutdown~~ by transferring manually unit power supply from the normal circuit to the alternate circuit. L26

~~4.8.1.1.2~~ Each diesel generator shall be demonstrated OPERABLE:

~~a.~~ At least once per 31 days ~~on a STAGGERED TEST BASIS~~ by: L5

SR 3.8.1.4 ~~1)~~ Verifying the fuel level in the day tank,

SR 3.8.3.1 ~~2)~~ Verifying the fuel level in the fuel storage tank, M1

SR 3.8.1.6 ~~3)~~ Verifying the fuel transfer pump starts and automatically transfers fuel from the storage system to the day tank,

SR 3.8.1.2, SR 3.8.1.7, SR 3.8.1.15 ~~4)~~ Verifying the diesel starts from ambient condition and accelerates to at least 58.8 Hz ~~600 rpm~~ in less than or equal to 10 seconds.* The generator voltage and frequency shall be 4160 +420 -210 ~~± 420~~ volts and 60 ± 1.2 ~~Hz within 10 seconds* after the start signal.~~ L13 M11

The diesel generator shall be started for this test by using one of the following signals:

a) Manual, or

b) Simulated loss of ESF bus voltage by itself, or

c) Simulated loss of ESF bus voltage in conjunction with an ESF actuation test signal, or

d) An ESF actuation test signal by itself.

LA2

SR 3.8.1.3 NOTES 2,3,4 INSERT 3.8-3A M9 L5

SR 3.8.1.3 ~~5)~~ Verifying the generator is synchronized, then loaded to greater than or equal to 5500 kW ~~in accordance with the manufacturer's recommendations*~~, operates with a load greater than or equal to 4950 kW and ≤ 5500 kW for at least 60 minutes, and L11 L31

SR 3.8.1.3 NOTE 1

L28

~~6) Verifying the diesel generator is aligned to provide standby power to the associated ESF busses.~~ LA3

SR 3.8.1.5 ~~b.~~ At least once per 31 days ~~and after each operation of the diesel where the period of operation was greater than or equal to 1 hour~~ by checking for and removing accumulated water from the day tanks; L7

SR 3.8.1.7 SR 3.8.1.2 NOTE Insert 3.8-3B LA4

*The diesel generator start (10 sec) from normal standby ~~ambient~~ conditions shall be performed at least once per 184 days in these surveillance tests. ~~All other engine starts for the purpose of this surveillance testing may be preceded by an engine prelube period and/or other warmup procedures recommended by the manufacturer so that mechanical stress and wear on the diesel engine is minimized.~~

REV C

LCO 3.8.1
LCO 3.8.3
Section 5.0

SR 3.8.3.3 ~~c.~~ At least once per 31 days by checking for and removing accumulated water from the fuel oil storage tanks;

~~d.~~ By sampling new fuel oil in accordance with ASTM-D4057 prior to addition to storage tanks and:

1) By verifying in accordance with the tests specified in ASTM-D975-81 prior to addition to the storage tanks that the sample has:

Addressed in Section 5.5 See DOC for Section 5.5

&

SR 3.8.3.2 (A11)

a) An API Gravity of within 0.3 degrees at 60°F, or a specific gravity of within 0.0016 at 60°F, when compared to the supplier's certificate, or an absolute specific gravity at 60°F of greater than or equal to 0.83 but less than or equal to 0.89, or an API gravity of greater than or equal to 27 degrees but less than or equal to 39 degrees;

b) A kinematic viscosity at 40°C of greater than or equal to 1.9 centistokes, but less than or equal to 4.1 centistokes, if the gravity was not determined by comparison with the supplier's certification;

c) A flash point equal to or greater than 125°F; and

d) A clear and bright appearance with proper color when tested in accordance with ASTM-D4176-82.

2) By verifying within 30 days of obtaining the sample that the other properties specified in Table 1 of ASTM-D975-81 are met when tested in accordance with ASTM-D975-81 except that the analysis for sulfur may be performed in accordance with ASTM-D1552-79 or ASTM-D2622-82.

~~e.~~ At least once every 31 days by obtaining a sample of fuel oil from the storage tank, in accordance with ASTM-D2276-78, and verifying that total particulate contamination is less than 10 mg/liter when checked in accordance with ASTM-D2276-78, Method A.

(L29) SR 3.8.1.12 and SR 3.8.1.13

~~f.~~ At least once per 18 months, ~~during shutdown,~~ by: INSERT 3.8-4A (A3)

~~1) (Not used.)~~ its associated single largest post-accident load (LA5)

SR 3.8.1.9 ~~2)~~ Verifying the generator capability to reject a load of greater than or equal to ~~1034 kW~~ while maintaining voltage at 4160 + 420 volts ~~and~~ frequency at 60 ± 4.5 Hz, (transient state), 60 ± 1.2 Hz (steady state), 7 (A5)

+ 420 − 210 (M11)

(L8) and maintaining steady state

LCO 3.8.3 ← INSERT 3.8-4B (L17) (A11)

RAI 3.8.1-5

INSERT 3.8-4A (A_3)

SURVEILLANCE		FREQUENCY
SR 3.8.1.9	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1 or 2. -- ...	
SR 3.8.1.10	-------------------NOTES------------------- 1. ... 2. This Surveillance shall not be performed in MODE 1 or 2. -- ...	
SR 3.8.1.11	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1, 2, 3 or 4. -- ...	
SR 3.8.1.14	-------------------NOTES------------------- 1. ... 2. This Surveillance shall not be performed in MODE 1 or 2. -- ...	

A1

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

SR Note Insert 3.8-5A L24

SR 3.8.1.10 ~~3)~~ Verifying the diesel generator capability to reject a load of ~~5500 kW~~ ≥ 4950 kWatts without tripping. The generator voltage shall not exceed 4784 volts during and following the load rejection, L25

SR 3.8.1.11 ~~4)~~ ~~Simulating~~ On an actual or simulated a loss of ESF bus voltage by itself, and: L9

a) Verifying de-energization of the ESF busses and load shedding from the ESF busses, and

b) Verifying the diesel starts on the auto-start signal, energizes the ESF busses with permanently connected loads within 10 seconds, energizes the auto-connected safe shutdown loads through the load sequencing timer and operates for greater than or equal to 5 minutes while its generator is loaded with the shutdown loads. After energization, the steady-state voltage and frequency of the ESF busses shall be maintained at 4160 ~~± 420~~ +420 -210 volts and 60 ± 1.2 Hz during this test. M11

SR 3.8.1.12 ~~5)~~ Verifying that on an actual or simulated ESF Actuation test signal ~~without loss of ESF bus voltages~~, the diesel generator starts on the auto-start signal and operates on standby for greater than or equal to 5 minutes. The generator voltage and frequency shall be 4160 ± 420 -210 volts and 60 ± 1.2 Hz within 10 seconds after the auto-start signal; ~~the generator steady state generator voltage and frequency shall be maintained within these limits during this test;~~ L9 L29 M11 LA7

SR 3.8.1.19 ~~6)~~ ~~Simulating a~~ On an actual or simulated loss of ESF bus voltage in conjunction with an ESF Actuation test signal, and L9

a) Verifying deenergization of the ESF busses and load shedding from the ESF busses;

b) Verifying the diesel starts on the auto-start signal, energizes the ESF busses with permanently connected loads within 10 seconds, energizes the auto-connected emergency (accident) loads through the LOCA sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with emergency loads. After energization, the steady-state voltage and frequency of the ESF busses shall be maintained at 4160 ~~± 420~~ +420 -210 volts and 60 ± 1.2 Hz during this test; and M11

SR 3.8.1.13 ~~7)~~ Verifying that all automatic diesel generator trips, except engine overspeed and generator differential, are automatically bypassed upon loss-of-voltage on the emergency bus concurrent with ~~a~~ an actual or simulated Safety Injection Actuation signal. L29 L9

REV L

LCO 3.8.1

RAI 3.8.1-21

INSERT 3.8-5A (L_{24})

SURVEILLANCE		FREQUENCY
SR 3.8.1.10	-------------------NOTES------------------- 1. Momentary transients above the voltage limit immediately following a load rejection do not invalidate this test. 2. ... --- ...	

LCO 3.8.2

INSERT 3.8-9G (L_{15})

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ...	... AND A.2.5 Declare affected Low Temperature Overpressure Protection (LTOP) feature(s) inoperable.	Immediately

A1 3.8 ELECTRICAL POWER SYSTEMS

3.8.4 ~~3/4.8.2~~ D.C. SOURCES - OPERATING

LCO 3.8.4
LCO 3.8.9

Division 11(21) and Division 12(22)

LIMITING CONDITION FOR OPERATION

power subsystems

LCO 3.8.9 ~~3.8.2.1 As a minimum the following~~ D.C. electrical ~~sources~~ shall be OPERABLE:

LCO 3.8.9 ~~a.~~ 125-Volt D.C. Bus 111 ~~fed from Battery 111~~ for Unit 1 (Bus 211 ~~fed from Battery 211~~ for Unit 2) ~~and its associated full capacity charger~~, ~~and with~~
LCO 3.8.4 ~~one of its associated crosstie breakers in the open position, and~~

LA14

LCO 3.8.9 ~~b.~~ 125-Volt D.C. Bus 112 ~~fed from Battery 112~~ for Unit 1 (Bus 212 ~~fed from Battery 212~~ for Unit 2) ~~and its associated full capacity charger~~, ~~and with~~
LCO 3.8.4 ~~one of its associated crosstie breakers in the open position.~~

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

LCO 3.8.4 COND A ~~a.~~ With one of the required 125-Volt D.C. buses inoperable due to its normal associated full capacity charger being inoperable, ~~operations may continue provided that~~ within 2 hours the inoperable bus and its associated battery are energized by the opposite unit's 125-Volt D.C. bus and its OPERABLE charger via the crosstie breakers and that within 24 hours the ~~inoperable bus and its~~ charger ~~are~~ is restored to OPERABLE status. Otherwise be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.

LCO 3.8.4 COND E

A14 — for 60 hours

LCO 3.8.4 COND B ~~b.~~ With both of the crosstie breakers closed for a 125-Volt D.C. bus that is required to be OPERABLE and with both units operating (Modes 1, 2, 3, or 4), the 125-Volt D.C. bus may energize the opposite unit's inoperable 125-Volt D.C. bus having an inoperable charger without a load restriction.

LCO 3.8.4 COND C ~~c.~~ With both of the crosstie breakers closed for a 125-Volt D.C. bus that is required to be OPERABLE and with the opposite unit shutdown (Modes 5, 6, or defueled), the crosstie breakers may remain closed for up to 7 days provided items 1 and 2 below are satisfied. Otherwise open one of the crosstie breakers.

LCO 3.8.4 RA C.1 & NOTE

~~(1)~~ The shutdown unit's bus load is restricted to:

Shutdown Unit Battery Status	~~Operating Unit Battery Type~~	Load Restriction
Inoperable	~~C&D~~	200 Amps
~~Inoperable~~	~~Gould~~	~~63 Amps~~
~~OPERABLE~~	~~Either~~	~~None~~

A12
A12

LCO 3.8.4 COND C ~~(2)~~ If a load restriction applies, then once per 12 hours verify that the shutdown unit's bus loading will not exceed the load restriction.

LCO 3.8.9 COND C
LCO 3.8.4 COND D ~~d.~~ With one of the required 125-Volt D.C. buses inoperable, ~~except for the allowances of ACTIONS (a), (b), or (c) above~~ restore the inoperable bus to OPERABLE status within 2 hours, or be in at least HOT STANDBY within the
LCO 3.8.4 COND E
LCO 3.8.9 COND D
next 6 hours and in COLD SHUTDOWN within the following 30 hours.

INSERT 3.8-10A (3.8.9 ONLY) — M7

SURVEILLANCE REQUIREMENTS

SR 3.8.9.1 ~~4.8.2.1.1~~ Each D.C. bus shall be determined OPERABLE and energized from its battery at least once per 7 days by verifying correct breaker alignment.

Rev. L

A1

SURVEILLANCE REQUIREMENTS (Continued)

~~4.8.2.1.2 Each 125-volt battery bank and its associated charger shall be demonstrated OPERABLE:~~ INSERT 3.8-11B L23

RAI 3.8.7-1 Rev. L

~~a.~~ At least once per 7 days by verifying that:

SR 3.8.6.1 ~~1)~~ The parameters in Table 4.8-2 meet the Category A limits, and

SR 3.8.4.1 ~~2)~~ The total battery terminal voltage is greater than or equal to 127.6 volts ~~(C&D) 126 volts (Gould)~~ on float charge. A12

~~b.~~ At least once per 92 days and within 7 days after a battery discharge with battery terminal voltage below 110 volts, or battery overcharge with battery terminal voltage above 145 volts, by verifying that:
SR 3.8.6.2

~~1)~~ The parameters in Table 4.8-2 meet the Category B limits,

SR 3.8.4.2 ~~2)~~ There is no visible corrosion at either terminals or connectors, or the connection resistance of these items is less than 150×10^{-6} ohm~~*~~, and LA9

SR3.8.6.3 ~~3)~~ The average electrolyte temperature of ~~all connected~~ representative cells is above or equal to 60°F every 92 days L19 L30

~~c.~~ At least once per 18 months by verifying that:

SR3.8.4.3 ~~1)~~ The cells, cell plates, and battery racks show no visual indication of physical damage or abnormal deterioration that could degrade battery performance, A4

SR 3.8.4.4 ~~2)~~ The cell-to-cell and terminal connections are clean, tight, and coated with anticorrosion material,

SR 3.8.4.5 ~~3)~~ The resistance of each cell-to-cell and terminal connection is less than or equal to 150×10^{-6} ohm~~*~~, and LA9

SR 3.8.4.6 ~~4)~~ The battery charger will supply a load equal to the manufacturer's rating for at least 8 hours.

INSERT 3.8-11A A3

~~d.~~ At least once per 18 months ~~, during shutdown,~~ by verifying that the battery capacity is adequate to supply and maintain in OPERABLE status ~~all of~~ the ~~actual or simulated~~ emergency loads for the design duty cycle when the battery required is subject to a battery service test;
SR3.8.4.7

LA9

~~*Obtained by subtracting the normal resistance of: 1) the cross room rack connector (400 x 10^{-6} ohm, typical) and 2) the bi-level rack connector (50 x 10^{-6} ohm, typical); from the measured cell-to-cell connection resistance.~~

Rev. L

Rev. C

INSERT 3.8-11A (A_3)

SURVEILLANCE		FREQUENCY
SR 3.8.4.7	----------NOTES---------- 1. ... 2. This surveillance shall not be performed in MODE 1, 2, 3, or 4. ------------------------------	

Rev C

RAI 3.8.7-1

INSERT 3.8-11B (L_{23})

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Cell Parameters

LCO 3.8.6 Battery cell parameters for Division 11(21) and Division 12(22) batteries shall be within limits of Table 3.8.6-1.

APPLICABILITY: When associated DC electrical power subsystems are required to be OPERABLE.

ACTIONS

------------------------------NOTE------------------------------
Separate Condition entry is allowed for each battery.

SURVEILLANCE REQUIREMENTS (Continued) INSERT 3.8-11aA A3

SR3.8.4.8 SR3.8.4.7 Note 1
e. At least once per 60 months, ~~during shutdown,~~ by verifying that the battery capacity is at least 80% of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test. The modified performance discharge test ~~(C&D) and the performance discharge test (Gould)~~ may be performed in lieu of the battery service test required by Specification 4.8.2.1.2d.; A12

SR3.8.4.8
f. At least once per 12* months ~~during shutdown,~~ by giving performance discharge tests or modified performance discharge tests of battery capacity to any battery that shows signs of degradation or has reached 85% of the service life expected for the application. ~~Degradation is indicated when the battery capacity drops more than 10% of rated capacity from its capacity on the previous performance test or modified performance test, or is below 90% of the manufacturer's rating.~~ LA15

~~This requirement is applicable to Batteries 112, 211, and 212. This requirement is applicable to Battery 111 upon entering MODE 4 for Unit 1, Cycle 9.~~

A12
~~g. At least once per 18 months during shutdown, by giving performance discharge tests or modified performance discharge tests of battery capacity to any battery that shows signs of degradation or has reached 85% of the service life expected for the application. Degradation is indicated when the battery capacity drops more than 10% of rated capacity from its capacity on the previous performance test or modified performance test, or is below 90% of the manufacturer's rating. This requirement is applicable to Battery 111 until entering MODE 4 for Unit 1, Cycle 9.~~

SR 3.8.4.8 Frequency

*If the battery has reached 85% of service life, delivers a capacity of 100% or greater of the manufacturer's rated capacity, and has shown no signs of degradation, performance testing at two-year intervals is acceptable until the battery shows signs of degradation.

Rev. L

INSERT 3.8-11aA (A_3)

SURVEILLANCE		FREQUENCY
SR 3.8.4.8	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. -- ...	

A1

TABLE ~~4.8-2~~ 3.8.6-1

LCO 3.8.6

BATTERY ~~SURVEILLANCE~~ REQUIREMENTS
Cell Parameters

	CATEGORY A ~~(1)~~ a	CATEGORY B ~~(2)~~ a	CATEGORY C
PARAMETER	LIMITS FOR EACH DESIGNATED PILOT CELL	LIMITS FOR EACH CONNECTED CELL	ALLOWABLE[3] VALUE FOR EACH CONNECTED CELL
Electrolyte Level	>Minimum level indication mark, and ≤ ¼" above maximum level indication mark (a)	>Minimum level indication mark, and ≤ ¼" above maximum level indication mark (a)	Above top of plates, and not overflowing
Float Voltage	≥ 2.13 volts	≥ 2.13 volts ~~(6)~~ (b)	> 2.07 volts
Specific Gravity ~~(4)~~ (c) (d)	≥ 1.200 ~~(5)~~ (d)	≥ 1.195	Not more than 0.020 below the average of all connected cells
		Average of all connected cells > 1.205	Average of all connected cells ≥ 1.195 ~~(5)~~ (d)

L6

TABLE NOTATIONS

~~(1)~~ For any Category A parameter(s) outside the limit(s) shown, the battery may be considered OPERABLE provided that within 24 hours and once per 7 days thereafter all the Category B measurements are taken and found to be within their allowable values, and provided all Category A and B parameter(s) are restored to within limits within the next ~~6~~ 31 days. COND A RA A.2 & A3 M10 L23

~~(2)~~ For any Category B parameter(s) outside the limit(s) shown, the battery may be considered OPERABLE provided that the Category B parameters are within their allowable values and provided the Category B parameter(s) are restored to within limits within ~~7~~ 31 days. COND A RA A.2 & A.3

COND B ~~(3)~~ Any Category ~~B~~ C parameter not within its allowable value indicates an inoperable battery.

A12

c ~~(4)~~ ~~Corrected for electrolyte temperature and level for Gould.~~ Corrected for electrolyte temperature ~~for C&D~~.

d ~~(5)~~ Or battery ~~charging~~ float current is less than ~~2 amps (Gould)~~ 3 amps ~~(C&D)~~ when on charge. INSERT 3.8-12B M12

b ~~(6)~~ Corrected for average electrolyte temperature. A12

INSERT 3.8-12A → footnote (a)

L6

INSERT 3.8-12C → COND A RA A.1

L23

INSERT 3.8-12A (L_6)

(a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum during equalizing charges provided it is not overflowing.

INSERT 3.8-12B (M_{12})

... is acceptable for meeting specific gravity limits following a battery recharge, for a maximum of 7 days. When charging current is used to satisfy specific gravity requirements, specific gravity of each connected cell shall be measured prior to expiration of the 7 day allowance.

INSERT 3.8-12C (L_{23})

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more batteries with one or more battery cell parameters not within Category A or B limits.	A.1 Verify pilot cell electrolyte level and float voltage meet Table 3.8.6-1 Category C limits. AND A.2 ...	...

LCO 3.8.5
LCO 3.8.10
LCO 3.8.6
LCO 3.8.4

3.8.5 D.C. SOURCES - SHUTDOWN

LCO 3.8.5 INSERT 3.8-13A (M3)

LIMITING CONDITION FOR OPERATION

LCO 3.8.10

3.8.2.2 As a minimum, one 125-volt D.C. bus fed from its battery and its associated full-capacity charger and with one of its associated crosstie breakers in the open position shall be OPERABLE. (LA14)

APPLICABILITY: MODES 5 and 6, During movement of irradiated fuel assemblies (M4)

ACTION:

LCO 3.8.5 ACTIONS NOTE INSERT 3.8-13B (L14)

a. With both of the crosstie breakers closed for the 125-Volt D.C. bus that is required to be OPERABLE and with the opposite unit operating (Modes 1, 2, 3, or 4), the shutdown unit's operable 125-Volt D.C. bus may energize the operating unit's inoperable 125-Volt D.C. bus having an inoperable charger ~~without a load restriction.~~ LCO 3.8.5 NOTE (A8)

LCO 3.8.5 COND A
LCO 3.8.5 COND B

~~b.~~ With both of the crosstie breakers closed for the 125-Volt D.C. bus that is required to be OPERABLE and with both units shutdown (Modes 5, 6, or defueled), the 125-Volt D.C. bus may energize the opposite unit's 125-Volt D.C. bus for up to 7 days provided items 1 and 2 below are satisfied. Otherwise open one of the crosstie breakers.

~~(1)~~ The opposite unit's bus load is restricted to:

Opposite Unit Battery Status	Operable Bus Battery Type	Load Restriction
Inoperable	C&D	200 Amps
~~Inoperable~~	~~Gould~~	~~63 Amps~~
~~OPERABLE~~	~~Either~~	~~None~~

(A12)

LCO 3.8.5 COND B

~~2~~ If a load restriction applies, then once per 12 hours verify that the opposite shutdown unit's bus loading will not exceed the load restriction.

LCO 3.8.10 COND A — LCO 3.8.5 COND A — one or more required DC electrical subsystems INSERT 3.8-13C (M3)

LCO 3.8.4

c. With ~~the~~ required 125-Volt D.C. bus inoperable, except for the allowances of ACTIONS (a) or (b) above immediately suspend all operations involving CORE ALTERATIONS, positive reactivity additions, or movement of irradiated fuel; initiate corrective action to restore the required bus to OPERABLE status ~~as soon as possible~~ and within 8 hours, depressurize and vent the Reactor Coolant System through at least a 2 square inch vent.

INSERT 3.8-13E (L15)

SURVEILLANCE REQUIREMENTS

4.8.2.2 The above required 125-volt D.C. bus fed from its battery and its associated charger shall be demonstrated OPERABLE per Specifications 4.8.2.1.1 and 4.8.2.1.2.

SR 3.8.5.1 INSERT 3.8-13D (L22)

INSERT 3.8-13D (L_{22})

SURVEILLANCE		FREQUENCY
SR 3.8.5.1	---NOTE--- The following SRs are not required to be performed: SR 3.8.4.6, SR 3.8.4.7, and SR 3.8.4.8. ------ For DC sources required to be OPERABLE, the following SRs are applicable: SR 3.8.4.1, SR 3.8.4.2, SR 3.8.4.3, SR 3.8.4.4, SR 3.8.4.5, SR 3.8.4.6, SR 3.8.4.7, SR 3.8.4.8.	In accordance with applicable SRs

INSERT 3.8-13E (L_{15})

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ...	... AND A.2.5 Declare affected Low Temperature Overpressure Protection feature(s) inoperable.	Immediately

A1

LCO 3.8.7
LCO 3.8.9

3.8 ELECTRICAL POWER SYSTEMS

3.8.9 ~~3/4.8.3 ONSITE POWER~~ DISTRIBUTION Systems - ~~OPERATING~~

LIMITING CONDITION FOR OPERATION

LCO 3.8.9

~~3.8.3.1~~ The following electrical busses shall be ~~energized in the specified manner~~ OPERABLE for the applicable unit:

a. A.C. ESF Busses consisting of:

UNIT 1	UNIT 2
Division 11	Division 21
1) 4160-Volt Bus 141,	1) 4160-Volt Bus 241
2) 480-Volt Bus 131X, and	2) 480-Volt Bus 231X, and
3) 480-Volt Bus 131Z.	3) 480-Volt Bus 231Z.

~~b. A.C. ESF Busses consisting of:~~

~~UNIT 1~~	~~UNIT 2~~
Division 12	Division 22
1) 4160-Volt Bus 142	1) 4160-Volt Bus 242
2) 480-Volt Bus 132X, and	2) 480-Volt Bus 232X, and
3) 480-Volt Bus 132Z.	3) 480-Volt Bus 232Z.

LCO 3.8.7 Four Instrument bus inverters shall be OPERABLE

LA14

~~c~~. 120-Volt A.C. Instrument Bus 111 for Unit 1 (Bus 211 for Unit 2) energized from its associated inverter connected to D.C. Bus 111 for Unit 1 (Bus 211 for Unit 2),

~~d~~. 120-Volt A.C. Instrument Bus 113 for Unit 1 (Bus 213 for Unit 2) energized from its associated inverter connected to D.C. Bus 111 for Unit 1 (Bus 211 for Unit 2),

~~e~~. 120-Volt A.C. Instrument Bus 112 for Unit 1 (Bus 212 for Unit 2) energized from its associated inverter connected to D.C. Bus 112 for Unit 1 (Bus 212 for Unit 2), and

~~f~~. 120-Volt A.C. Instrument Bus 114 for Unit 1 (Bus 214 for Unit 2) energized from its associated inverter connected to D.C. Bus 112 for Unit 1 (Bus 212 for Unit 2).

APPLICABILITY: MODES 1, 2, 3, and 4.

M7 — and 16 hours from discovery of failure to meet LCO

ACTION:

LCO 3.8.9 COND A ~~a~~. With one of the required divisions of A.C. ESF busses not fully energized, reenergize the division within 8 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

LCO 3.8.9 COND D

inoperable — LA14

LCO 3.8.9 COND B and LCO 3.8.9 COND D ~~b~~. With one A.C. instrument bus either not energized from its associated inverter, or with the inverter ~~not connected to its associated D.C. bus~~: 1) reenergize the A.C. instrument bus within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours, and 2) reenergize the A.C. instrument bus from its associated inverter ~~connected to its associated D.C. bus~~ within 24 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

A9 — LCO 3.8.7 COND A NOTE — INSERT 3.8-14B

LCO 3.8.7 COND A

LCO 3.8.7 COND B

OPERABLE — LA14

LCO 3.8.9 COND E — INSERT 3.8-14A — A15

Rev L

LCO 3.8.9

INSERT 3.8-14A (A_{15})

RAI 3.8.9-2

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Two electrical power distribution subsystems inoperable that result in a loss of safety function.	E.1 Enter LCO 3.0.3.	Immediately

LCO 3.8.7

RAI 3.8.1-22

INSERT 3.8-14B (A_9)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ...	A.1 ---------NOTE--------- Enter applicable Conditions and Required Actions of LCO 3.8.9. "Distribution Systems - Operating" with any instrument bus de-energized. ---------------------- ...	

LCO 3.8.8

INSERT 3.8-16D (L_{15})

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ...	A.2.5 Declare affected Low Temperature Overpressure Protection feature(s) inoperable.	Immediately

LCO 3.8.10

INSERT 3.8-16D (L_{15})

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ...	A.2.6 Declare affected Low Temperature Overpressure Protection feature(s) inoperable.	Immediately

LCO 3.8.10

INSERT 3.8-16E (M_8)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ...	... AND A.2.5 Declare associated required residual heat removal subsystem(s) inoperable and not in operation.	Immediately

INSERT 3.8-2D (A_2)

RAI 3.8.1-01

CONDITION	REQUIRED ACTION	COMPLETION TIME
G. Two DGs inoperable, and one or more buses with one or more required qualified circuits inoperable. OR One DG inoperable, one bus with two required qualified circuits inoperable, and the second bus with one or more required qualified circuits inoperable.	G.1 Enter LCO 3.0.3.	Immediately

INSERT 3.8-2E (A_9)

RAI 3.8.1-22

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. ...	------------NOTE------------ Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating," when Condition D is entered with no AC power source to a division. ---------------------------- ...	

SURVEILLANCE REQUIREMENTS

~~4.8.1.1.1~~ Each of the above required independent circuits between the offsite transmission network and the Onsite Class 1E Distribution System shall be:

SR 3.8.1.1 ~~a.~~ Determined OPERABLE at least once per 7 days by verifying correct breaker alignments, indicated power availability, and

SR 3.8.1.8 ~~b.~~ Demonstrated OPERABLE at least once per 18 months ~~during shutdown~~ (L26) by transferring manually unit power supply from the normal circuit to the alternate circuit.

~~4.8.1.1.2~~ Each diesel generator shall be demonstrated OPERABLE:

~~a.~~ At least once per 31 days ~~on a STAGGERED TEST BASIS~~ (L5) by:

SR 3.8.1.4 ~~1)~~ Verifying the fuel level in the day tank,

SR 3.8.3.1 ~~2)~~ Verifying the fuel level in the fuel storage tank,

SR 3.8.1.6 ~~3)~~ Verifying the fuel transfer pump starts and automatically (M4) transfers fuel from the storage system to the day tank,

SR 3.8.1.2, SR 3.8.1.7, SR 3.8.1.15 ~~4)~~ Verifying the diesel starts 58.8 Hz and (L13) from ambient condition and accelerates to at least ~~600 rpm~~ in less than or equal to 10 seconds.* The generator voltage and frequency shall be 4160 ~~± 420~~ +120 −210 (M11) volts and 60 ± 1.2 Hz ~~within 10 seconds* after the start signal~~. ~~The diesel generator shall be started for this test by using one of the following signals:~~

~~a) Manual, or~~

~~b) Simulated loss of ESF bus voltage by itself, or~~

~~c) Simulated loss of ESF bus voltage in conjunction with an ESF actuation test signal, or~~

~~d) An ESF actuation test signal by itself.~~ (LA2)

SR 3.8.1.3 NOTES 2, 3, 4 INSERT 3.8-3A (M9) (L5)

SR 3.8.1.3 ~~5)~~ Verifying the generator is synchronized, loaded to greater than or equal to 5500 kW ~~in accordance with the manufacturer's recommendations*~~ (L11) (SR 3.8.1.3 NOTE 1), operates with a load greater (L31) than or equal to ≥ 4950 kW and ≤ (L25) 5500 kW for at least 60 minutes, and

~~6) Verifying the diesel generator is aligned to provide standby power to the associated ESF busses.~~ (LA3)

SR 3.8.1.5 ~~b.~~ At least once per 31 days ~~and after each operation of the diesel where the period of operation was greater than or equal to 1 hour~~ (L7) by checking for and removing accumulated water from the day tanks;

SR 3.8.1.2 NOTE INSERT 3.8-3B

SR 3.8.1.7

*The diesel generator start (10 sec) from ~~ambient~~ normal standby conditions shall be performed ~~at least once per 184 days in these surveillance tests. All other engine starts for the purpose of this surveillance testing may be preceded by an engine prelube period and/or other warmup procedures recommended by the manufacturer so that mechanical stress and wear on the diesel engine is minimized.~~ (LA4)

REV C

RAI 3.8.1-11

INSERT 3.8-4A (A_3)

SURVEILLANCE		FREQUENCY
SR 3.8.1.9	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1 or 2. -- ...	
SR 3.8.1.10	-------------------NOTES------------------- 1. ... 2. This Surveillance shall not be performed in MODE 1 or 2. -- ...	
SR 3.8.1.11	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1, 2, 3 or 4. -- ...	
SR 3.8.1.14	-------------------NOTES------------------- 1. ... 2. This Surveillance shall not be performed in MODE 1 or 2. -- ...	

A1

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

SR Note Insert 3.8-5A L24

SR 3.8.1.10 3) Verifying the diesel generator capability to reject a load of ≥ 4950 kW and ≤ 5500 kW without tripping. The generator voltage shall not exceed 4784 volts during and following the load rejection, L25

SR 3.8.1.11 4) ~~Simulating~~ On an actual or simulated a loss of ESF bus voltage by itself, and: L9

a) Verifying de-energization of the ESF busses and load shedding from the ESF busses, and

b) Verifying the diesel starts on the auto-start signal, energizes the ESF busses with permanently connected loads within 10 seconds, energizes the auto-connected safe shutdown loads through the load sequencing timer and operates for greater than or equal to 5 minutes while its generator is loaded with the shutdown loads. After energization, the steady-state voltage and frequency of the ESF busses shall be maintained at 4160 ~~± 420~~ +420 -210 volts and 60 ± 1.2 Hz during this test. M11

L9

SR 3.8.1.12 L29 5) Verifying that on an actual or simulated ESF Actuation test signal ~~without loss of ESF bus voltages~~, the diesel generator starts on the auto-start signal and operates on standby for greater than or equal to 5 minutes. The generator voltage and frequency shall be 4160 ~~± 420~~ +420 -210 volts and 60 ± 1.2 Hz within 10 seconds after the auto-start signal; ~~the generator steady state generator voltage and frequency shall be maintained within these limits during this test.~~ M11 LA7

SR 3.8.1.14 6) ~~Simulating a~~ On an loss of ESF bus voltage in conjunction with an actual or simulated ESF Actuation test signal, and L9

a) Verifying deenergization of the ESF busses and load shedding from the ESF busses;

b) Verifying the diesel starts on the auto-start signal, energizes the ESF busses with permanently connected loads within 10 seconds, energizes the auto-connected emergency (accident) loads through the LOCA sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with emergency loads. After energization, the steady-state voltage and frequency of the ESF busses shall be maintained at 4160 ~~± 420~~ +420 -210 volts and 60 ± 1.2 Hz during this test; and M11

SR 3.8.1.13 L29 7) Verifying that all automatic diesel generator trips, except engine overspeed and generator differential, are automatically bypassed upon loss-of-voltage on the emergency bus concurrent with ~~a~~ an actual or simulated Safety Injection Actuation signal. L9

Rev L

RAI 3.8.1-21

INSERT 3.8-5A (L_{24})

SURVEILLANCE		FREQUENCY
SR 3.8.1.10	-------------------NOTES------------------- 1. Momentary transients above the voltage limit immediately following a load rejection do not invalidate this test 2. ... --- ...	

LCO 3.8.2

INSERT 3.8-9G (L_{15})

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ...	... AND A.2.5 Declare affected Low Temperature Overpressure Protection (LTOP) feature(s) inoperable.	 Immediately

A1 3.8 3.8.4 ~~3/4 8.2~~ D.C. SOURCES – OPERATING

Division 11 (21) and Division 12 (22)

power subsystems

LIMITING CONDITION FOR OPERATION

LCO 3.8.9 ~~3.8.2.1 As a minimum the following~~ D.C. electrical ~~sources~~ shall be OPERABLE:

LCO 3.8.9 ~~a.~~ 125-Volt D.C. Bus 111 ~~fed from Battery 111~~ for Unit 1 (Bus 211 ~~fed from Battery 211~~ for Unit 2) and its associated full capacity charger, and with one of its associated crosstie breakers in the open position, and
LCO 3.8.4

LA14

LCO 3.8.9 ~~b.~~ 125-Volt D.C. Bus 112 ~~fed from Battery 112~~ for Unit 1 (Bus 212 ~~fed from Battery 212~~ for Unit 2) and its associated full capacity charger and with one of its associated crosstie breakers in the open position.
LCO 3.8.4

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

LCO 3.8.4 COND A ~~a.~~ With one of the required 125-Volt D.C. buses inoperable due to its normal associated full capacity charger being inoperable, ~~operations may continue provided that~~ within 2 hours the inoperable bus and its associated battery are energized by the opposite unit's 125-Volt D.C. bus and its OPERABLE charger via the crosstie breakers and that within 24 hours the ~~inoperable bus and its~~ charger ~~are~~ restored to OPERABLE status. Otherwise be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.
LCO 3.8.4 COND E

L5

LCO 3.8.4 COND B ~~b.~~ With both of the crosstie breakers closed for a 125-Volt D.C. bus that is required to be OPERABLE and with both units operating (Modes 1, 2, 3, or 4), the 125-Volt D.C. bus may energize the opposite unit's inoperable 125-Volt D.C. bus having an inoperable charger without a load restriction. for 60 hours A19

LCO 3.8.4 COND C ~~c.~~ With both of the crosstie breakers closed for a 125-Volt D.C. bus that is required to be OPERABLE and with the opposite unit shutdown (Modes 5, 6, or defueled), the crosstie breakers may remain closed for up to 7 days provided items 1 and 2 below are satisfied. Otherwise open one of the crosstie breakers.

~~(1)~~ The shutdown unit's bus load is restricted to:

LCO 3.8.4 RA C.1 & NOTE

Shutdown Unit Battery Status	Operating Unit Battery Type	Load Restriction
Inoperable	AT&T	100 Amps
Inoperable	C & D	200 Amps
OPERABLE	Either	None

Rev. L

LCO 3.8.4 COND C ~~(2)~~ If a load restriction applies, then once per 12 hours verify that the shutdown unit's bus loading will not exceed the load restriction.

LCO 3.8.9 COND C
LCO 3.8.9 COND D ~~d.~~ With one of the required 125-Volt D.C. buses inoperable, except for the allowances of ACTIONS (a), (b), or (c) above, restore the inoperable bus to OPERABLE status within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
LCO 3.8.4 COND E
LCO 3.8.9 COND D

M7 INSERT 3.8-10A (3.8.9 only)

SURVEILLANCE REQUIREMENTS

SR 3.8.9.1 ~~4.8.2.1.1~~ Each D.C. bus shall be determined OPERABLE and energized from its battery at least once per 7 days by verifying correct breaker alignment.

A1 SURVEILLANCE REQUIREMENTS (Continued)

ITS 3.8.7-1

~~4.8.2.1.2 Each 125-volt battery bank and its associated charger shall be demonstrated OPERABLE:~~

L23 Insert 3.8-11B ~~a.~~ At least once per 7 days by verifying that:

SR 3.8.6.1 ~~1)~~ The parameters in Table 4.8-2 meet the Category A limits, and

SR 3.8.4.1 ~~2)~~ The total battery terminal voltage is greater than or equal to 130.5 volts (AT&T) 127.6 volts (C & D) on float charge. Rev. L

SR 3.8.6.2 ~~b.~~ At least once per 92 days and within 7 days after a battery discharge with battery terminal voltage below 110 volts, or battery overcharge with battery terminal voltage above 145 volts, by verifying that:

~~1)~~ The parameters in Table 4.8-2 meet the Category B limits,

SR 3.8.4.2 ~~2)~~ There is no visible corrosion at either terminals or connectors, or the connection resistance of these items is less than equal to or L30 150 x 10^-6 ohm*, ~~and~~ LA9

SR 3.8.6.3 ~~3)~~ The average electrolyte temperature of ~~all connected~~ representative cells is above 60°F. every 92 days L19

~~c.~~ At least once per 18 months by verifying that:

SR 3.8.4.3 ~~1)~~ The cells, cell plates, and battery racks show no visual indication of physical damage or abnormal deterioration, that could degrade battery performance A4

SR 3.8.4.4 ~~2)~~ The cell-to-cell and terminal connections are clean, tight, and coated with anticorrosion material,

SR 3.8.4.5 ~~3)~~ The resistance of each cell-to-cell and terminal connection is less than or equal to 150 x 10^-6 ohm*, and LA9

SR 3.8.4.6 ~~4)~~ The battery charger will supply a load equal to the manufacturer's rating for at least 8 hours. Insert 3.8-11A A3

SR 3.8.4.7 ~~d.~~ At least once per 18 months, ~~during shutdown,~~ by verifying that the battery capacity is adequate to supply and maintain in OPERABLE status ~~all of~~ the ~~actual or simulated~~ required emergency loads for the design duty cycle when the battery is subject to a battery service test;

LA9

* Obtained by subtracting the normal resistance of: 1) the cross room rack connector (C & D only: 400 x 10^-6 ohm, typical) and 2) the bi-level rack connector (both AT&T and C & D: 50 x 10^-6 ohm, typical); from the measured cell-to-cell connection resistance. Rev. L

LCO 3.8.4

INSERT 3.8-11A (A_3)

Rev C

SURVEILLANCE		FREQUENCY
SR 3.8.4.7	-------------------NOTES------------------- 1. ... 2. This surveillance shall not be performed in MODE 1, 2, 3, or 4. ---	

INSERT 3.8-11B (L_{23})

Rev C

RAI 3.8.7-1

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Cell Parameters

LCO 3.8.6 Battery cell parameters for Division 11(21) and Division 12(22) batteries shall be within limits of Table 3.8.6-1.

APPLICABILITY: When associated DC electrical power subsystems are required to be OPERABLE.

ACTIONS

--NOTE--
Separate Condition entry is allowed for each battery.

A1

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.8.4.8 ~~e.~~ At least once per 60 months, during shutdown, by verifying that the battery capacity is at least 95% (AT&T) 80% (C & D) of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test. The modified

SR 3.8.4.7 Note 1 performance discharge test ~~and the performance discharge test~~ may be performed in lieu of the battery service test required by Specification 4.8.2.1.2d.; M13   Rev L

SR 3.8.4.8 ~~f.~~ At least once per 12 months* during shutdown, by giving performance discharge tests or modified performance discharge tests of battery capacity to any battery that shows signs of degradation or has reached 85% of the service life expected for the application. Degradation is indicated when the battery capacity drops more than 5% (AT&T) 10% (C & D) of rated capacity from its capacity on the previous performance test or modified performance test, or is below 100% (AT&T) 90% (C & D) of the manufacturer's rating. LA.5

L32 or equal to   Rev L

SR 3.8.4.8 Frequency * Testing at a 2 year interval is acceptable as long as the battery capacity is greater than or equal to 100% of rated capacity and the battery shows no signs of degradation.

LCO 3.8.4

INSERT 3.8-11aA (A_3)

SURVEILLANCE		FREQUENCY
SR 3.8.4.8	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. -- ...	

(A1)

TABLE ~~4.8-2 (AT&T)~~

BATTERY SURVEILLANCE REQUIREMENTS (cell parameters)

PARAMETER	CATEGORY A(1) LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B(2) LIMITS FOR EACH CONNECTED CELL	Category C ALLOWABLE(3) VALUE FOR EACH CONNECTED CELL
Electrolyte Level	>Minimum level indication mark, and ≤ ¼" above maximum level indication mark (a)	>Minimum level indication mark, and ≤ ¼" above maximum level indication mark (a)	Above top of plates, and not overflowing
Float Voltage	≥ 2.18 volts (AT&T) ≥ 2.13 volts (C&D)	≥ 2.18 volts ~~(6)~~ (b) (AT&T) ≥ 2.13 volts(b) (C&D)	> 2.14 volts (AT&T) > 2.07 volts (C&D)
Specific Gravity ~~(4)~~ (c)(d) (L6)	≥ 1.285 ~~(5)~~ (AT&T) ≥ 1.200 (C&D)	≥ 1.280 (AT&T) ≥ 1.195 (C&D) Average of all connected cells > 1.290 (AT&T) > 1.205 (C&D)	Not more than 0.020 below the average of all connected cells Average of all connected cells ≥ 1.280 ~~(5)~~ (AT&T) ≥ 1.195 (C&D)

TABLE NOTATIONS

(and once per 7 days thereafter) (M10)

CONDA RA A.2 & A.3 ~~(1)~~ For any Category A parameter(s) outside the limit(s) shown, the battery may be considered OPERABLE provided that within 24 hours all the Category B measurements are taken and found to be within their allowable values, and provided all Category A and B parameter(s) are restored to within limits within ~~the next 6~~ days. (31) (L23)

CONDA RA A.2 & A.3 ~~(2)~~ For any Category B parameter(s) outside the limit(s) shown, the battery may be considered OPERABLE provided that the Category B parameters are within their allowable values and provided the Category B parameter(s) are restored to within limits within 7 days. (31)

COND E ~~(3)~~ Any Category ~~B~~ C parameter not within its allowable value indicates an inoperable battery.

c ~~(4)~~ Corrected for electrolyte temperature and level.

d ~~(5)~~ Or battery charging current is less than 2 amps when on ~~charge~~ float. (AT&T) 3 amps (C&D) INSERT 3.8-12B (M12)

b ~~(6)~~ Corrected for average electrolyte temperature.

(L6)

footnote (a) ← INSERT 3.8-12A

(L23)

COND A RA A.1 ← INSERT 3.8-12C

... (AT&T). Corrected for electrolyte temperature (C&D).

(L6) Level correction (AT&T) is not required when battery charging is < 2 amps when on float charge.

LCO 3.8.6

INSERT 3.8-12A (L_6)

(a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum during equalizing charges provided it is not overflowing.

INSERT 3.8-12B (M_{12})

... is acceptable for meeting specific gravity limits following a battery recharge, for a maximum of 7 days. When charging current is used to satisfy specific gravity requirements, specific gravity of each connected cell shall be measured prior to expiration of the 7 day allowance.

INSERT 3.8-12C (L_{23})

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more batteries with one or more battery cell parameters not within Category A or B limits.	A.1 Verify pilot cell electrolyte level and float voltage meet Table 3.8.6-1 Category C limits. AND A.2 ...	...

See Braidwood CTS p. 3/4 8-12

A1

TABLE 4.8-2 (C & D)

BATTERY SURVEILLANCE REQUIREMENTS

PARAMETER	CATEGORY A[1] LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B[2] LIMITS FOR EACH CONNECTED CELL	ALLOWABLE[3] VALUE FOR EACH CONNECTED CELL
Electrolyte Level	>Minimum level indication mark, and ≤ ¼" above maximum level indication mark	>Minimum level indication mark, and ≤ ¼" above maximum level indication mark	Above top of plates, and not overflowing
Float Voltage	≥ 2.13 volts	≥ 2.13 volts[6]	> 2.07 volts
Specific Gravity[4]	≥ 1.200[5]	≥ 1.195	Not more than 0.020 below the average of all connected cells
		Average of all connected cells > 1.205	Average of all connected cells ≥ 1.195[5]

TABLE NOTATIONS

(1) For any Category A parameter(s) outside the limit(s) shown, the battery may be considered OPERABLE provided that within 24 hours all the Category B measurements are taken and found to be within their allowable values, and provided all Category A and B parameter(s) are restored to within limits within the next 6 days.

(2) For any Category B parameter(s) outside the limit(s) shown, the battery may be considered OPERABLE provided that the Category B parameters are within their allowable values and provided the Category B parameter(s) are restored to within limits within 7 days.

(3) Any Category B parameter not within its allowable value indicates an inoperable battery.

(4) Corrected for electrolyte temperature.

(5) Or battery charging current is less than 3 amps when on charge.

(6) Corrected for average electrolyte temperature.

Rev. L

3.8.5 **D.C. SOURCES - SHUTDOWN**

A1

LCO 3.8.10

LCO 3.8.4

LCO 3.8.10

LIMITING CONDITION FOR OPERATION

LCO 3.8.5 INSERT 3.8-13A — M3

3.8.2.2 As a minimum, one 125-volt D.C. bus fed from its battery and its associated full-capacity charger and with one of its associated crosstie breakers in the open position shall be OPERABLE. — LA14

APPLICABILITY: MODES 5 and 6, During movement of irradiated fuel assemblies — M4

ACTION:

LCO 3.8.5 ACTIONS Note INSERT 3.8-12B — L14

~~a.~~ With both of the crosstie breakers closed for the 125-Volt D.C. bus that is required to be OPERABLE and with the opposite unit operating (Modes 1, 2, 3, or 4), the shutdown unit's operable 125-Volt D.C. bus may energize the operating unit's inoperable 125-Volt D.C. bus having an inoperable charger without a load restriction. — A8

LCO Note

LCO 3.8.5 COND A

LCO 3.8.5 COND B

~~b.~~ With both of the crosstie breakers closed for the 125-Volt D.C. bus that is required to be OPERABLE and with both units shutdown (Modes 5, 6, or defueled), the 125-Volt D.C. bus may energize the opposite unit's 125-Volt D.C. bus for up to 7 days provided items 1 and 2 below are satisfied. Otherwise open one of the crosstie breakers.

~~(1)~~ The opposite unit's bus load is restricted to:

Opposite Bus Battery Status	Operable Bus Battery Type	Load Restriction
Inoperable	AT&T	100 Amps
Inoperable	C & D	200 Amps
OPERABLE	Either	None

LCO 3.8.5 COND B ~~(2)~~ If a load restriction applies, then once per 12 hours verify that the opposite shutdown unit's bus loading will not exceed the load restriction.

LCO 3.8.5 COND A → INSERT 3.8-13C — M3

LCO 3.8.10 COND A

LCO 3.8.4

~~c.~~ With ~~the~~ required 125-Volt D.C. bus inoperable, ~~except for the allowances of ACTIONS (a) or (b) above,~~ immediately suspend all operations involving CORE ALTERATIONS, positive reactivity additions, or movement of irradiated fuel; initiate corrective action to restore the required bus to OPERABLE status ~~as soon as possible;~~ and within 8 hours, depressurize and vent the Reactor Coolant System through at least a 2 square inch vent.

INSERT 3.8-12E — L15

SURVEILLANCE REQUIREMENTS

SR 3.8.5.1 INSERT 3.8-13D — L22

4.8.2.2 The above required 125-volt D.C. bus fed from its battery and its associated charger shall be demonstrated OPERABLE per Specifications 4.8.2.1.1 and 4.8.2.1.2.

INSERT 3.8-13D (L_{22})

SURVEILLANCE		FREQUENCY
SR 3.8.5.1	-------------------NOTE------------------- The following SRs are not required to be performed: SR 3.8.4.6, SR 3.8.4.7, and SR 3.8.4.8. ---	
	For DC sources required to be OPERABLE, the following SRs are applicable: SR 3.8.4.1, SR 3.8.4.2, SR 3.8.4.3, SR 3.8.4.4, SR 3.8.4.5, SR 3.8.4.6, SR 3.8.4.7, SR 3.8.4.8.	In accordance with applicable SRs

Rev C

Rev C

INSERT 3.8-13E (L_{15})

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ...	...	
	AND	
	A.2.5 Declare affected Low Temperature Overpressure Protection feature(s) inoperable.	Immediately

Rev C

A1

3.8 ELECTRICAL POWER SYSTEMS

3.8.9 ~~3/4.8.3 ONSITE POWER~~ DISTRIBUTION Systems - Operating

~~OPERATING~~

LIMITING CONDITION FOR OPERATION

LCO 3.8.9 ~~3.8.3.1~~ The following electrical busses shall be ~~energized in the specified manner~~ OPERABLE for the applicable unit:

~~a.~~ A.C. ESF Busses consisting of:

UNIT 1	UNIT 2
Division 11	Division 21
1) 4160-Volt Bus 141,	1) 4160-Volt Bus 241
2) 480-Volt Bus 131X.	2) 480-Volt Bus 231X.

~~b. A.C. ESF busses consisting of:~~

~~UNIT 1~~	~~UNIT 2~~
Division 12	Division 22
1) 4160-Volt Bus 142	1) 4160-Volt Bus 242
2) 480-Volt Bus 132X.	2) 480-Volt Bus 232X.

LCO 3.8.7 four Instrument bus inverters shall be OPERABLE

LA14

~~c.~~ 120-Volt A.C. Instrument Bus 111 for Unit 1 (Bus 211 for Unit 2) energized from its associated inverter connected to D.C. Bus 111 for Unit 1 (Bus 211 for Unit 2),

~~d.~~ 120-Volt A.C. Instrument Bus 113 for Unit 1 (Bus 213 for Unit 2) energized from its associated inverter connected to D.C. Bus 111 for Unit 1 (Bus 211 for Unit 2),

~~e.~~ 120-Volt A.C. Instrument Bus 112 for Unit 1 (Bus 212 for Unit 2) energized from its associated inverter connected to D.C. Bus 112 for Unit 1 (Bus 212 for Unit 2), and

~~f.~~ 120-Volt A.C. Instrument Bus 114 for Unit 1 (Bus 214 for Unit 2) energized from its associated inverter connected to D.C. Bus 112 for Unit 1 (Bus 212 for Unit 2).

APPLICABILITY: MODES 1, 2, 3, and 4.

and 16 hours from discovery of failure to meet LCO — M7

ACTION:

LCO 3.8.9 COND A ~~a.~~ With one of the required divisions of A.C. ESF busses not fully energized, reenergize the division within 8 hours or be in at least

LCO 3.8.9 COND D HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

inoperable — LA14

LCO 3.8.9 COND B and LCO 3.8.9 COND D ~~b.~~ With one A.C. instrument bus ~~either~~ not energized from its associated inverter, or with the inverter ~~not connected to its associated D.C. bus~~: 1) reenergize the A.C. instrument bus within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours, and 2) reenergize the A.C. instrument bus from its associated inverter ~~connected to its associated D.C. bus~~ within 24 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

A9 — LCO 3.8.7 COND A NOTE — INSERT 3.8-14B

LCO 3.8.7 COND A

LCO 3.8.7 COND B

OPERABLE — LA14

LCO 3.8.9 COND E — INSERT 3.8-14A — A15

REV L

LCO 3.8.9

RAI 3.8.9-2

INSERT 3.8-14A (A_{15})

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Two electrical power distribution subsystems inoperable that result in a loss of safety function.	E.1 Enter LCO 3.0.3.	Immediately

LCO 3.8.7

RAI 3.8.1-22

INSERT 3.8-14B (A_9)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ...	A.1 --------NOTE-------- Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating" with any instrument bus de-energized. --------------------- ...	

LCO 3.8.8

INSERT 3.8-16D (L_{15})

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ...	A.2.5 Declare affected Low Temperature Overpressure Protection feature(s) inoperable.	Immediately

LCO 3.8.10

INSERT 3.8-16D (L_{15})

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ...	A.2.6 Declare affected Low Temperature Overpressure Protection feature(s) inoperable.	Immediately

INSERT 3.8-16E (M_8)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ...	... AND A.2.5 Declare associated required residual heat removal subsystem(s) inoperable and not in operation.	Immediately

RAI 3.8.1-22

A_9 ITS LCO 3.8.1, Condition D, ITS LCO 3.8.2, Condition A, and ITS LCO 3.8.7, Condition A, (corresponding to CTS LCO 3.8.1.1, Action b, CTS LCO 3.8.1.2, Action, and CTS LCO 3.8.3.1, Action b, respectively), have been modified by a Note requiring entry into applicable Conditions and Required Actions of ITS LCO 3.8.9 and ITS LCO 3.8.10 (Distribution Systems) with one required division de-energized. This Note is necessary because power sources (AC, DC and inverters) are considered a support system to the Distribution System; therefore, ITS LCO 3.0.6 would allow taking Actions for the AC Sources only. However, in the case of an inoperable electrical power source such that a distribution system was de-energized, additional Actions may be required to assure continued safe operation. Rather than specify those additional Actions in the sources Specifications, direction is provided to apply the Actions of the supported Distribution System. This is an administrative change with no impact on safety because the new requirement is consistent with a reasonable interpretation of the CTS.

A_{10} CTS LCO 3.8.1.2 Actions detail the requirements for less than the required AC electrical power sources Operable. ITS LCO 3.8.2 has separated the Actions into two Conditions: Condition A addresses one required qualified circuit inoperable; and Condition B addresses one required DG inoperable. Reformatting these requirements provides greater clarity for the TS user. This change is consistent with NUREG-1431.

A_{11} ITS SRs 3.8.3.1 and 3.8.3.3 are provided in Insert 3.8-4B for completeness, even though they are CTS SRs appropriately indicated (refer to CTS SRs 4.8.1.1.2.a.2) and 4.8.1.1.2.c). This is an administrative presentation issue only. ITS SR 3.8.3.2 refers fuel oil property testing to an Administrative Controls section Program. The details of the CTS conversion to these ITS Program requirements are addressed in Section 5.0.

A_{12} (Byron Only) Byron CTS LCOs 3.8.2.1 and 3.8.2.2, associated SRs, and Table 4.8-2, Reference C&D and Gould batteries. Byron has only C&D batteries. Therefore all references to Gould batteries have been deleted from ITS.

A_{13} Not used.

A_{14} CTS LCO 3.8.2.1, Action b, states that with both units operating (MODE 1, 2, 3, or 4) and the DC bus crosstie breakers closed to supply power to a DC bus having an inoperable charger, there are no load restrictions imposed. For the same situation, ITS LCO 3.8.4 Required Action B.1 requires that at least one crosstie breaker between the crosstied divisions be opened, within a Completion Time of 60 hours. The 60 hours is based on the 24 hours the unit with the inoperable charger has to restore the inoperable charger (CTS Action a) and the 36 hours the unit with the inoperable charger has to reach Cold Shutdown if the charger is not restored to OPERABLE status (CTS Action a). At the point in time when the unit with the inoperable charger reaches Cold Shutdown, CTS Action b would no longer apply and CTS Action c would be applicable to the unit without the inoperable charger. Therefore, the ITS LCO 3.8.4 Condition B Completion Time of 60 hours is a presentation preference only that facilitates TS usage.

RAI 3.8.9-2

A_{15} CTS LCO 3.8.3.1 allows restoration times for one division of AC ESF buses (8 hours - Action a), and one AC instrument bus (2 hours - Action b) de-energized. ITS LCO 3.8.9, Conditions A and B, allow one AC electrical power distribution subsystem to be inoperable for the same times, respectively. ITS LCO 3.8.9 Condition E is added to require that if two electrical power distribution subsystems are inoperable, resulting in a loss of function, enter ITS LCO 3.0.3 immediately. The addition of Condition E, along with ITS LCO 3.0.6, Safety Function Determination Program, ensure that with the loss of any electrical power distribution system no loss of function will occur without the appropriate action. This is believed to be the intent of CTS since no action is provided for two subsystems inoperable. This change is consistent with NUREG-1431.

TECHNICAL CHANGES - MORE RESTRICTIVE (M)

M_1 CTS SR 4.8.1.1.2.a.3) requires the verification of fuel oil transfer from the storage tank to the day tank. This CTS SR is not specific as to whether the transfer is performed manually, or proving the automatic transfer capability. ITS SR 3.8.1.6 specifically requires the automatic fuel oil transfer capability be verified. This represents a more restrictive requirement, which reflects the assumed safety basis of the system's design. Therefore this change will not result in any negative impact on safety.

| M_2 Not used.

M_{11} As a result of the ComEd Dresden Nuclear Power Station Electrical Distribution System Functional Inspection (EDSFI), setpoint calculations were performed to determine the adequacy of the second level (degraded) undervoltage setpoints. These calculations resulted in new, more conservative (i.e., higher), setpoints for the second level undervoltage relays. The new setpoints are set to ensure that equipment downstream of the 4.16 kV buses (i.e., at the 480 VAC and 120 VAC levels) will receive sufficient voltage levels in order to operate satisfactorily in the performance of their safety related functions during a transient. In support of these more conservative settings, the emergency diesel generator's minimum acceptable voltage level requires being raised to a value of 3950 VAC. This higher value is within the capabilities of the Byron/Braidwood equipment, and will ensure that in the event of a Loss of Offsite Power, the necessary low voltage sensitive components will operate as required. Increasing the minimum acceptable voltage from 3740 VAC to 3950 VAC represents a more restrictive requirement, consistent with plant specific analyses and current procedural controls. Therefore this change will not result in any negative impact on safety.

Rev C

Rev L

M_{12} CTS Table 4.8-2, footnote (5) applies to CTS Category A limits and Category B allowable limits for each connected cell and states, "Or battery charging current is less than 2 amps when on charge." ITS revises this footnote by adding the statement, "... is acceptable for meeting specific gravity limits following a battery recharge, for a maximum of 7 days. When charging current is used to satisfy specific gravity requirements, specific gravity of each connected cell shall be measured prior to expiration of the 7 days." ITS places additional restrictions over CTS in that the battery charging current when on float charge is acceptable for meeting the specific gravity limits, only when following a battery recharge and for a maximum of 7 days. Placing the restrictions of only after the battery recharge and the 7 days limitation, constitutes a more restrictive change.

Rev C

M_{13} (Braidwood only) CTS SR 4.8.2.1.2.e states, "The modified performance discharge test and the performance discharge test may be performed in lieu of the battery service test required by Specification 4.8.2.1.2.d." ITS SR 3.8.4.7 Note 1 states, "The modified performance discharge test in SR 3.8.4.8 may be performed in lieu of the service test in SR 3.8.4.7." This is considered to be a more restrictive change, since it is disallowing the performance discharge test to be performed in lieu of the battery service test. By letter dated January 14, 1998, ComEd requested a change to CTS to allow replacement of the 125 VDC AT&T batteries with new C&D batteries. NRC letter dated August 18, 1998 issued Amendment 94 for Braidwood for this change. In the proposed License Amendment Request, removing the reference to AT&T for the modified performance discharge test and removing the reference to Gould for the performance discharge test in CTS SR 4.8.2.1.2.e allowed the modified and normal performance discharge test to be performed in lieu of the service test for both the C&D and AT&T batteries. Allowing only the modified performance discharge test to be performed in lieu of the service test is consistent with both IEEE-450, 1995 and NUREG-1431.

RAI 3.8.1-12

LA_6 CTS SR 4.8.1.1.2.f.7) requires the first 2 hours of the 24-hour DG load run be at a loading "equivalent to the 2-hour rating of 6050 kW" with a footnote allowing that "instantaneous loads of 6050 kW (+0, -150) are acceptable as equivalent to the 2-hour rating." ITS simply states an acceptable load range (i.e., ≥ 5775 kW and ≤ 6050 kW); relocating the remaining discussion to the ITS Bases. The requirements of ITS LCO 3.8.1 and the associated Surveillance Requirements for the DGs are adequate to ensure the DGs are maintained Operable. As such, these relocated details are not required to be in the Technical Specifications to provide adequate protection of the public health and safety. The relocation of this information maintains the consistency with NUREG-1431. Any change to this descriptive information will be made in accordance with the Bases Control Program described in ITS Section 5.5.

LA_7 CTS SR 4.8.1.1.2.f.7) requires the 24-hour DG run be associated with a 10 second start and confirmation of running voltage and frequency. CTS SR 4.8.1.1.2.f.5) requires the DG to start on an ESF Actuation test signal and confirmation of running voltage and frequency. Since operating voltage and frequency is stated and verified in other Surveillances, explicitly repeating those requirements in the 24-hour run surveillance and the auto-start surveillance is not necessary. The requirements of ITS LCO 3.8.1 and the associated Surveillance Requirements for the DGs are adequate to ensure the DGs are maintained Operable. As such, these relocated details are not required to be in the Technical Specifications to provide adequate protection of the public health and safety. These details are to be relocated to the TRM. Relocating these details to the TRM maintains the consistency with NUREG-1431. Any changes to these details will be made in accordance with 10 CFR 50.59.

LA_8 CTS SR 4.8.1.1.2.f.8) specifies the maximum auto-connected load to each DG. This design detail for the autoconnected loads is relocated to the UFSAR. This detail is not necessary to ensure the Operability of the DGs. The definition of Operability, and the 10 CFR 50.59 approval process for design changes, are adequate to ensure the DG loading is maintained within acceptable design limits. As such, this relocated requirement is not required to be in the Technical Specifications to provide adequate protection of the public health and safety. Changes to the UFSAR are controlled by 10 CFR 50.59. In addition, any change to the loads placed on the DG will be controlled by 10 CFR 50.59 (a design change is required to change the actual loads).

LA_9 CTS SR 4.8.2.1.2.b.2 and SR 4.8.2.1.2.c.3 footnote states that connection resistance is obtained by subtracting the normal resistance of the cross room rack connector and the bi-level rack connector from the measured cell-to-cell connection resistance. This detail is relocated to the ITS Bases. References to "typical values" for battery cross room rack and battery bi-level rack normal resistances have been deleted. This detail is not directly related to the OPERABILITY of the battery. As such, the relocated requirement is not required to be in the TS to provide adequate protection of the public health and safety. The relocation of this information maintains consistency with NUREG-1431. Any change to this requirement will be made in accordance with the Bases Control Program described in ITS Section 5.5.

LA_{10} CTS SRs 4.8.1.1.2.i and 4.8.1.1.2.j require verification of the ability to cross-tie the "A" DGs to the respective opposite unit's 4 kV ESF bus. This capability is not a credited function for any assumed design basis event, and is not needed to preclude any new or different accident (refer to DOC "L_2" for a related discussion). In addition, these CTS SRs do not represent real life actual conditions. In the event of a loss of offsite power (LOOP) on Unit 2, crosstieing Unit 1 'A' DG to bus 241 (Unit 2) would not be performed via synchronizing the 1A DG to bus 241. In the event of a LOOP on Unit 2, both Unit 2 ESF buses would be de-energized, and therefore the crosstie would be to a dead Unit 2 bus. This Surveillance is to be relocated to the TRM. This Surveillance confirms the ability to power a unit-specific auxiliary feedwater pump from the opposite-unit DG, which may be needed in certain station blackout scenarios. However, this cross-tie ability is not directly related to the Operability of a unit's AC power sources, or to the Operability of a unit's auxiliary feedwater pump. As such, this relocated requirement is not required to be in the Technical Specifications to provide adequate protection of the public health and safety. Relocating this surveillance maintains consistency with NUREG-1431. Any change to this requirement will be made in accordance with 10 CFR 50.59.

RAI 3.8.1-14

LA_{11} CTS SR 4.8.1.1.2.f.13), to verify the DG lockout features prevent DG starting only when required, is to be relocated to the TRM. If a DG lockout feature prevents the DG from operating during an accident, this will still be identified during the LOOP, LOCA, and LOCA/LOOP DG Surveillances (ITS SRs 3.8.1.11, 3.8.1.12, and 3.8.1.19), which are currently performed at the same periodicity as the "lockout" Surveillance. Since the condition requiring the lockout is one that reflects DG inoperability, failure of a lockout feature to properly lockout a DG does not, in itself, impact DG Operability. This requirement is not necessary to ensure the Operability of the DGs. The requirements of ITS LCO 3.8.1 and the associated Surveillance Requirements are adequate to ensure the DGs are maintained Operable. As such, this requirement is not required to be in the TS to provide adequate protection of the public health and safety. Relocating this surveillance maintains consistency with NUREG-1431. Any change to this requirement will be made in accordance with 10 CFR 50.59.

LA_{12} CTS SR 4.8.1.1.2.h details for the method for cleaning the diesel fuel storage tank (i.e., "draining," "removing the accumulated sediment," and "using a sodium hypochlorite solution"), and the requirement to perform a pressure test on the DG fuel oil system piping, are to be relocated to the TRM. The CTS details regarding the methods of tank cleaning reflect a preventative type of SR. Sediment in the tank, or failure to perform this SR, does not necessarily result in an inoperable storage tank or DG. Preventative maintenance SRs generally have been relocated from the TS and allowed to be under licensee control, as they are not necessary for assuring Operability. The pressure test of the fuel oil system is covered by ASME Code Section XI Article IWD-5000. As such, this requirement is not required to be in the TS to provide adequate protection of the public health and safety. Relocating this surveillance maintains consistency with NUREG-1431, as modified by TSTF-2, Revision 1. Any change to this requirement will be made in accordance with 10 CFR 50.59.

Rev J

LA_{13} CTS LCO 3.8.1.2 Actions on the inoperability of a required AC source, and CTS LCO 3.8.3.2 Actions for inoperable buses, require suspension of "crane operations with loads over the spent fuel pool." "Crane operation" issues are relocated from the CTS (e.g., CTS LCO 3.9.7, "Crane Travel - Spent Fuel Storage Facility"), based on the administrative controls on heavy loads. Therefore, the Actions associated with crane operation following a loss of power sources are to be relocated to the TRM consistent with other heavy-loads issues. The design features and system operation are also described in the UFSAR. As such, these requirements are not required to be in the TS to provide adequate protection of the public health and safety. The relocation of these requirements maintains consistency with NUREG-1431. Any change to these requirements will be made in accordance with 10 CFR 50.59.

LA_{14} CTS LCOs 3.8.2.1, 3.8.2.2, 3.8.3.1, and 3.8.3.2 provide details defining the Operability of the DC electric sources, Instrument Buses and the Instrument Bus inverters. These details consist of design features which are adequately detailed and controlled in the UFSAR and ITS Bases. The details relating to system design, function, and Operability are not necessary in the ITS LCO. The definition of Operability suffices. As such, these details are not required to be in the TS to provide adequate protection of the public health and safety. The relocation of these details maintains the consistency with NUREG-1431. Any change to these details will be made in accordance with the Bases Control Program described in ITS Section 5.5, and in accordance with 10 CFR 50.59 for UFSAR revisions.

L_3 With one DG inoperable, CTS LCO 3.8.1.1, Action c, requires all features that depend on the Operable DG to be Operable. If this requirement can not be met, the CTS Action requires a shutdown be commenced within 2 hours. ITS LCO 3.8.1 Required Action B.2 provides two relaxations:

RAI 3.8.1-10

1. Rather than a plant shutdown requirement, the ITS requires that the feature(s) supported by the inoperable DG be declared inoperable if its redundant counterpart is inoperable. This provides for actions appropriate to the actual inoperabilities, which may avoid an immediate shutdown and the risks associated with a plant shutdown. For example, if the "B" DG is inoperable in conjunction with the "A" hydrogen recombiner, CTS Actions would require a shutdown to commence within 2 hours, while ITS would allow entering Actions for both hydrogen recombiners inoperable, thereby providing for the complete 72 hours to restore the DG to Operable status. Not requiring a unit shutdown is acceptable since Required Action B.2 is intended to address the loss of safety function in the event of a loss of offsite power. These features are designed with redundant safety related trains. Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has an inoperable DG. In this condition, the remaining OPERABLE DG is adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function may not have been lost.

RAI 3.8.1-10

2. ITS allows 4 hours (versus 2 hours) to commence the specified action. This extension provides additional time to restore either the inoperable DG or the inoperable feature, and is considered a reasonable time to effect repairs prior to requiring a forced shutdown of the unit. This extension is acceptable since it takes into account the OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during the period.

RAI 3.8.1-10

L_4 CTS LCO 3.8.1.1, Action b, for one offsite circuit and one DG inoperable, requires demonstration of the remaining Operable DG within 8 hours, even though this condition requires commencing a plant shutdown in 12 hours if one of the sources is not returned to Operable status. Requiring determination of the remaining DG's Operability within the restoration time may detract from the activities necessary to complete the restoration. The additional 4 hours that could be gained before a required shutdown would commence if it was found that the remaining DG was inoperable, is not a significant impact on safety since this flexibility will increase the likelihood completing the activities necessary to restore one source to Operable status. Furthermore, ITS LCO 3.8.1, Required Action B.3.1 and B.3.2 continues to require 24 hours for the DG Operability demonstration whether a DG alone is inoperable, or is inoperable in conjunction with an inoperable qualified circuit. This change is consistent with Generic Letter 84-15 and NUREG-1431.

RAI 3.8.1-4

L_8 CTS SR 4.8.1.1.2.f.2) requires the DG to reject the equivalent of its single largest load with acceptance criteria of both transient and steady state generator voltage and frequency response. ITS SR 3.8.1.9 also requires both transient and steady state response for this test, but does not impose a transient voltage limit. This is consistent with recommendations of Regulatory Guide 1.9, in that the major concern during the loss of the single largest load is the loss of the DG due to overspeed tripping. The DG frequency (speed response) is more exaggerated than the voltage response, and is more limiting in maintaining the continued Operability of the DG. Therefore, meeting the frequency acceptance criteria and eliminating the transient voltage criteria continues to provide adequate testing of the DG response.

L_9 CTS SRs 4.8.1.1.2.f.4), 4.8.1.1.2.f.5), 4.8.1.1.2.f.6), 4.8.1.1.2.f.6)c) and 4.8.1.1.2.f.10) are revised to add the phrase "an actual or simulated," in Reference to the test signals used to actuate the DGs (in SRs 3.8.1.11, 3.8.1.12, 3.8.1.19, 3.8.1.13, and 3.8.1.17, respectively). The CTS wording requires "simulating" or that a "test signal" or "simulated...signal" be used, which does not allow for an actual signal to be applied in meeting the Specification. The revised wording will allow the plant to take credit for an actual signal to initiate the protective function being surveilled, as well as a simulated signal. Therefore, this change is less restrictive. This clarification is consistent with NUREG-1431.

L_{10} CTS SR 4.8.1.1.2.f.11) requires testing to ensure that the DG day tank cross connect lines are unobstructed, such that the fuel transfer pump transfers fuel from its storage tank to the day tank of each DG (the procedure involves pumping to the associated day tank with the cross connect line unisolated and verifying a corresponding increase in both day tanks' levels). No analyzed event credits the use of this cross connect for DG operation, and during normal operation, this line is required to be closed to maintain DG separation. Since no DG Operability criteria is affected by the function of this cross connect line, this verification can be eliminated with no impact on safety.

L_{11} CTS SRs 4.8.1.1.2.a.5) and 4.8.1.1.2.f.7) require a specific load range for DG testing. ITS SRs 3.8.1.3, 3.8.1.14, and 3.8.1.15 are modified by a Note that allows that "momentary transients outside the load range do not invalidate this test." Momentary transients may occur for various reasons during loading, unloading, and steady state operation of the DG. However, these transients are quickly restored to within the limits and do not reflect an inability of the DG system to fulfill its function. Therefore, these transients should not be considered as a failure of the Surveillance.

RAI 3.8.9-2

L_{18} Not used.

RAI 3.8.6-2

L_{19} CTS SR 4.8.2.1.2.b.3) requires that once every 92 days and within 7 days after a battery discharge, the average electrolyte temperature of all connected cells is verified to be above 60°F. ITS SR 3.8.6.3 requires that once every 92 days the average electrolyte temperature of representative cells is verified to be ≥ 60°F. Deletion of the SR after a battery discharge is acceptable because a large discharge of the battery will tend to heat the battery electrolyte, not reduce the temperature. Therefore, the requirement to measure electrolyte temperature after a discharge is not necessary. In addition, CTS requires the average electrolyte temperature for all connected cells to be verified. ITS requires the average electrolyte temperature of the representative cells to be verified. Changing the SR to representative cells is consistent with IEEE-450 testing requirements and terminology. Based on the above, both of these changes are considered to be less restrictive, however since the changes are consistent with an approved NRC and industry standard, there is no impact on safety. This is acceptable because a large discharge of the battery will tend to heat the battery electrolyte not reduce the temperature. The requirement to measure electrolyte temperature is not necessary. Therefore, this less restrictive change will have no impact on safety.

RAI 3.8.7-1

L_{20} Not used.

L_{21} Not used.

L_{22} CTS SR 4.8.2.2 for DC sources while shutdown, requires performance of all the Surveillances that are required for DC sources while operating. ITS SR 3.8.5.1, Note, provides several exceptions to required demonstrations (although still retaining the applicability of the specific function to be Operable) that are not provided in CTS SR 4.8.2.2. The reason for the Note is to preclude requiring the Operable battery from being rendered inoperable during the performance of SRs. With limited DC sources available, testing should not cause inoperability of a required source. This change is consistent with NUREG-1431.

RAI 3.8.1-21

L_{24} A Note is added to CTS SR 4.8.1.1.2.f.3) and ITS SR 3.8.1.10, which states that momentary transients above the stated voltage limit immediately following a load rejection do not invalidate the test. Based on plant experience and discussions with the DG manufacturer during a DG full load reject test, there is an initial very high, very short duration voltage spike (as high as 8000-9000 volts). The DG vendor has indicated that the momentary spike does not result in generator damage. The installed plant instrumentation does not necessarily pick up this initial voltage spike due to the extremely short duration of the voltage spike. However, without such an allowance, if sensitive instrumentation were used (in the future) during a DG full load rejection, and this momentary voltage spike was detected, the DG SR would not be met. As a result, Condition B of ITS LCO 3.8.1 would be entered, even though the DG responded as expected. In addition, Condition B requires performance of ITS SR 3.8.1.2 on the remaining OPERABLE DG, which would not be necessary. Because this allowance reflects the expected DG response and potentially prevents unnecessary DG starts, the allowance does not have an unacceptable impact on safety. This change is consistent with allowances granted for other ComEd nuclear stations.

L_{25} CTS SRs 4.8.1.1.2.a.5), 4.8.1.1.2.f.3), and 4.8.1.1.2.f.7) include requirements associated with loading the diesel generator to greater than or equal to the continuous rating of the DGs (5500 kW). Consistent with NUREG-1431, these SRs are modified in ITS SR 3.8.1.3 (31 day, 60 min run), SR 3.8.1.10 (full load reject), and SR 3.8.1.14 (24 hour run) to include a 90% to 100% of the continuous rating of the DGs load band (4950 kW to 5500 kW). In addition, the Note contained in ITS SR 3.8.1.15 (hot restart) includes this load band. Regulatory Guide 1.9, Revision 3 recommends that these tests be conducted at 90% to 100% of the DG continuous rating. The maximum expected accident load for the worst case DG is 5166 kW (Byron DG 1A - during the first 30 minutes). Therefore, conducting the tests utilizing the proposed load band still is representative of the postulated conditions for the DGs. Furthermore, performing tests at greater than or equal to the continuous rating of the DGs can increase the need for DG tear down and maintenance. Therefore this change does not have an adverse impact on safety.

DISCUSSION OF CHANGES TO CTS
ITS SECTION 3.8 - ELECTRICAL POWER SYSTEMS

Rev. L

Rev. C

L_{30} CTS SR 4.8.2.1.2.b.3) states, "The average electrolyte temperature of all connected cells is above 60°F." ITS changes this SR to state, "The average electrolyte temperature of representative cells is equal to or above 60°F." This is considered to be a less restrictive change, since it is allowing the temperature to be equal to or above 60°F instead of just being above 60°F. This change is made to be consistent with the manufacturer's recommendations based on the battery sizing calculation, 19-D-21, Revision 6, and the battery load profile. In addition, this revised temperature is consistent with the ventilation system capabilities in the battery room, as well as the recommendation of IEEE-450.

RAI 3.8.1-11

L_{31} CTS SR 4.8.1.1.2.a.5) requires "verifying the generator is synchronized, loaded to greater than or equal to 5500 kW in accordance with the manufacturer's recommendations ... ." ITS 3.8.1.3 Note 1 states, "DG loadings may include gradual loading as recommended by the manufacturer." There may be occasions where the manufacturer's recommendations may not be strictly complied with, but the DG is still verified operable. Prudent operations may necessitate an engineering evaluation of the data to ensure the slight alteration is acceptable and the manufacturer may be contacted for confirmation. The purpose of gradual loading is to increase engine reliability by eliminating the degradation caused by "fast loading" which does not allow the engine to gradually come to thermal equilibrium. Increased engine reliability ultimately results in increased plant safety. This testing philosophy is consistent with NUREG-1431 and was specified in GL 93-05 (Line Item Tech Spec Improvements). Enclosure 1 of GL 93-05 included a line item which allowed the elimination of 60 second "fast loading" and incorporation of loading "in accordance with the manufacturer's recommendations". This line item tech spec change was adopted as part of CTS Amendment 7? for Braidwood and Amendment 79 for Byron. For the reason's stated above, it is the licensee's intent to perform DG surveillances in accordance with the manufacturers recommendations. This type of operation directly increases engine reliability and therefore indirectly increases plant safety. This philosophy is reflected in current operating procedures. The current ITS verbage does not change this philosophy, but gives the station the flexibility to deviate from the manufacturers loading schedule if required (i.e., tornado/T-storm warnings, emerging plant conditions, etc.) without invalidating the SR. GL 93-05 stated that, "while the majority of the testing at power is important, safety can be improved, equipment degradation decreased, and an unnecessary burden on personnel resources eliminated by reducing the amount of testing that the TS require during power operation." This is considered to be a less restrictive change since literal compliance with the CTS would require that the DG loading for this SR only be done as recommended by the manufacturer. This change is consistent with NUREG-1431.

L_{32} (Braidwood only) CTS SR 4.8.2.1.2.f footnote * states, "Testing at a 2 year interval is acceptable as long as the battery capacity is greater than 100% of rated capacity and the battery shows no signs of degradation." ITS SR 3.8.4.8 Frequency changes this to state, "... AND 24 months when battery has reached 85% of the expected life with capacity ≥ 100% of manufacturer's rating." This is considered to be a less restrictive change, since it is allowing the testing interval to be extended when battery capacity is ≥ 100% instead of > 100%. This change was inadvertently omitted from the CTS License Amendment Request for the recently issued Braidwood Amendment 94, and is made to be consistent with the recommendation of IEEE-450, as well as NUREG-1431.

DAT 3.8.1-22

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. ~~One [required] offsite circuit inoperable.~~ ~~AND~~ ~~One [required] DG inoperable.~~ Insert 3.8-4A P22	------------NOTE------------ Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems—Operating," when Condition D is entered with no AC power source to ~~any train~~ division 9 P1 -------------------------------	
	B1 D.1 Restore [required] ~~offsite~~ qualified circuit(s) to OPERABLE status. P1	12 hours
	OR	
B2	D.2 Restore ~~[required]~~ DG to OPERABLE status.	12 hours
E. Two ~~[required]~~ DGs inoperable. B2	E.1 Restore one ~~[required]~~ DG to OPERABLE status.	2 hours

(continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.1.1	Verify correct breaker alignment and indicated power availability for each [required] ~~offsite~~ qualified circuit. (B1) (P1)	7 days
SR 3.8.1.2	------------------NOTES------------------ 1. Performance of SR 3.8.1.7 satisfies this SR. (R) ~~2. All DG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading.~~ (P4) [3. A modified DG start involving idling and gradual acceleration to synchronous speed may be used for this SR ~~as recommended by the manufacturer~~. When modified start procedures are not used, the time, voltage, and frequency tolerances of SR 3.8.1.7 must be met.] (B1) (P1) -- (P1) Verify each DG starts from standby conditions and achieves steady state voltage ≥ [3740] 3950 V and ≤ [4580] V, and frequency ≥ [58.8] Hz and ≤ [61.2] Hz. (B3)	31 days ~~As specified in Table 3.8.1-1~~ (P5)

(continued)

REV L

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.7	~~-------------------NOTE-------------------~~ ~~All DG starts may be preceded by an engine prelube period.~~ ~~--~~ P4 Verify each DG starts from normal standby condition and achieves in ≤ [10] seconds, voltage ≥ ~~[3740]~~ 3950 V and ≤ [4580] V, and frequency ≥ [58.8] Hz and ≤ [61.2] Hz. B3	184 days P25
SR 3.8.1.8 P2	-------------------NOTE------------------- ~~This Surveillance shall not be performed in MODE 1 or 2.~~ ~~However, credit may be taken for unplanned events that satisfy this SR.~~ C2 -- Verify ~~[automatic [and]~~ manual] required transfer of AC power sources from the normal ~~offsite~~ qualified circuit to ~~each~~ ~~alternate~~ the reserve [required] qualified ~~offsite~~ circuit. (5) B2	[18 months]

(continued)

REV L

LCO INSERT(S)
SECTION 3.8

LCO 3.8.1

RAI 3.8.1-21

INSERT 3.8-9A (P_{27})

SURVEILLANCE		FREQUENCY
SR 3.8.1.10	------NOTES------ 1. Momentary transients above the voltage limit immediately following a load rejection do not invalidate this test. 2. ... ------ ...	...

P1 B1

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.11	-------------------NOTES------------------- ~~1. All DG starts may be preceded by an engine prelube period.~~ P4 2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. ~~However, credit may be taken for unplanned events that satisfy this SR.~~ C2 --- Verify on an actual or simulated loss of offsite power signal: a. De-energization of ~~emergency~~ ESF buses; b. Load shedding from ~~emergency~~ buses; c. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤ [10] seconds, 2. energizes auto-connected shutdown loads through ~~[automatic~~ the shutdown load sequence~~r]~~ timers, 3. maintains steady state voltage ≥ ~~[3740]~~ 3950 B3 V and ≤ [4580] V, 4. maintains steady state frequency ≥ [58.8] Hz and ≤ [61.2] Hz, and 5. supplies permanently connected [and auto-connected] shutdown loads for ≥ 5 minutes.	[18 months]

RAI 3.8.1-17

(continued)

REV L

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.12	~~NOTES~~ ~~1. All DG starts may be preceded by prelube period.~~ P4 ~~2. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.~~ P23 C2 Verify on an actual or simulated Engineered Safety Feature (ESF) actuation signal each DG auto-starts from standby condition and: ~~a. In ≤ [10] seconds after auto-start and during tests, achieves voltage ≥ [3740] V and ≤ [4580] V; frequency ≥ 58.8 Hz;~~ C11 ~~b. In ≤ [10] seconds after auto-start and during tests, achieves frequency ≥ [58.8] Hz and ≤ [61.2] Hz; and~~ C11 c. Operates for ≥ 5 minutes~~;~~. ~~d. Permanently connected loads remain energized from the offsite power system; and~~ ~~e. Emergency loads are energized [or auto-connected through the automatic load sequencer] from the offsite power system.~~ P6	[18 months] ~~Steady state voltage ≥ 3950 V and ≤ 4580 V; and~~

(continued)

a. In ≤ 10 SECONDS ACHIEVES VOLTAGE ≥ 3950 V AND ≤ 4580;

b. In ≤ 10 SECONDS ACHIEVES FREQUENCY ≥ 58.8 HZ AND ≤ 61.2 HZ; AND

EAI 3.8.1-17

REV C

REV L

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.14	-------------------NOTES------------------- 1. Momentary transients outside the load ~~and power factor~~ range~~s~~ do not invalidate this test. P7 2. This Surveillance shall not be performed in MODE 1 or 2. ~~However, credit may be taken for unplanned events that satisfy this SR.~~ C2 --- Verify each DG ~~operating at a power factor ≤ [0.9]~~ operates for ≥ 24 hours: a. For ≥ ~~[~~2~~]~~ hours loaded ≥ ~~[5250]~~ 5775 kW and ≤ ~~[5500]~~ 6050 kW; and b. For the remaining hours of the test loaded ≥ ~~[4500]~~ 4950 kW and ≤ ~~[5000]~~ 5500 kW.	~~[~~18 months~~]~~
SR 3.8.1.15	-------------------NOTE~~S~~------------------- 1. This Surveillance shall be performed within 5 minutes of shutting down the DG after the DG has operated ≥ ~~[~~2~~]~~ hours loaded ≥ ~~[4500]~~ 4950 kW and ≤ ~~[5000]~~ 5500 kW, or until operating temperature has stabilized. B3 P6 2. Momentary transients outside of load range do not invalidate this test. ~~2. All DG starts may be preceded by an engine prelube period.~~ P9 --- Verify each DG starts and achieves~~;~~ in ≤ ~~[~~10~~]~~ seconds, voltage ≥ ~~[3740]~~ 3950 V~~,~~ and ≤ ~~[~~4580~~]~~ V, and frequency ≥ ~~[~~58.8~~]~~ Hz and ≤ ~~[~~61.2~~]~~ Hz. B3	~~[~~18 months~~]~~

(continued)

REV L
REV C
REV C

REV L

P1 B1

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.18	-------------------NOTE------------------- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. ~~However, credit may be taken for unplanned events that satisfy this SR.~~ C2 --- Verify interval between each sequenced load block is within ± [10% of design interval] for each ~~emergency~~ safeguards [and shutdown] ~~load~~ sequence~~s~~ timer.	[18 months]
SR 3.8.1.19	-------------------NOTE~~S~~------------------- ~~1. All DG starts may be preceded by an engine prelube period.~~ P4 ~~2~~. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. ~~However, credit may be taken for unplanned events that satisfy this SR.~~ C2 --- Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ESF actuation signal: a. De-energization of ~~emergency~~ ESF buses; b. Load shedding from ~~emergency~~ ESF buses; c. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤ [10] seconds,	[18 months]
		(continued)

RAI 3.8.1-17

REV L

P1 B1

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.1.19	(continued) the safeguards 2. energizes auto-connected emergency loads through ~~load~~ sequencer~~s~~, timers 3. achieves steady state voltage ≥ ~~[3740]~~ V and ≤ [4580] V, B3 3950 4. achieves steady state frequency ≥ [58.8] Hz and ≤ [61.2] Hz, and 5. supplies permanently connected [and auto-connected] emergency loads for ≥ 5 minutes.	
SR 3.8.1.20	~~NOTE~~ ~~All DG starts may be preceded by an engine prelube period.~~ P4 Verify when started simultaneously from standby condition, each DG achieves, in ≤ [10] seconds, ~~voltage ≥ [3744] V and ≤ [4576] V, and~~ frequency ≥ [58.8] Hz ~~and ≤ [61.2] Hz~~. P10	10 years

RAI 3.8.1-17
REV C

REV L

3.8 ELECTRICAL POWER SYSTEMS

3.8.2 AC Sources—Shutdown

LCO 3.8.2 The following AC electrical power sources shall be OPERABLE:

a. One qualified circuit between the offsite transmission network and the onsite Class 1E AC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems—Shutdown"; and

b. One diesel generator (DG) capable of supplying one ~~train~~ division of the onsite Class 1E AC electrical power distribution subsystem(s) required by LCO 3.8.10.

RAI 3.8.2-2

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

------NOTE------
LCO 3.0.3 is not applicable.
---------------- (P11)

ACTIONS

RAI 3.8.1-22

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ~~One~~ required qualified ~~offsite~~ circuit inoperable.	------------NOTE------------ Enter applicable Conditions and Required Actions of LCO 3.8.10, with one required ~~train~~ division (P1) de-energized as a result of Condition A. ----------------------------	
	A.1 Declare affected required feature(s) with no offsite power available inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
		(continued)

REV L

P1

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources—Operating

LCO 3.8.4 ~~The Train A and Train B~~ Division 11(21) and Division 12(22) DC electrical power subsystems shall be OPERABLE. AND NOT CROSSTIED TO THE OPPOSITE UNIT.

Rev J

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
COND A, B C & D ← INSERT 3.8-24 A (P15)			
~~A.~~ D. One DC electrical power subsystem inoperable for reasons other then Condition A, B, C, or D.	~~A~~ D.1	Restore DC electrical power subsystem to OPERABLE status.	2 hours
~~B.~~ E. Required Action and Associated Completion Time not met.	~~B~~ E.1 AND ~~B~~ E.2	Be in MODE 3. Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is ≥ ~~[129]~~ 130.5 ..... Braidwood Unit 2 / 127.6 V on float charge. (B3)	7 days

(continued)

REV L

Byron Specification LCO 3.8.4

INSERT 3.8-24A (continued) (P_{15})

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. One DC electrical power division crosstied to opposite-unit DC electrical power subsystem with an inoperable source, while opposite unit is in MODE 5, 6, or defueled.	C.1	----------NOTE-------- Only required when opposite unit has an inoperable battery. ---------------------- Verify opposite-unit DC bus load ≤ 200 amps.	Once per 12 hours
	AND		
	C.2	Open at least one crosstie breaker between the crosstied divisions.	7 days

Braidwood Specification LCO 3.8.4

INSERT 3.8-24A (continued) (P_{15})

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. One DC electrical power division crosstied to opposite-unit DC electrical power subsystem with an inoperable source, while opposite unit is in MODE 5, 6, or defueled.	C.1	---------NOTE-------- Only required when opposite unit has an inoperable battery. --------------------- Verify opposite-unit DC bus load ≤ 100 amps for AT&T (≤ 200 amps for C&D).	Once per 12 hours
	AND		
	C.2	Open at least one crosstie breaker between the crosstied divisions.	7 days

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.6	------NOTE------ ~~This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR.~~ P8 C2 ------------ Verify each battery charger supplies ~~≥ [400] amps at ≥ [125] V~~ a load equal to the manufacturers rating for ≥ [8] hours. P16	[18 months]
SR 3.8.4.7	------NOTES------ 1. The modified performance discharge test in SR 3.8.4.8 may be performed in lieu of the service test in SR 3.8.4.7 ~~once per 60 months~~. P28 2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. ~~However, credit may be taken for unplanned events that satisfy this SR.~~ C2 ------------ Verify battery capacity is adequate to supply, and maintain ~~in~~ OPERABLE status, the required emergency loads for the design duty cycle when subjected to a battery service test.	[18 months]

(continued)

P1 B3

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.8	------------------NOTE------------------ This Surveillance shall not be performed in MODE 1, 2, 3, or 4. ~~However, credit may be taken for unplanned events that satisfy this SR.~~ (C2) -- (B3) Verify battery capacity is ≥ ~~[80]~~% 95 Braidwood Unit 2, 80 Braidwood Unit 1 and Byron Unit 1 and Unit 2 of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.	60 months AND 12 months when battery shows degradation or has reached [85]% of THE expected life with capacity < 100% of manufacturer's rating ~~AND~~ 24 months when battery has reached [85]% of the expected life with capacity ≥ 100% of manufacturer's rating

REV L

P1

RAI 3.8.5-1

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources—Shutdown

P31 P15

INSERT 3.8-28A

LCO 3.8.5 ~~DC electrical power subsystem shall be OPERABLE to support the DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems—Shutdown."~~

RAI 3.8.7-2

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

-----NOTE-----
LCO 3.0.3 is not Applicable.

P11

ACTIONS

RDWC

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required DC electrical power subsystems inoperable for reasons other than Condition B. (P20)	A.1.1 Declare affected required feature(s) inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND	
		(continued)

REV L

LCO 3.8.5

eAI 3.8.5-1

INSERT 3.8-28A (P_{31} and P_{15})

LCO 3.8.5 The following shall be OPERABLE, with at least one unit crosstie breaker per division open:

a. One DC electrical power subsystem capable of supplying one division of the onsite Class 1E DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution System - Shutdown"; and

b. One source of DC electrical power, other than that required by LCO 3.8.5.a, capable of supplying the remaining onsite Class 1E DC electrical power distribution subsystem(s) when required by LCO 3.8.10.

------------------------------NOTE------------------------------
One division may be crosstied to the opposite unit, when the opposite unit is in MODE 1, 2, 3, or 4 with an inoperable battery charger.

Byron Specification LCO 3.8.5

INSERT 3.8-29A (P_{13} and P_{20})

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ...	...	
	AND	
(P_{13})	A.2.5 Declare affected Low Temperature Overpressure Protection feature(s) inoperable.	Immediately
B. (P_{20}) One DC electrical power division crosstied to opposite-unit DC electrical power subsystem with an inoperable source, while opposite unit is in MODE 5, 6, or defueled.	B.1 ----------NOTE-------- Only required when opposite unit has an inoperable battery. --------------------- Verify opposite-unit DC bus load is ≤ 200 amps.	Once per 12 hours
	AND	
	B.2 Open at least one crosstie breaker between the crosstied divisions.	7 days

Braidwood Specification LCO 3.8.5

INSERT 3.8-29A (P_{13} and P_{20})

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ...	... AND A.2.5 Declare affected Low Temperature Overpressure Protection feature(s) inoperable.	Immediately
(P_{13})		
B. One DC electrical power division crosstied to opposite-unit DC electrical power subsystem with an inoperable source, while opposite unit is in MODE 5, 6, or defueled. (P_{20})	B.1 ----------NOTE--------- Only required when opposite unit has an inoperable battery. --------------------- Verify opposite-unit DC bus load is ≤ 100 amps for AT&T (≤ 200 amps for C&D). AND B.2 Open at least one crosstie breaker between the crosstied divisions.	Once per 12 hours 7 days

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time of Condition A not met. OR One or more batteries with average electrolyte temperature of the representative cells < [60]°F. OR One or more batteries with one or more battery cell parameters not within Category C values.	B.1 Declare associated battery inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.6.1	Verify battery cell parameters meet Table 3.8.6-1 Category A limits.	7 days

(continued)

RAI 3.8.7-1

Rev L

B1

Table 3.8.6-1 (page 1 of 1)
Battery Cell Parameters Requirements

PARAMETER	CATEGORY A: LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B: LIMITS FOR EACH CONNECTED CELL	CATEGORY C: ALLOWABLE LIMITS FOR EACH CONNECTED CELL
Electrolyte Level	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark(a)	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark(a)	Above top of plates, and not overflowing
Float Voltage	≥ 2.13 V	≥ 2.13 V(b)	> 2.07 V
Specific Gravity(~~b~~ c)(~~e~~ d)	≥ ~~[~~1.200~~]~~	≥ ~~[~~1.195~~]~~ AND Average of all connected cells > ~~[~~1.205~~]~~	Not more than 0.020 below average of all connected cells AND Average of all connected cells ≥ ~~[~~1.195~~]~~

(a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum during equalizing charges provided it is not overflowing.

P29 (b) Corrected for average electrolyte temperature.

c (~~b~~) Corrected for electrolyte temperature ~~and level. Level correction is not required, however, when battery charging is < [2] amps when on float charge.~~ P32

3 B3

d (~~e~~) A battery charging current of < ~~[2]~~ 3 amps when on float charge is acceptable for meeting specific gravity limits following a battery recharge, for a maximum of ~~[~~7~~]~~ days. When charging current is used to satisfy specific gravity requirements, specific gravity of each connected cell shall be measured prior to expiration of the ~~[~~7~~]~~ day allowance.

Rev. C

REV L

REV L

Table 3.8.6-1 (page 1 of 1)
Battery Cell Parameters Requirements

PARAMETER	CATEGORY A: LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B: LIMITS FOR EACH CONNECTED CELL	CATEGORY C: ALLOWABLE LIMITS FOR EACH CONNECTED CELL
Electrolyte Level	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark[(a)]	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark[(a)]	Above top of plates, and not overflowing
Float Voltage	≥ ~~2.13~~ 2.18 V	≥ ~~2.13~~ 2.18 V [(b)]	> ~~2.07~~ 2.14 V
Specific Gravity[~~(b)~~ (c)] [~~(c)~~ (d)]	≥ ~~[1.200]~~ 1.285	≥ ~~[1.195]~~ 1.280 **AND** Average of all connected cells > ~~[1.205]~~ 1.290	Not more than 0.020 below average of all connected cells **AND** Average of all connected cells ≥ ~~[1.195]~~ 1.280

(a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum during equalizing charges provided it is not overflowing.

(P29) (b) Corrected for average electrolyte temperature.

c (~~b~~) Corrected for electrolyte temperature and level. Level correction is not required, however, when battery charging is < [2] amps when on float charge.

d (~~c~~) A battery charging current of < [2] amps when on float charge is acceptable for meeting specific gravity limits following a battery recharge, for a maximum of [7] days. When charging current is used to satisfy specific gravity requirements, specific gravity of each connected cell shall be measured prior to expiration of the [7] day allowance.

P1

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Inverters—Operating

Four instrument bus

LCO 3.8.7 ~~The required Train A and Train B~~ inverters shall be OPERABLE.

B2

P19

~~NOTE~~

~~[One/two] inverter[s] may be disconnected from [its/their] associated DC bus for ≤ 24 hours to perform an equalizing charge on [its/their] associated [common] battery, provided:~~

~~a. The associated AC vital bus(es) [is/are] energized from [its/their] [Class 1E constant voltage source transformers] [inverter using internal AC source]; and~~

~~b. All other AC vital buses are energized from their associated OPERABLE inverters.~~

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One ~~required~~ Instrument bus inverter inoperable.	A.1 ---------NOTE-------- Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating" with any ~~vital~~ Instrument bus de-energized. -------------------- Restore inverter to OPERABLE status.	 24 hours

(continued)

RAI 3.8.1-22

REV L

P1

3.8 ELECTRICAL POWER SYSTEMS

3.8.8 Inverters—Shutdown

P31

INSERT 3.8-36A

LCO 3.8.8 ~~Inverters shall be OPERABLE to support the onsite Class 1E AC vital bus electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems—Shutdown."~~

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

NOTE
LCO 3.0.3 is not applicable.

P11

ACTIONS

P1

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more [required] AC instrument bus power sources ~~inverters~~ inoperable. B1	A.1	Declare affected required feature(s) inoperable.	Immediately
	OR		
	A.2.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	A.2.2	Suspend movement of irradiated fuel assemblies.	Immediately
	AND		
	A.2.3	Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND		
			(continued)

REV C

REV L

RAI 3.8.5-1

<u>INSERT 3.8-36A</u> (P_{31} and P_1)

LCO 3.8.8 The following shall be OPERABLE:

a. Two inverters capable of supplying one division of the onsite Class 1E AC instrument bus electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution System – Shutdown"; and

b. One source of instrument bus power, other than that required by LCO 3.8.8.a, capable of supplying the remaining onsite Class 1E AC instrument bus electrical power distribution subsystem(s) when required by LCO 3.8.10.

P1

3.8 ELECTRICAL POWER SYSTEMS

3.8.9 Distribution Systems—Operating

LCO 3.8.9 The following ~~Train A and Train B~~ AC, DC, and AC instrument bus ~~vital bus~~ electrical power distribution subsystems shall be OPERABLE: for the applicable unit

P24 INSERT 3.8-38A

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One AC electrical power distribution subsystem inoperable.	A.1 Restore AC electrical power distribution subsystem to OPERABLE status.	8 hours AND 16 hours from discovery of failure to meet LCO
B. One AC instrument ~~vital~~ bus~~(es)~~ inoperable.	B.1 Restore AC instrument ~~vital~~ bus~~(es)~~ electrical power distribution subsystem ~~subsystem~~ to OPERABLE status. C4 P1	2 hours AND 16 hours from discovery of failure to meet LCO
C. One DC electrical power distribution subsystem inoperable.	C.1 Restore DC electrical power distribution subsystem to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO

RAI 3.8.9-2

(continued)

Rev 2

(P1)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A, B, or C not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 5.	6 hours 36 hours
E. Two ~~trains with~~ electrical power inoperable distribution subsystems that result in a loss of safety function.	E.1 Enter LCO 3.0.3.	Immediately

RAI 3.8.9-2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.9.1 (B2)	Verify correct breaker alignments and voltage to ~~required~~ AC, DC, and AC ~~vital~~ instrument bus electrical power distribution subsystems.	7 days

Rev L

P1

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems—Shutdown

LCO 3.8.10 The necessary portion s of the following AC, DC, and AC ~~vital bus~~ instrument bus electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE for the applicable unit. P24

P24 Insert 3.8-40A

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

-----NOTE-----
LCO 3.0.3 is not Applicable.
P11

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required AC, DC, or AC ~~vital bus~~ instrument bus electrical power distribution subsystems inoperable.	A.1	Declare associated supported required feature(s) inoperable.	Immediately
	<u>OR</u>		
	A.2.1	Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>		
	A.2.2	Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>		
	A.2.3	Initiate action to suspend operations involving positive reactivity additions.	Immediately
	<u>AND</u>		
			(continued)

REV L

REV L

LCO 3.8.10

INSERT 3.8-41A (P_{13})

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ...	... AND A.2.6 Declare affected Low Temperature Overpressure Protection feature(s) inoperable.	 Immediately

DOC 3.8.2-2 ITEM 1 REV C

C_9 Not used.

C_{10} Not used.

C_{11} Not used.

C_{12} Not used.

PLANT SPECIFIC CHANGES (P)

P_1 All reformatting, renumbering, and editorial rewording of the ITS LCOs and SRs is in accordance with the Westinghouse Standard Technical Specifications, NUREG-1431. During the development certain wording preferences or English language conventions were adopted. As a result, the Technical Specifications (TS) should be more readily readable by, and therefore understandable to, plant operators and other users. During this reformatting, renumbering, and rewording process, no technical changes to the TS (either actual or interpretational) were made unless they were identified and justified.

P_2 NUREG-1431 LCO 3.8.1, Required Actions A.2 and C.1, have been deleted. Required Action A.2 involved restrictions on loss of offsite power to one division and loss of features on the other division. Required Action C.1 involved restrictions on the loss of two offsite power sources. These limitations are not imposed in the CTS, and are therefore, removed in the conversion to the ITS.

RAI 3.8.9-2

P_3 Not used.

P_4 The NUREG-1431 SR Notes, allowing DG starts to be preceded by an engine prelube period, are intended to apply to designs with a manually initiated prelube prior to a planned DG start. The plant specific DG design provides for a continuous prelube and keep warm system, which when operating constitutes the "standby status" of the DG. Therefore, eliminating these SR Notes is consistent with the plant specific design.

P_5 SR 3.8.1.2 and SR 3.8.1.3 of NUREG-1431 have frequencies "as specified in Table 3.8.1-1." In accordance with NRC Generic Letter 94-01, "Removal of Accelerated Testing and Special Reporting Requirements for Emergency Diesel Generators," this Table was deleted from CTS in Amendment 71 (Braidwood) and Amendment 79 (Byron). The frequency of the associated surveillances has been changed to once per 31 days in the ITS SRs, as recommended in Generic Letter 94-01.

RAI 3.8.1-20

P_6 NUREG-1431 SR 3.8.1.12 item d and e have been deleted to reflect the plant-specific performance. In the performance of the DG emergency start test (ITS SR 3.8.1.12) the relay actuations required to perform the test successfully do not cause a perturbation to the ESF bus parameters. During this test, the DG output breaker will not receive a closure signal due to the absence of the signal from the undervoltage relay on the ESF bus for breaker operation, and offsite power will continue to feed any loads connected to the associated ESF bus. This test does not start any of emergency loads due to actuation of the K611 relay which only starts the DG for a SI signal. NUREG SR 3.8.1.15 has been revised to reflect the plant-specific CTS requirements that are being retained.

P_7 NUREG-1431 SRs 3.8.1.9, 10 and 14 (ITS SRs 3.8.1.9, 10, and 14) require that the DG be operating at its rated power factor when the total load rejection test is performed, and for 2 hours of the 24-hour full load test, respectively. The practice of performing these tests at rated power factor has been determined to be unjustified, potentially destructive, testing due to exceeding the vendors recommendation for maximum voltage of the generator. Amplification of this issue is contained in the Engineering Position Paper on Power Factor Loading During Emergency Diesel Generator Testing dated November 28, 1995. Both Cooper-Bessemer and the NRC concurred with the determination for discontinuing the DG load rejection testing at rated power factor. Therefore, this requirement has been deleted. However, the recommendations are incorporated into the Bases for ITS SR 3.8.1.14 to reflect practice and commitment.

RAI 3.8.1-22 Rev C

P_8 SR 3.8.4.6 of NUREG-1431 contains a Note specifying, "This surveillance shall not be performed in MODE 1, 2, 3, or 4." This requirement does not exist in the current licensing basis of CTS SR 4.8.2.1.2.c.4), and has therefore been deleted from ITS SR 3.8.4.6.

P_9 Not used.

P_{10} SR 3.8.1.20 of NUREG-1431 (ITS 3.8.1.20) contains a Reference to the voltage and frequency bands required when performing the SR. CTS SR 4.8.1.1.2.g. requires only that the DG attain rated speed within 10 seconds. Reg Guides 1.108 and 1.9 delineate the requirements for performing DG testing. Those tests which require verification of voltage and frequency are so stipulated in the Reg Guides. The 10 year testing requirement does not stipulate that voltage and frequency are to be verified, only that the DGs are to be started and run. Therefore, SR 3.8.1.20 has been modified by deleting the references to the voltage and frequency bands.

P_{11} ITS LCOs 3.8.2, 3.8.5, 3.8.8, and 3.8.10 ACTIONS Tables have been modified by adding a note stating, "LCO 3.0.3 is not applicable." LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operation. Therefore, in either case, inability to suspend movement of irradiated fuel assemblies would not be sufficient reason to require a reactor shutdown. This change is consistent with NUREG-1431 philosophy.

P_{12} SR 3.8.2.1 of NUREG-1431 has been modified to provide clarification of which SRs are applicable in Modes 5 and 6, and which are actually required to be performed. The SRs in AC Sources - Shutdown verify the operability requirements of the AC Sources in Modes 5 and 6. The Note associated with the SR and the SR have been revised to reflect the renumbering of the SRs of ITS LCO 3.8.1. Also, SR 3.8.2.1 has been revised to present the information in a positive statement (i.e. to state the required SRs, not the exceptions). The revised wording improves clarity and operator understanding of the applicable requirements. These revisions make no change of intent and are otherwise consistent with NUREG-1431.

P_{16} SR 3.8.4.6 of NUREG-1431 contains specific values for voltage and frequency which must be maintained during the given 8-hour period of the SR. In ITS SR 3.8.4.6, the specific values are deleted and replaced with the stipulation that the battery charger must supply "a load equal to the manufacturer's rating" for the 8-hour period. This change is consistent with attempts to minimize amendments to the Technical Specifications, and is consistent with the CTS. By stating that the SR will be performed in accordance with the manufacturer's rating, the need to amend the SR will be averted should the manufacturer's recommendations change. All SRs are performed in accordance with approved procedures which must include a 50.59 safety evaluation. Therefore, adequate control is maintained to ensure manufacturer recommendations are properly analyzed.

P_{17} Not used.

P_{18} Not used.

P_{19} NUREG LCO 3.8.7 contains a Note which allows an instrument bus inverter to be disconnected from its associated DC bus for up to 24 hours while performing an equalizing charge on the battery. The inverters used at Braidwood and Byron are not required to be disconnected during equalizing charges. Therefore, this Note has been deleted consistent with CTS.

P_{20} LCO 3.8.5 is modified by a Note which allows one division to be crosstied when the opposite unit is in MODE 1, 2, 3, or 4 with an inoperable battery charger. This is consistent with the allowance of CTS LCO 3.8.2.2 Action a. In addition, the Actions of NUREG-1431 LCO 3.8.5 have been modified by the addition of ITS LCO 3.8.5 Condition B. Condition B addresses the requirements for the condition when the unit's DC bus is crosstied to a shutdown unit with an inoperable source. These additional requirements are contained in CTS LCO 3.8.2.1.

P_{24} LCO 3.8.9 of NUREG-1431 has been modified by the addition of the specific buses to which the LCO applies. This information is included here in lieu of Table B 3.8.9-1, which has been deleted from the Bases. This format is similar to that of CTS LCOs 3.8.2.1 and 3.8.3.1, and provides clarity for the user. This change is mandated by CTS, which include these specific buses only. Other buses that become de-energized would result in direct application of the definition of Operability, and entry into affected systems TS, in lieu of entering ITS LCO 3.8.9. In addition, this list of buses is included in ITS LCO 3.8.10 consistent with CTS LCO 3.8.2.2.

RAI 3.8.1-17

P_{25} NUREG SR 3.8.1.7 has been revised to add the word "normal" to the phrase, "from standby conditions." As approved by the Staff in the SER for Byron License Amendment 79 and Braidwood License Amendment 71, and as stated in the Byron and Braidwood CTS Bases, the surveillance requirements for demonstrating the OPERABILITY of the diesel generators are based on the recommendations in Revision 3 of Regulatory Guide 1.9, with the exceptions noted in Appendix A to the UFSAR. Appendix A to the UFSAR states that an exception has been taken against the use of the term "standby conditions" to denote "normal standby conditions." Specifically, it is noted that the semiannual fast start test described in Regulatory Position C.2.2.3 (ITS SR 3.8.1.7) is performed from "normal standby conditions." Standby condition and normal standby condition are defined in Appendix A to the UFSAR, as well as in the Surveillance Requirements Section of the Bases for ITS LCO 3.8.1 for SR 3.8.1.2 and SR 3.8.1.7.

P_{26} SR 3.8.7.1 and SR 3.8.8.1 of NUREG-1431 contains verification of frequency of the AC instrument inverters. The inverter panels at Byron and Braidwood do not display output frequency, and this requirement is not included in the CTS. Therefore, this requirement has been deleted from ITS SR 3.8.7.1.

RAI 3.8.1-21

JUSTIFICATION FOR DIFFERENCES TO NUREG-1431 LCOS
SECTION 3.8 - ELECTRICAL POWER SYSTEMS

P_{27} A note is added to NUREG-1431 SR 3.8.1.10, indicating that momentary transients above the stated voltage limits immediately following a load rejection do not invalidate the surveillance. Based on plant experience and discussions with the DG manufacturer during a DG full load reject test, there is an initial very high, very short duration voltage spike (as high as 8000-9000 volts). The DG vendor has indicated that the momentary spike does not result in generator damage. The installed plant instrumentation does not necessarily pick up this initial voltage spike due to the extremely short duration of the voltage spike. However, without such an allowance, if sensitive instrumentation were used (in the future) during a DG full load rejection, and this momentary voltage spike was detected, the DG SR would not be met. As a result, Condition B of ITS LCO 3.8.1 would be entered, even though the DG responded as expected. In addition, Condition B requires performance of ITS SR 3.8.1.2 on the remaining OPERABLE DG, which would not be necessary. Because this allowance reflects the expected DG response and potentially prevents unnecessary DG starts, the allowance does not have an unacceptable impact on safety.

P_{28} NUREG SR 3.8.4.7 Note 1 allows a modified performance discharge test to be performed in lieu of a service test "once per 60 months." This Note is being revised to delete the "once per 60 months" requirement. ComEd is committed to IEEE 450 which is also endorsed by NUREG-1431 and the NRC. IEEE 450 Section 5 does not place a limitation or restriction on the use of a discharge test in lieu of a service test since the discharge test is required to envelope the duty cycle of the service test. In accordance with IEEE 450, Section 5.4, "a modified performance discharge test can be used in lieu of a service test at anytime" which eliminates a time restriction. Therefore, deletion of the 60 month requirement is consistent with IEEE 450.

Rev. C

P_{29} NUREG Table 3.8.6-1 has been revised by adding footnote (b) which states, "Corrected for average electrolyte temperature." This only applies to Category B limit for float voltage. This is being added to be consistent with CTS which reflects current licensing basis and manufacturer's recommendation.

P_{30} NUREG SR 3.8.6.2 Frequency has been changed from "Once within 24 hours" to "Once within 7 days" to be consistent with current licensing basis (CTS SR 4.8.2.1.2.b). Maintaining CLB does not create any additional degradation of the batteries, nor increase any potential for any accident evaluated in the UFSAR.

RAI 3.8.5-01

P_{31} This change clarifies the DC Sources-Shutdown and Inverter-Shutdown LCOs to reflect more specific requirements for each subsystem. As written, the NUREG LCO requirements imply that a full complement of battery and charger are required for both subsystems. Similarly, for inverters, a DC battery-backed inverter is required for both divisions or trains. The requirements for the second subsystem should be relaxed to require either a battery or a charger and either DC input or regulated AC input. This level of DC Source and Inverter requirements will continue to assure that sufficient power is available to support the response to events postulated during shutdown conditions in the event of a loss of offsite power or a single failure. This change is consistent with the initial philosophy of the ITS NUREGs and is an added restriction (beyond CTS LCO 3.8.2.2 and CTS LCO 3.8.3.2) which is not required by the CTS. CTS LCO 3.8.2.2 (DC Sources-Shutdown) requires only one 125 VDC bus, associated battery, and battery charger be energized and Operable. CTS LCO 3.8.3.2 (Onsite Power Distribution-Shutdown) requires only one 4160 V ESF bus, one 480 V ESF bus, and two of four instrument buses to be energized without regard to what equipment may be required to be Operable (and therefore energized) on the remaining buses. ITS adds requirements for additional divisions (refer to CTS DOC M_3), consistent with the Operability requirements of all other features that may be required by the ITS. Specifically:

a. ITS LCO 3.8.5, DC Sources - Shutdown, requires: 1) one division to be Operable with a battery and its charger, and 2) when the other division is required to be energized, providing power from a battery or a battery charger. This added restriction (beyond CTS LCO 3.8.2.2) enforces a level of Technical Specification control which is not required by the CTS.

b. ITS LCO 3.8.8, Inverters - Shutdown, requires: 1) two Operable inverters to power two instrument buses, and 2) when other instrument bus(es) are required to be energized, providing other sources of power for those bus(es). This added restriction (beyond CTS LCO 3.8.3.2) enforces a level of Technical Specification control which is not required by the CTS.

P_{32} NUREG-1431 Table 3.8.6-1 has been revised to reflect Braidwood CTS License Amendment 94 and Byron CTS License Amendment 93 for batteries recently installed.

BASES INSERT(S)
SECTION 3.8

Bases 3.8.1

RAI 3.8.1-8

INSERT B 3.8-1A (P_{37})

Offsite power is supplied to the station switchyard from the transmission network. From the switchyard, two electrically and physically separated lines (i.e., independent transmission circuits) provide AC power through their associated System Auxiliary Transformer (SAT) banks (SATs 142-1 and 142-2 from one line, and SATs 242-1 and 242-2 from the second line), to the 4.16 kV ESF buses. Normally, SATs 142-1 and 142-2 feed Unit 1 4.16 kV ESF buses, and SATs 242-1 and 242-2 feed Unit 2 4.16 kV ESF buses. Additionally, each 4.16 kV ESF bus has a reserve feed via its associated crosstie to an opposite-unit 4.16 kV ESF bus. Each unit is required to have qualified normal and reserve circuits to each 4.16 kV bus (detailed in the LCO Bases for this Specification). The transmission network and switchyard are maintained in accordance with UFSAR, and are not governed by the requirements of Technical Specifications.

BASES

LCO (continued)

~~Bus A, and is fed through breaker PA 0201, powering the ESF transformer, which, in turn, powers the #2 ESF bus through its normal feeder breaker.~~ B2

Each DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage. This will be accomplished within ~~[~~10~~]~~ seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as DG ~~in standby with the~~ engine hot and DG ~~in standby with the~~ engine at ambient conditions. Additional DG capabilities must be demonstrated to meet required Surveillance~~,~~s e.g., capability of the DG to revert to standby status on an ECCS signal while operating in parallel test mode. Emergency Core Cooling System P37 P1

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

division P37

The AC sources in one train must be separate and independent (to the extent possible) of the AC sources in the other train. For the DGs, separation and independence are complete.

qualified circuits

For the ~~offsite AC sources,~~ separation and independence are to the extent practical. ~~A circuit may be connected to more than one ESF bus, with fast transfer capability to the other circuit OPERABLE, and not violate separation criteria. A circuit that is not connected to an ESF bus is required to have OPERABLE fast transfer interlock mechanisms to at least two ESF buses to support OPERABILITY of that circuit.~~ P3

APPLICABILITY

The AC sources ~~[and sequencers]~~ are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that: B2

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

(continued)

DAT 3.8.1-17

BASES

ACTIONS

B.2 (continued)

a. An inoperable DG exists; and

P3.7

b. A required feature on the other ~~train~~ Division ~~(train A or train B)~~ is inoperable.

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

P3.7

Discovering one required DG inoperable REDUNDANT coincident with one or more inoperable required ~~support or supported~~ feature(s), ~~or both, that are associated with the OPERABLE DG~~, results in starting the Completion Time for the Required Action. Four hours from ~~the~~ discovery of these events existing concurrently is Acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

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

B.3.1 and B.3.2

Required Action B.3.1 provides an allowance to avoid unnecessary testing of OPERABLE DG(s). If it can be determined that the cause of the inoperable DG does not exist on the OPERABLE DG, SR 3.8.1.2 does not have to be performed. If the cause of inoperability exists on the other DG~~(s)~~, the other DG~~(s)~~ would be declared inoperable upon discovery and Condition E of LCO 3.8.1 would be entered. Once the failure is repaired, the common cause failure no longer exists, and Required Action B.3.1 is satisfied. If the cause of the initial inoperable DG cannot be confirmed not to exist on the remaining DG~~(s)~~, performance of

(continued)

P1

BASES

SURVEILLANCE REQUIREMENTS (continued)

~~ANSI C84.1 (Ref. 11)~~ allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage is specified as 90% or 3600 V. It also allows for voltage drops to motors and other equipment down through the 120 V level where minimum operating voltage is also usually specified as 90% of name plate rating. The specified maximum steady state output voltage of ~~4750~~ 4580 V is equal to the maximum operating voltage specified for 4000 V motors. It ensures that for a lightly loaded distribution system, the voltage at the terminals of 4000 V motors is no more than the maximum rated operating voltages. The specified minimum and maximum frequencies of the DG are 58.8 Hz and 61.2 Hz, respectively. These values are equal to ± 2% of the 60 Hz nominal frequency and are derived from the recommendations given in Regulatory Guide 1.9 (Ref. 3).

B3

SR 3.8.1.1

This SR ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. The breaker alignment verifies that each breaker is in its correct position to ensure that distribution buses and loads are connected to their preferred power source, and that appropriate independence of offsite circuits is maintained. The 7 day Frequency is adequate since breaker position is not likely to change without the operator being aware of it and because its status is displayed in the control room.

SR 3.8.1.2 and SR 3.8.1.7

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

P12

~~To minimize the wear on moving parts that do not get lubricated when the engine is not running, these SRs are modified by a Note (Note 2 for SR 3.8.1.2) to indicate that all DG starts for these Surveillances may be preceded by an engine prelube period and followed by a warmup period prior to loading.~~ P1

INSERT B3.8-16A

P13

For the purpose~~s~~ of ~~SR 3.8.1.2 and~~ SR 3.8.1.7 testing, the DGs are started from normal standby conditions once per 184 days. Normal ~~S~~standby conditions

Insert B3.8-16B P29

P29

(continued)

REV L

RAI 3.8.1-17

BASES INSERT(S)
SECTION 3.8

Bases 3.8.1

INSERT B 3.8-16A (P_{13})

Each SR 3.8.1.2 and SR 3.8.1.7 DG start requires the DG to achieve and maintain a steady state voltage and frequency range. The start signals used for this test may consist of one of the following signals:

a. Manual;

b. Simulated loss of ESF bus voltage by itself;

c. Simulated loss of ESF bus voltage in conjunction with an ESF actuation test signal; or

d. An ESF actuation test signal by itself.

RAI 3.8.1-17

INSERT B 3.8-16B (P_{29})

For the purpose of SR 3.8.1.2 testing, the DGs are started from standby conditions once per 31 days. Standby conditions for a DG mean that the diesel engine coolant and oil are being continuously circulated and temperature is being maintained consistent with manufacturer's recommended operating range (low lube oil and jacket water temperature alarm settings to the high lube oil and jacket water temperature alarm settings).

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.2 and SR 3.8.1.7 (continued)

P2q
INSERT B3.8-17 A

for a DG mean that the diesel engine coolant and oil are being continuously circulated and temperature is being maintained ~~consistent with manufacturer recommendations~~.

B1

In order to reduce stress and wear on diesel engines, ~~some manufacturers recommend~~ a modified start is used in which the starting speed of DGs is limited, warmup is limited to this lower speed, and the DGs are gradually accelerated to synchronous speed prior to loading. These start procedures are the intent of ~~Note 3, which is only applicable when such modified start procedures are recommended by the manufacturer~~ starts in accordance with SR 3.8.1.2.

Rev C

SR 3.8.1.7 requires that, at a 184 day Frequency, the DG starts from normal standby conditions and achieves required voltage and frequency within 10 seconds. The 10 second start requirement supports the assumptions of the design basis LOCA analysis in the UFSAR, Chapter [15] (Ref. 5).

The 10 second SR start requirement is not applicable to SR 3.8.1.2 (see Note 3) when a modified start procedure as described above is used. If a modified start is not used, the 10 second start requirement of SR 3.8.1.7 applies.

Since SR 3.8.1.7 requires a 10 second start, it is more restrictive than SR 3.8.1.2, and it may be performed in lieu of SR 3.8.1.2. This is ~~the intent of~~ also addressed in the Note ~~1 of~~ SR 3.8.1.2.

P20

The ~~normal~~ 31 day Frequency for SR 3.8.1.2 ~~(see Table 3.8.1-1, "Diesel Generator Test Schedule," in the accompanying LCO)~~ is consistent with Regulatory Guide 1.9 (Ref. 3). The 184 day Frequency for SR 3.8.1.7 is a reduction in cold testing consistent with Generic Letter 84-15 (Ref. 7). These Frequencies provide adequate assurance of DG OPERABILITY, while minimizing degradation resulting from testing.

SR 3.8.1.3

This Surveillance verifies that the DGs are capable of synchronizing with the offsite electrical system and accepting loads greater than or equal to the equivalent of the maximum expected accident loads. A minimum run time of

(continued)

(P1) (B1)

BASES

RAI 3.8.1-7

SURVEILLANCE REQUIREMENTS

SR 3.8.1.3 (continued)

60 minutes is required to stabilize engine temperatures~~, while minimizing the time that the DG is connected to the offsite source~~.

(P27)

Although no power factor requirements are established by this SR, the DG is normally operated ~~at a power factor~~ between ~~[0.8 lagging] and [1.0]. The [0.8] value is the design rating of the machine, while the [1.0] is an operational limitation [to ensure circulating currents are minimized]~~ 0 and 1000 KVARs. The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

(B3) (P48)

The 31 day Frequency for this Surveillance ~~(Table 3.8.1-1)~~ (P2) is consistent with Regulatory Guide 1.9 (Ref. 3).

RAI 3.8.1-22

This SR is modified by four Notes. Note 1 indicates that diesel engine runs for this Surveillance may include gradual loading, as recommended by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized. Note 2 states that momentary transients, ~~because of~~ (e.g.,) changing bus loads (X), do not invalidate this test. Similarly, momentary ~~power factor~~ KVAR transients ~~above the limit~~ OUTSIDE OF THE SPECIFIED RANGE do not invalidate the test. Note 3 indicates that this Surveillance should be conducted on only one DG at a time in order to avoid common cause failures that might result from offsite circuit or grid perturbations. Note 4 stipulates a prerequisite requirement for performance of this SR. A successful DG start must precede this test to credit satisfactory performance.

(P44)

SR 3.8.1.4

(B2)

This SR provides verification that the level of fuel oil in the day tank ~~(and engine mounted tank)~~ is at or above the level at which fuel oil is automatically added. The level is expressed as an equivalent volume in gallons, and is selected to ensure adequate fuel oil for a minimum of 1 hour of DG operation at full load plus 10%.

The 31 day Frequency is adequate to assure that a sufficient supply of fuel oil is available, since low level alarms are

(continued)

RAI 3.8.1-21

INSERT B 3.8-23A (P_{40})

Note 1 states that momentary transients above the stated voltage limit immediately following a load rejection (i.e., the DG full load rejection) do not invalidate this test.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.13 (continued)

B2

~~Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:~~

~~a. Performance of the SR will not render any safety system or component inoperable;~~

~~b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and~~

~~c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.~~

SR 3.8.1.14

Regulatory Guide ~~1.108~~ 1.9 (Ref. ~~9~~ 3), paragraph ~~2.a.(3)~~ 2.2.9, ~~requires~~ recommends demonstration once per 18 months that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours, ≥ ~~[2]~~ 2 hours of which is at a load band (P44) equivalent to 105% to 110% (P44) of the continuous duty rating and the remainder of the time at a load equivalent to the continuous duty rating of the DG. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for ~~prelubricating and~~ warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are also applicable to this SR.

(P12) Although no power factor requirements are established by this SR a portion of the (P21)

~~In order to ensure that the DG is tested under load conditions that are as close to design conditions as possible,~~ testing ~~must be~~ is performed ~~using a power factor of ≤ [0.9]. This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience.~~ between 0 and 1000 KVARs (P37) INSERT B3.8-27A (P21) The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

(continued)

BASES

CAT 3.8.1-18

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.16

As required by Regulatory Guide ~~1.108~~ 1.9 (Ref. ~~9~~ 3), paragraph ~~2.a.(6)~~ 2.2.11, this Surveillance ensures that the manual synchronization and ~~automatic~~ load transfer from the DG to the offsite source can be made and the DG can be returned to ready to load status when offsite power is restored. It also ensures that the autostart logic is reset to allow the DG to reload if a subsequent loss of offsite power occurs. The DG is considered to be in ready to load status when the DG is at rated speed and voltage, the output breaker is open and can receive an autoclose signal on bus undervoltage, and the load sequence timers are reset.

The Frequency of ~~[~~18 months~~]~~ is consistent with the recommendations of Regulatory Guide ~~1.108~~ 1.9 (Ref. ~~9~~ 3), ~~paragraph 2.a.(6)~~, and takes into consideration unit conditions required to perform the Surveillance.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. ~~Credit may be taken for unplanned events that satisfy this SR.~~ C2

SR 3.8.1.17

Demonstration of the test mode override ensures that the DG availability under accident conditions will not be compromised as the result of testing and the DG will automatically reset to ready to load operation if a LOCA actuation signal is received during operation in the test mode. Ready to load operation is defined as the DG running at rated speed and voltage with the DG output breaker open. These provisions for automatic switchover are required by IEEE-308 (Ref. ~~13~~ 9), paragraph 6.2.6(2).

P27 ~~The requirement to automatically energize the emergency loads with offsite power is essentially identical to that of SR 3.8.1.12.~~ The intent in the requirement associated with SR 3.8.1.17.b is to show that the emergency loading was not affected by the DG operation in test mode. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the emergency loads to perform these functions is acceptable.

(continued)

P1 B1

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.4 DC Sources—Operating

BASES

P37

instrument

BACKGROUND

The station DC electrical power system provides the AC emergency power system with control power. It also provides both motive and control power to selected safety related equipment and ~~preferred~~ AC ~~vital~~ bus power (via inverters). As required by 10 CFR 50, Appendix A, GDC 17 (Ref. 1), the DC electrical power system is designed to have sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure. The DC electrical power system also conforms to the recommendations of Regulatory Guide 1.6 (Ref. 2) and IEEE-308 (Ref. 3).

B2 Division 11(21) and Division 12(22) for each unit P37

The [125~~/250~~] VDC electrical power system consists of two independent and redundant safety related Class 1E DC electrical power subsystems (~~[Train A and Train B]~~). Each subsystem consists of ~~two~~ 125 VDC batter~~ies~~ ~~[each battery [50]% capacity]~~, the associated battery charger~~(s)~~ for each battery, and all the associated control equipment and interconnecting cabling.

one B3

B2

~~The 250 VDC source is obtained by use of the two 125 VDC batteries connected in series. Additionally there is [one] spare battery charger per subsystem, which provides backup service in the event that the preferred battery charger is out of service. If the spare battery charger is substituted for one of the preferred battery chargers, then the requirements of independence and redundancy between subsystems are maintained.~~

B2

During normal operation, the [125~~/250~~] VDC load~~s~~ ~~is~~ powered from the battery chargers with the batteries floating on the system. In case of loss of normal power to the battery charger, the DC load is automatically powered from the station batter~~ies~~y.

s are

P37 Division 11(21) and Division 12(22)

The ~~[Train A and Train B]~~ DC electrical power subsystems provide the control power for its associated Class 1E AC power load group, [4.16] kV switchgear, and [480] V load centers. The DC electrical power subsystems also provide DC electrical power to the inverters, which in turn power the AC ~~vital~~ buses.

instrument

P37

INSERT B3.8-50A

(continued)

REV L

BASES

BACKGROUND (continued)

The DC power distribution system is described in more detail in Bases for LCO 3.8.9, "Distribution System—Operating," and LCO 3.8.10, "Distribution Systems—Shutdown."

P15
INSERT B3.8-51A

~~Each battery has adequate storage capacity to carry the required load continuously for at least 2 hours and to perform three complete cycles of intermittent loads discussed in the FSAR, Chapter [8] (Ref. 4).~~

Each 125 VDC battery is separately housed in a ventilated room apart from its charger and distribution centers. Each subsystem is located in an area separated physically and electrically from the other subsystem to ensure that a single failure in one subsystem does not cause a failure in a redundant subsystem. There is no sharing between redundant Class 1E subsystems, such as batteries, battery chargers, or distribution panels. INSERT B3.8-51B P7

~~The batteries for Train A and Train B DC electrical power subsystems are sized to produce required capacity at 80% of nameplate rating, corresponding to warranted capacity at end of life cycles and the 100% design demand. Battery size is based on 125% of required capacity and, after selection of an available commercial battery, results in a battery capacity in excess of 150% of required capacity. The voltage limit is 2.13 V per cell, which corresponds to a total minimum voltage output of 128 V per battery discussed in the FSAR, Chapter [8] (Ref. 4). The criteria for sizing large lead storage batteries are defined in IEEE-485 (Ref. 5).~~

P37 Division 11(21) and Division 12(22)

Each ~~Train A and Train B~~ DC electrical power subsystem battery charger has ample power output capacity for the steady state operation of connected loads required during normal operation, while at the same time maintaining its battery bank fully charged. Each battery charger also has sufficient capacity to restore the battery from the design minimum charge to its fully charged state within 24 hours while supplying normal steady state loads discussed in the UFSAR, Chapter [8] (Ref. 4). P1 Rev C

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter [6] (Ref. 6), and in the UFSAR, Chapter [15] (Ref. 7), assume that Engineered Safety Feature (ESF) systems are OPERABLE. The DC

(continued)

INSERT B 3.8-51A (P_{15})

Each battery was sized based upon supplying the design duty cycle in the event of a loss of offsite AC power concurrent with a Loss Of Coolant Accident (LOCA) and a single failure of a Diesel Generator (DG). Each battery has a nominal rating of 2320 ampere-hours at the 8 hour discharge rate to an end voltage of 1.75 volts per cell, and was sized based upon continuously carrying the various estimated loads. The batteries were sized in accordance with IEEE-485-1983 (Ref. 5).

INSERT B 3.8-51B (P_7)

While it is possible to interconnect the Unit 1 and Unit 2 DC electrical power subsystems, they normally remain disconnected, except when a DC source must be taken out of service for the purposes of maintenance and/or testing, or in the event of a failure of a DC source.

The crosstie between 125 VDC ESF buses 111 and 211 and the crosstie between 125 VDC ESF buses 112 and 212 are each provided with two normally locked open, manually operated circuit breakers. No interlocks are provided since the interconnected buses are not redundant. However, if one battery is inoperable, procedural and administrative controls are used to limit the connected load to 200 amps based on not exceeding the OPERABLE battery capacity. These controls ensure that combinations of maintenance and test operations will not preclude the system capabilities to supply power to the ESF DC loads. The provisions of administratively controlled, manually actuated, interconnections between the non-redundant Class 1E DC buses increases the overall reliability and availability of the DC systems for each unit in that it provides a means for manually providing power to a DC bus at a time when it would otherwise have to be out-of-service (e.g., to perform a battery discharge test during an outage, to replace a damaged cell, etc.). Crosstie breaker closed alarms are also provided to alert the operator when the units are crosstied.

INSERT B 3.8-51A (P_{15})

Each battery was sized based upon supplying the design duty cycle in the event of a loss of offsite AC power concurrent with a Loss Of Coolant Accident (LOCA) and a single failure of a Diesel Generator (DG). Each battery has a nominal rating of 1760 ampere-hours for AT&T (2320 ampere-hours for C&D) at the 8 hour discharge rate to an end voltage of 1.75 volts per cell, and was sized based upon continuously carrying the various estimated loads. The batteries were sized in accordance with IEEE-485-1983 (Ref. 5).

INSERT B 3.8-51B (P_7)

While it is possible to interconnect the Unit 1 and Unit 2 DC electrical power subsystems, they normally remain disconnected, except when a DC source must be taken out of service for the purposes of maintenance and/or testing, or in the event of a failure of a DC source.

The crosstie between 125 VDC ESF buses 111 and 211 and the crosstie between 125 VDC ESF buses 112 and 212 are each provided with two normally locked open, manually operated circuit breakers. No interlocks are provided since the interconnected buses are not redundant. However, if one battery is inoperable, procedural and administrative controls are used to limit the connected load to 100 amps for AT&T (200 amps for C&D) based on not exceeding the OPERABLE battery capacity. These controls ensure that combinations of maintenance and test operations will not preclude the system capabilities to supply power to the ESF DC loads. The provisions of administratively controlled, manually actuated, interconnections between the non-redundant Class 1E DC buses increases the overall reliability and availability of the DC systems for each unit in that it provides a means for manually providing power to a DC bus at a time when it would otherwise have to be out-of-service (e.g., to perform a battery discharge test during an outage, to replace a damaged cell, etc.). Crosstie breaker closed alarms are also provided to alert the operator when the units are crosstied.

BASES

APPLICABLE SAFETY ANALYSES (continued)

electrical power system provides normal and emergency DC electrical power for the DGs, emergency auxiliaries, and control and switching during all MODES of operation.

The OPERABILITY of the DC sources is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the ~~unit~~ plant. This includes maintaining the DC ~~sources~~ electrical power distribution subsystem OPERABLE during accident conditions in the event of: P37

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

b. A worst case single failure.

The DC sources satisfy Criterion 3 of ~~the NRC Policy Statement~~ 10 CFR 50.36(c)(2)(ii). C9

LCO

The DC electrical power subsystems, each subsystem consisting of: ¶ a. (a) ~~two~~ batter~~ies~~y, ¶ b. battery charger, ~~for each battery~~ ¶ c. and the corresponding control equipment and interconnecting cabling supplying power to the associated bus within the ~~train~~ division, are required to be OPERABLE to ensure the availability of the required power to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence (AOO) or a postulated DBA. Loss of any ~~train~~ division DC electrical power subsystem does not prevent the minimum safety function from being performed (Ref. 4). B2

P22 P37

Furthermore, at least one crosstie breaker is required to be open to maintain independence between Division 11 and Division 21, and at least one crosstie breaker between Division 12 and Division 22, between the units.

An OPERABLE DC electrical power subsystem requires ~~all~~ the required batter~~ies~~y and respective charger~~s~~ to be operating and connected to the associated DC bus~~es~~.

APPLICABILITY

The DC electrical power sources are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure safe unit operation and to ensure that:

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

(continued)

<u>INSERT B 3.8-53A</u> (continued) (P_{22})

RAI 3.8.4-3

<u>C.1 and C.2</u>

Condition C addresses an operating unit's DC bus that is crosstied to the opposite unit's associated DC bus, which has an inoperable source (i.e., battery or battery charger), when the opposite unit is shutdown. This provision is included to accommodate maintenance and/or testing of the shutdown unit's DC subsystems.

With the shutdown unit's battery inoperable, the operating unit will be required to supply all loads on the shutdown unit's crosstied bus should an event occur on the shutdown unit. Therefore, Required Action C.1 specifies that the possible loading on the shutdown unit's DC bus be verified to be ≤ 200 amps once per 12 hours. Limiting the load to 200 amps ensures that the operating unit's DC subsystem will not be overloaded in the event of a concurrent event on the operating unit. Required Action C.1 is modified by a Note only requiring Required Action C.1 when the opposite unit has an inoperable battery.

RAI 3.8.4-3

Required Action C.2 requires the associated crosstie breaker to be opened within 7 days and ensures that measures are being taken to restore the inoperable battery or battery charger and reestablish independence of the DC subsystems.

<u>INSERT B 3.8-53A</u> (continued) (P_{22})

RAI 3.8.4-3

<u>C.1 and C.2</u>

Condition C addresses an operating unit's DC bus that is crosstied to the opposite unit's associated DC bus, which has an inoperable source (i.e., battery or battery charger), when the opposite unit is shutdown. This provision is included to accommodate maintenance and/or testing of the shutdown unit's DC subsystems.

With the shutdown unit's battery inoperable, the operating unit will be required to supply all loads on the shutdown unit's crosstied bus should an event occur on the shutdown unit. Therefore, Required Action C.1 specifies that the possible loading on the shutdown unit's DC bus be verified to be ≤ 100 amps for AT&T (≤ 200 amps for C&D) once per 12 hours. Limiting the load 100 amps for AT&T (200 amps for C&D) ensures that the operating unit's DC subsystem will not be overloaded in the event of a concurrent event on the operating unit. Required Action C.1 is modified by a Note only requiring Required Action C.1 when the opposite unit has an inoperable battery.

RAI 3.8.4-3

Required Action C.2 requires the associated crosstie breaker to be opened within 7 days and ensures that measures are being taken to restore the inoperable battery or battery charger and reestablish independence of the DC subsystems.

B1 P1

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.6

This SR requires that each battery charger be capable of supplying [400] amps and [125] V for ≥ [8] hours. These requirements are based on the design capacity of the chargers (Ref. 4). According to Regulatory Guide 1.32 (Ref. 10), the battery charger ~~supply~~ output capacity is required to be based on the largest combined demands of the various steady state loads and the charging ~~capacity~~ demands to restore the battery from the design minimum charge state to the fully charged state, irrespective of the status of the unit during these demand occurrences. The minimum required amperes and duration ensures that these requirements can be satisfied.

P37

The Surveillance Frequency is acceptable, given the unit conditions required to perform the test and the other administrative controls existing to ensure adequate charger performance during these [18 month] intervals. In addition, this Frequency is intended to be consistent with expected fuel cycle lengths.

This Surveillance is required to be performed during MODES 5 and 6 since it would require the DC electrical power subsystem to be inoperable during performance of the test.

P27 ~~This SR is modified by a Note. The reason for the Note is that performing the Surveillance would perturb the electrical distribution system and challenge safety systems.~~ C2 ~~Credit may be taken for unplanned events that satisfy this SR.~~

SR 3.8.4.7

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

The Surveillance Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.32 (Ref. 10) and Regulatory Guide 1.129 (Ref. 11), which state that the battery service test should be performed during refueling operations or at some other outage, with intervals between tests, not to exceed [18 months].

(continued)

Rev L

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.7 (continued)

This SR is modified by two Notes. Note 1 allows the performance of a modified performance discharge test in lieu of a service test ~~once per 60 months~~. P37

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

performance P1

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

P37
INSERT B3.8-57A

The reason for Note 2 is that performing the Surveillance would perturb the electrical distribution system and challenge safety systems. ~~Credit may be taken for unplanned events that satisfy this SR.~~

C2

SR 3.8.4.8

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

(continued)

INSERT B 3.8-57A (P_{37})

... and the test discharge rate must envelop the duty cycle of the service test if the modified performance discharge test is performed in lieu of a service test

P1 P35

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.8 (continued)

A battery modified performance discharge test is described in the Bases for SR 3.8.4.7. Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.4.8; however, only the modified performance discharge test may be used to satisfy SR 3.8.4.8 while satisfying the requirements of SR 3.8.4.7 at the same time.

Braidwood's Unit 2 — DELETE AND REPLACE WITH INSERT B.3.8-58A

The acceptance criteria for this Surveillance are consistent with IEEE-450 (Ref. 9) and IEEE-485 (Ref. 5). These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements.

Rev 1

The Surveillance Frequency for this test is normally 60 months. If the battery shows degradation, or if the battery has reached 85% of its expected life and capacity is < 100% of the manufacturer's rating, the Surveillance Frequency is reduced to 12 months. However, if the battery shows no degradation but has reached 85% of its expected life, the Surveillance Frequency is only reduced to 24 months for batteries that retain capacity ≥ 100% of the manufacturer's rating. Degradation is indicated, according to IEEE-450 (Ref. 9), when the battery capacity drops by more than 10% relative to its capacity on the previous performance test or when it is ~~≥ [10%]~~ below the manufacturer's rating. These Frequencies are consistent with the recommendations in IEEE-450 (Ref. 9).

Braidwood Unit 2

P37

5% FOR AT&T

FOR C&D)

>0% FOR AT&T
(>10% FOR C&D)

P37

Rev L

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would perturb the electrical distribution system and challenge safety systems. ~~Credit may be taken for unplanned events that satisfy this SR.~~

C2

Rev L

REFERENCES

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

2. Regulatory Guide 1.6, March 10, 1971.

3. IEEE-308-~~[1978]~~.

(continued)

Rev L

INSERT B 3.8-58A (P_{35})

AT&T Batteries: AT&T battery manufacturer's data indicates that the capacity of the battery actually increases over its service life. The NRC has concurred that the battery meets acceptable operating criteria if it can be shown that battery capacity for the AT&T batteries is at least 95% of the manufacturer's rating when subjected to a performance discharge test every 60 months.

BASES

REFERENCES (continued)

4. UFSAR, ~~Chapter~~ [8]. Section 8.3.2.1
5. IEEE-485-[1983], June 1983.
6. UFSAR, Chapter [6].
7. UFSAR, Chapter [15].
8. Regulatory Guide 1.93, December 1974.
9. IEEE-450-~~[1987]~~. 1995
10. Regulatory Guide 1.32, February 1977.
11. Regulatory Guide 1.129, December 1974.

Rev L

Rev L

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.5 DC Sources—Shutdown

BASES

BACKGROUND

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

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident and transient analyses in the UFSAR, Chapter ~~[6]~~ (Ref. 1) and Chapter ~~[15]~~ (Ref. 2), assume that Engineered Safety Feature systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the diesel generators, emergency auxiliaries, and control and switching during all MODES of operation.

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

The OPERABILITY of the minimum DC electrical power sources during MODES 5 and 6 and during movement of irradiated fuel assemblies ensures that:

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

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

c. Adequate DC electrical power is provided to mitigate events postulated during shutdown, such as a fuel handling accident.

The DC sources satisfy Criterion 3 of ~~the NRC Policy Statement~~ 10 CFR 50.36 (c)(2)(ii). C9

LCO

The DC electrical power ~~subsystems~~, ~~each~~ subsystem with: a. at least one consisting of ~~two~~ batter~~ies, one~~ battery charger ~~per battery~~, ~~and~~ the corresponding control equipment, and

Insert B 3.8-60A — P49

DAT 3.8.5-01

(continued)

RAI 3.8.5-01

| INSERT B 3.8-60A (P_{49})

a. ...

b. when the redundant division of the class 1E DC electrical power distribution subsystem is required by LCO 3.8.10, the other subsystem consisting of either a battery or a charger; and

c. ...

P1

BASES

LCO (continued)

P19

interconnecting cabling within the ~~train~~ division(s) are required to be OPERABLE to support required ~~trains~~ of the distribution systems required OPERABLE by LCO 3.8.10, "Distribution Systems—Shutdown." This ensures the availability of sufficient DC electrical power sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents).

P22

Furthermore, at ~~least~~ one unit crosstie breaker per division is required to be open to maintain independence between the units.

P41 Insert B3.8-61A

APPLICABILITY

The DC electrical power sources required to be OPERABLE at all times in MODES 5 and 6, and during movement of irradiated fuel assemblies, provide assurance that:

a. Required features to provide adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core;

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

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

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

The DC electrical power requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.4.

ACTIONS

INSERT B3.8-61B P26

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.~~4~~ 5 P32

If two ~~train~~ divisions are required by LCO 3.8.10, the remaining ~~train~~ division with DC power available may be capable of supporting sufficient systems to allow continuation of CORE ALTERATIONS and fuel movement. By allowing the option to declare required features inoperable with the associated DC power source(s) inoperable, appropriate restrictions will be implemented in accordance with the affected required features' LCO ACTIONS. In many instances, this option may involve undesired administrative efforts. Therefore, the

(continued)

REV L

INSERT B 3.8-62B (P_{41})

B.1 and B.2

Condition B addresses a shutdown unit's DC bus that is crosstied to the opposite unit's associated DC bus, which has an inoperable source, when the opposite unit is also shutdown. This provision is included to accommodate maintenance and/or testing of the opposite unit's DC subsystems.

With the opposite unit's battery inoperable, the unit-specific DC subsystem will be required to supply all loads on the opposite unit's crosstied bus should an event occur on the opposite unit. Therefore, Required Action B.1 specifies that the possible loading on the opposite unit's DC bus be verified to be ≤ 200 amps once per 12 hours. Limiting the load to 200 amps, ensures that the unit-specific DC subsystem will not be overloaded in the event of a concurrent event on the unit. Required Action B.1 is modified by a Note requiring Required Action B.1 when the opposite unit has an inoperable battery.

Required Action B.2 requires the associated crosstie breaker to be opened within 7 days ensures that measures are being taken to reestablish independence of the DC subsystems.

INSERT B 3.8-62B (P_{41})

B.1 and B.2

Condition B addresses a shutdown unit's DC bus that is crosstied to the opposite unit's associated DC bus, which has an inoperable source, when the opposite unit is also shutdown. This provision is included to accommodate maintenance and/or testing of the opposite unit's DC subsystems.

With the opposite unit's battery inoperable, the unit-specific DC subsystem will be required to supply all loads on the opposite unit's crosstied bus should an event occur on the opposite unit. Therefore, Required Action B.1 specifies that the possible loading on the opposite unit's DC bus be verified to be ≤ 100 amps for AT&T (≤ 200 amps for C&D) once per 12 hours. Limiting the load to 100 amps for AT&T (200 amps for C&D), ensures that the unit-specific DC subsystem will not be overloaded in the event of a concurrent event on the unit. Required Action B.1 is modified by a Note requiring Required Action B.1 when the opposite unit has an inoperable battery.

Required Action B.2 requires the associated crosstie breaker to be opened within 7 days ensures that measures are being taken to reestablish independence of the DC subsystems.

BASES (continued)

APPLICABILITY

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

Insert B3.8-65A

P46

ACTIONS

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

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

The pilot cell electrolyte level and float voltage are required to be verified to meet the Category C limits within 1 hour (Required Action A.1). This check will provide a quick indication of the status of the remainder of the battery cells. One hour provides time to inspect the electrolyte level and to confirm the float voltage of the pilot cells. One hour is considered a reasonable amount of time to perform the required verification.

P37

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

Rev. C

(continued)

Rev L

BASES

SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

suffer no physical damage, and that adequate electron transfer capability is maintained in the event of transient conditions. IEEE-450 (Ref. 3) recommends that electrolyte level readings should be made only after the battery has been at float charge for at least 72 hours.

The Category A limit specified for float voltage is ≥ 2.13 V per cell. This value is based on the recommendations of IEEE-450 (Ref. 3), which states that prolonged operation of cells < 2.13 V can reduce the life expectancy of cells.

The Category A limit specified for specific gravity for each pilot cell is ≥ [1.200] (0.015 below the manufacturer fully charged nominal specific gravity or a battery charging current that had stabilized at a low value). This value is characteristic of a charged cell with adequate capacity. According to IEEE-450 (Ref. 3), the specific gravity readings are based on a temperature of 77°F (25°C).

P37

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

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

P37

The Category B limits specified for electrolyte level and float voltage are the same as those specified for Category A and have been discussed above. Footnote (b) to Table 3.8.6-1 requires the float voltage correction for average electrolyte temperature. The Category B limit specified for specific gravity for each connected cell is ≥ [1.195] (0.020 below the manufacturer fully charged, nominal specific gravity) with the average of all connected cells > [1.205] (0.010 below the manufacturer fully charged, nominal specific gravity). These values are based on manufacturer's recommendations. The minimum specific gravity value required for each cell ensures that the effects of a highly charged or newly installed cell will not mask overall degradation of the battery.

Rev. C

(continued)

SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

suffer no physical damage, and that adequate electron transfer capability is maintained in the event of transient conditions. IEEE-450 (Ref. 3) recommends that electrolyte level readings should be made only after the battery has been at float charge for at least 72 hours.

The Category A limit specified for float voltage is ≥ ~~2.13~~ 2.18 V per cell. This value is based on the recommendations of IEEE-450 (Ref. 3), which states that prolonged operation of cells < ~~2.13~~ 2.18 V can reduce the life expectancy of cells.

The Category A limit specified for specific gravity for each pilot cell is ≥ ~~[1.200]~~ 1.285 (0.015 below the manufacturer fully charged nominal specific gravity or a battery charging current that had stabilized at a low value). This value is characteristic of a charged cell with adequate capacity. According to IEEE-450 (Ref. 3), the specific gravity readings are based on a temperature of 77°F (25°C).

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

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

The Category B limits specified for electrolyte level and float voltage are the same as those specified for Category A and have been discussed above. The Category B limit specified for specific gravity for each connected cell is ≥ ~~[1.195]~~ 1.280 (0.020 below the manufacturer fully charged, nominal specific gravity) with the average of all connected cells > ~~[1.205]~~ 1.290 (0.010 below the manufacturer fully charged, nominal specific gravity). These values are based on manufacturer's recommendations. The minimum specific gravity value required for each cell ensures that the effects of a highly charged or newly installed cell will not mask overall degradation of the battery.

Footnote (b) to Table 3.8.6-1 requires the float voltage correction for average electrolyte temperature.

(continued)

Rev. C

BASES

SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

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

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

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

Rev. C

P37

The footnotes to Table 3.8.6-1 are applicable to Category A, B, and C specific gravity. Footnote (~~b~~) c to Table 3.8.6-1 requires the above mentioned correction for electrolyte ~~level and~~ temperature. ~~with the exception that level correction is not required when battery charging current is < [2] amps on float charge. This current provides, in general, an indication of overall battery condition.~~ Rev L

Because of specific gravity gradients that are produced during the recharging process, delays of several days may occur while waiting for the specific gravity to stabilize. A stabilized charger current is an acceptable alternative to specific gravity measurement for determining the state of charge. This phenomenon is discussed in IEEE-450 (Ref. 3). Footnote (~~c~~) d to Table 3.8.6-1 allows the float charge current to be used as an alternate to specific gravity for

(continued)

Rev L

BASES

SURVEILLANCE REQUIREMENTS

Table 3.8.6-1 (continued)

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

The Category C limits specified for electrolyte level (above the top of the plates and not overflowing) ensure that the plates suffer no physical damage and maintain adequate electron transfer capability. The Category C limits for float voltage is based on IEEE-450 (Ref. 3), which states that a cell voltage of ~~2.07~~ 2.14 V or below, under float conditions and not caused by elevated temperature of the cell, indicates internal cell problems and may require cell replacement.

The Category C limit of average specific gravity ≥ ~~1.195~~ 1.280 is based on manufacturer recommendations (0.020 below the manufacturer recommended fully charged, nominal specific gravity). In addition to that limit, it is required that the specific gravity for each connected cell must be no less than 0.020 below the average of all connected cells. This limit ensures that the effect of a highly charged or new cell does not mask overall degradation of the battery.

The footnotes to Table 3.8.6-1 are applicable to Category A, B, and C specific gravity. Footnote (~~b~~ c) to Table 3.8.6-1 requires the above mentioned correction for electrolyte level and temperature, with the exception that level correction is not required when battery charging current is < ~~[2]~~ 2 amps on float charge. This current provides, in general, an indication of overall battery condition.

Rev. C

Rev L

Because of specific gravity gradients that are produced during the recharging process, delays of several days may occur while waiting for the specific gravity to stabilize. A stabilized charger current is an acceptable alternative to specific gravity measurement for determining the state of charge. This phenomenon is discussed in IEEE-450 (Ref. 3). Footnote (~~c~~ d) to Table 3.8.6-1 allows the float charge current to be used as an alternate to specific gravity for

(continued)

BASES (continued)

P49 P1 One AC instrument bus division energized by two P37 division

LCO

P37 at least one P1 instrument INSERT B3.8-76A P49

The inverters ensure the availability of electrical power for the instrumentation for systems required to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence or a postulated DBA. ~~The~~ battery powered inverters provides uninterruptible supply of AC electrical power to ~~the~~ AC ~~vital~~ bus~~es~~ division even if the 4.16 kV safety buses are de-energized. OPERABILITY of these two inverters requires that the AC ~~vital~~ buses be powered by the associated inverters. This ensures the availability of sufficient inverter power sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents). P37

APPLICABILITY

P1 at all times

The inverters required to be OPERABLE in MODES 5 and 6, and during movement of irradiated fuel assemblies, provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel in the core;

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

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

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

Inverter requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.7.

ACTIONS

P26 INSERT B3.8-76B A.2.5 P32 P1 P49

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

P1 divisions With one or more required AC instrument bus power sources inoperable when P49 AC instrument bus power sources

~~If~~ two ~~trains~~ divisions are required by LCO 3.8.10, "Distribution Systems—Shutdown," the remaining OPERABLE ~~inverters~~ AC instrument bus power sources may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, ~~and~~ or operations with a potential for positive reactivity additions. By the allowance of the option to declare

(continued)

REV L

RAI 3.8.5-01

Bases 3.8.8

INSERT B 3.8-76A (P_{49})

When the redundant division of the Class 1E AC instrument bus electrical power distribution subsystem is required by LCO 3.8.10, the power source for the AC instrument buses may consist of:

a. one inverter powered by its associated battery;

b. one inverter powered by its internal AC source; or

c. one Class 1E constant voltage source transformer.

Rev. C

INSERT B 3.8-76B (P_{26})

LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Therefore, in either case, inability to suspend movement of irradiated fuel assemblies would not be sufficient reason to require a reactor shutdown.

P1 B1

BASES

LCO (continued)

P37

THE DIVISION ALSO INCLUDES (BUT IS NOT INCLUDED IN THE SUBSYSTEM REQUIRED TO BE OPERABLE BY LCO 3.8.9) SECONDARY 480 AND 120 V BUSES, MOTOR CONTROL CENTERS AND DISTRIBUTION PANELS.

OPERABLE AC electrical power distribution subsystems require the associated buses~~, load centers~~, ~~motor control centers~~, ~~and distribution panels~~ to be energized to their proper voltages. OPERABLE DC electrical power distribution subsystems require the associated buses to be energized to their proper voltage from either the associated battery or charger. OPERABLE instrument ~~vital~~ bus electrical power distribution subsystems require the associated buses to be energized to their proper voltage from the associated {inverter via inverted DC voltage, inverter using ~~internal~~ AC source, or Class 1E constant voltage transformer}.

P17

~~In addition, tie breakers between redundant safety related AC, DC, and AC vital bus power distribution subsystems, if they exist, must be open. This prevents any electrical malfunction in any power distribution subsystem from propagating to the redundant subsystem, that could cause the failure of a redundant subsystem and a loss of essential safety function(s). If any tie breakers are closed, the affected redundant electrical power distribution subsystems are considered inoperable. This applies to the onsite, safety related redundant electrical power distribution subsystems. It does not, however, preclude redundant Class 1E 4.16 kV buses from being powered from the same offsite circuit.~~

APPLICABILITY

The electrical power distribution subsystems are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

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

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

Electrical power distribution subsystem requirements for MODES 5 and 6 are covered in ~~the Bases for~~ LCO 3.8.10, "Distribution Systems—Shutdown."

REV C

(continued)

REV L

ACTIONS

A.1

P37 With one ~~or more required~~ AC buses, ~~load centers, motor control centers, or distribution panels~~ except AC ~~vital~~ instrument buses, ~~in one train~~ inoperable, the remaining AC electrical power distribution subsystem ~~in the other train~~ is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. The overall reliability is reduced, however, because a single failure in the remaining power distribution subsystem~~s~~ could result in the minimum required ESF functions not being supported. Therefore, the required AC bus~~es~~, ~~load centers, motor control centers, and distribution panels~~ must be restored to OPERABLE status within 8 hours. P37

Condition A worst scenario is one ~~train~~ division without AC power (i.e., no offsite power to the ~~train~~ division and the associated DG inoperable). In this Condition, the unit is more vulnerable to a complete loss of AC power. It is, therefore, imperative that the unit operator's attention be focused on minimizing the potential for loss of power to the remaining ~~train~~ division by stabilizing the unit, and on restoring power to the affected ~~train~~ division. The 8 hour time limit before requiring a unit shutdown in this Condition is acceptable because of:

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

b. The ~~potential~~ low probability for an event in conjunction with a single failure of a redundant component in the ~~train~~ division with AC power.

The second Completion Time for Required Action A.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition A is entered while, for instance, a DC bus is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 2 hours. This could lead to a total of 10 hours, since initial failure of the LCO, to restore the AC distribution system. At this time, a DC circuit could again

(continued)

ACTIONS

A.1 (continued)

become inoperable, and AC distribution restored OPERABLE. This could continue indefinitely.

The Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time the LCO was initially not met, instead of the time Condition A was entered. The 16 hour Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely.

REV 1

(P37)

B.1

instrument bus

With one AC ~~vital bus~~ inoperable, the remaining OPERABLE AC instrument ~~vital~~ buses are capable of supporting the minimum safety functions necessary to shut down the unit and maintain it in the safe shutdown condition. Overall reliability is reduced, however, since an additional single failure could result in the minimum ~~[required]~~ ESF functions not being supported. Therefore, the required AC ~~vital~~ instrument bus must be restored to OPERABLE status within 2 hours by powering the bus from the associated ~~[~~inverter via inverted DC, inverter using ~~internal~~ AC source, or Class 1E constant voltage transformer~~]~~. (B3)

instrument bus

Condition B represents one AC ~~vital bus~~ without power; potentially both the DC source and the associated AC source are nonfunctioning. In this situation, the unit is significantly more vulnerable to a complete loss of all noninterruptible power. It is, therefore, imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for loss of power to the remaining instrument ~~vital~~ buses and restoring power to the affected ~~vital~~ instrument bus.

This 2 hour limit is more conservative than Completion Times allowed for the vast majority of components that are without adequate ~~vital~~ AC power. Taking exception to LCO 3.0.2 for components without adequate ~~vital~~ AC power, that would have the Required Action Completion Times shorter than 2 hours if declared inoperable, is acceptable because of:

instrument

(continued)

P1

BASES

ACTIONS (continued)

C.1

one

P1

With DC bus~~(es)~~ ~~in one train~~ inoperable, the remaining DC electrical power distribution subsystem~~s are~~ is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. The overall reliability is reduced, however, because a single failure in the remaining DC electrical power distribution subsystem could result in the minimum required ESF functions not being supported. Therefore, the ~~required~~ DC bus~~es~~ must be restored to OPERABLE status within 2 hours by powering the bus from the associated battery or charger.

division

Condition C represents one ~~train~~ without adequate DC power; potentially both with the battery significantly degraded and the associated charger nonfunctioning. In this situation, the unit is significantly more vulnerable to a complete loss of all DC power. It is, therefore, imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for loss of power to the remaining ~~train~~s and restoring power to the affected ~~train~~.

and not crosstied to the other unit

P33

division

P37

This 2 hour limit is more conservative than Completion Times allowed for the vast majority of components that would be without power. Taking exception to LCO 3.0.2 for components without adequate DC power, which would have Required Action Completion Times shorter than 2 hours, is acceptable because of:

a. The potential for decreased safety by requiring a change in unit conditions (i.e., requiring a shutdown) while allowing stable operations to continue;

b. The potential for decreased safety by requiring entry into numerous applicable Conditions and Required Actions for components without DC power and not providing sufficient time for the operators to perform the necessary evaluations and actions for restoring power to the affected ~~train~~; and

division

P37

low probability

c. The ~~potential~~ for an event in conjunction with a single failure of a redundant component.

The 2 hour Completion Time for DC buses is consistent with Regulatory Guide 1.93 (Ref. 3).

(continued)

REV L

Rev L

Rev L

ACTIONS

C.1 (continued)

The second Completion Time for Required Action C.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition C is entered while, for instance, an AC bus is inoperable and subsequently returned OPERABLE, the LCO may already have been not met for up to 8 hours. This could lead to a total of 10 hours, since initial failure of the LCO, to restore the DC distribution system. At this time, an AC ~~train~~ bus could again become inoperable, and DC distribution restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time the LCO was initially not met, instead of the time Condition C was entered. The 16 hour Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely.

D.1 and D.2

If the inoperable distribution subsystem cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

(P27)

E.1

With two ~~trains with~~ inoperable ELECTRICAL POWER distribution subsystems that result in a loss of safety function, adequate core cooling, containment OPERABILITY and other vital functions for DBA mitigation would be compromised, and immediate plant shutdown in accordance with LCO 3.0.3 is required.

CAI 3.8.9-2

INSERT B 3.8-86A

Deleted in Revision L

RAI 3.8b-01

JUSTIFICATION FOR DIFFERENCES TO NUREG-1431 BASES
SECTION 3.8 - ELECTRICAL POWER SYSTEMS

GENERIC CHANGES (C)

C_1 Not used.

C_2 This change is consistent with NUREG-1431, as modified by TSTF-8, Revision 2. The proposed changes to SR 3.8.1.12 and SR 3.8.1.13 are not required. (See JFD P_{42}.)

C_3 This change is consistent with NUREG-1431, as modified by TSTF-38.

C_4 Not used.

C_5 This change is consistent with NUREG-1431, as modified by TSTF-2, Revision 1.

JUSTIFICATION FOR DIFFERENCES TO NUREG-1431 BASES
SECTION 3.8 - ELECTRICAL POWER SYSTEMS

RAI 3.8.9-2

P_{16} Not used.

P_{17} LCO Bases for ITS 3.8.9 delete the paragraph pertaining to crosstied divisions. No crossties between redundant safety related divisions exist in the Byron/Braidwood design.

RAI 3.8.4-7

P_{18} Not used.

P_{19} LCO section Bases for ITS LCO 3.8.3, more specifically reference the required 7-day fuel oil supply as supporting the "maximum post-accident load" versus "full load."

P_{20} The SR Section of the Bases for LCO 3.8.1 contains an explanation of the use of Table 3.8.1-1, "Diesel Generator Test Schedule." In accordance with NRC Generic Letter 94-01, "Removal of Accelerated Testing and Special Reporting Requirements for Emergency Diesel Generators," this Table was deleted from CTS in Amendment 71 (Braidwood) and Amendment 79 (Byron). Therefore, the discussion of this Table has been deleted from the Bases.

RAI 3.8.1-7

P_{21} The Bases for NUREG-1431 SR 3.8.1.14 (ITS SR 3.8.1.14) have been modified by the replacement of information regarding testing the DGs at rated power factor. The guidance from INSERT B 3.8-27A ensures that the DG is tested at its rated power factor for a brief time to verify the generator, regulator, and exciter can achieve their design ratings. During testing, the DG is increased to rated power factor for a short period while at full load and then returned to < 1000 kVARs. This testing ensures the full functionality of the generator and voltage regulator/exciter and yet serves to minimize exposure to the risks associated with a full load reject at rated power factor. The practice of performing this test at rated power factor has been determined to be unjustified, potentially destructive, testing due to exceeding the vendors recommendation for maximum voltage of the generator, if the generator should open during testing. Amplification of this issue is contained in the Engineering Position Paper on Power Factor Loading During Emergency Diesel Generator Testing dated November 28, 1995. Both Cooper-Bessemer and the NRC concurred with the determination for discontinuing most of the DG testing at rated power factor. This recommendation and commitment has been added to the Bases for ITS SR 3.8.1.14.

RAI 3.8, 4-2

JUSTIFICATION FOR DIFFERENCES TO NUREG-1431 BASES
SECTION 3.8 - ELECTRICAL POWER SYSTEMS

P_{30} Not used.

P_{31} The Bases for SR 3.8.7.1 and SR 3.8.8.1 of NUREG-1431 contain verification of frequency of the AC instrument inverters. The inverter panels at Byron and Braidwood do not display output frequency, and this requirement is not included in the CTS. Therefore, this requirement has been deleted from SR 3.8.7.1 and SR 3.8.8.1 in ITS.

P_{32} The Actions Section of the Bases for NUREG-1431, Condition A of LCOs 3.8.2, 3.8.5, 3.8.8, and 3.8.10, and Condition B of NUREG LCO 3.8.2 have been modified by the additional Required Action to "declare associated LTOP features inoperable immediately." The Actions of CTS LCOs 3.8.1.2, 3.8.2.2, and 3.8.3.2 require "within 8 hours, depressurize and vent the RCS through at least a 2 square inch vent." This CTS action is replaced with the additional NUREG actions referenced above. The addition of the requirement to immediately declare associated LTOP features inoperable allows the operator to evaluate the current plant conditions and to determine whether the LTOP features have been affected by the loss of power. If the LTOP features have not been affected, then unnecessarily restrictive actions may be averted.

P_{33} The Bases for NUREG-1431 LCO 3.8.9, Required Action C.1 Section, have been modified by the addition of the words, "and not crosstied to the other unit." This revision is made to address options made available by the ability to crosstie DC buses at Byron and Braidwood. ITS LCO 3.8.4 has been changed by new Conditions A, C, and D, which allow crosstieing the Unit's DC buses. ITS LCO 3.8.4 Condition B addresses all other inoperabilities of a DC electrical power subsystem. Conditions C and D specify additional requirements when an operating unit's DC bus is crosstied to a shutdown unit's DC bus. These additional requirements are contained in CTS LCO 3.8.2.1 and provide clarification for the TS user.

P_{34} Consistent with CTS 4.8.1.1.2.d), the sampling time frame for new fuel oil is revised to 30 days.

P_{35} Not used.

JUSTIFICATION FOR DIFFERENCES TO NUREG-1431 BASES
SECTION 3.8 - ELECTRICAL POWER SYSTEMS

RAI 3.8.1-6

P_{36} The Actions Section of the Bases for ITS LCO 3.8.1 was revised to be consistent with ITS LCO 3.8.1 Required Action B.2 and current plant design. Plant specific design consists of two AF pumps. 'A' train AF includes a motor driven AF pump that relies on the 'A' DG for emergency power. 'B' train AF includes a stand alone diesel driven AF pump that does not depend on the 'B' DG. In the event the 'A' DG were to be declared inoperable, not only would the redundant feature(s) associated with the OPERABLE DG (i.e. the 'B' DG) be required to be evaluated for OPERABILITY, but so would the independent 'B' AF pump. Further, in the event the 'A' DG and the 'B' AF pump were to be declared inoperable, both AF pumps would be declared inoperable, and the appropriate conditions of ITS LCO 3.7.5 would be entered.

P_{37} Bases revised to reflect the Byron & Braidwood design, analyses, or plant specific terminology.

P_{38} The Bases for LCO 3.8.3 Action C.1 and SR 3.8.3.2, regarding implementation of the Diesel Fuel Oil Testing Program, is revised to include clarification of basis and intent of the sequence and timing of some Program details. Additional plant specific changes made to reflect consistency with current testing methods and procedures.

P_{39} The Background Section of the Bases for NUREG LCO 3.8.1 has been modified to eliminate discussions relating to sequencing loads onto the SATs on an SI signal. The Byron/Braidwood design does not sequence loads when offsite power is available.

RAI 3.8.1-21

P_{40} A discussion of the SR 3.8.1.10 Note (which indicates that momentary transients above the voltage limit immediately following a load rejection do not invalidate the test) is added to the Bases for the SR.

P_{41} The Bases for LCO 3.8.5 are modified to include a description of the LCO Note which allows one division to be crosstied when the opposite unit is in MODE 1, 2, 3, or 4 with an inoperable battery charger. This is consistent with the allowance of CTS LCO 3.8.2.2 action a. In addition, the Actions of NUREG-1431 LCO 3.8.5 have been modified by the addition of ITS LCO 3.8.5 Condition B. Condition B addresses the requirements for the condition when the unit's DC bus is crosstied to a shutdown unit that has an inoperable battery or battery charger. These additional requirements are contained in CTS LCO 3.8.2.1.

JUSTIFICATION FOR DIFFERENCES TO NUREG-1431 BASES
SECTION 3.8 - ELECTRICAL POWER SYSTEMS

P_{42} The Notes to ITS SR 3.8.1.12 and SR 3.8.1.13 (restricting performance of the SR to MODES other than MODE 1 or 2) and associated Bases are deleted. Testing which satisfies the requirements of these SRs can be required as part of post-maintenance return to service testing or as a part of other TS required testing performed at power. Deletion of these Notes allows for minimizing wear and tear on the DGs by limiting the number of unnecessary starts. For example, if a DG becomes inoperable at power and, as part of a return to service testing, tests which satisfy the SR are required to determine OPERABILITY, performance of the SR during shutdown would be an additional start of the DG, that might not otherwise be required. (See also L_{29} Discussion of Change.)

RAI 3.8.7-1

P_{43} Not used.

P_{44} Consistent with Regulatory Guide 1.9, Section 2.2.9, the Bases description of SR 3.8.1.14 is revised to indicate that the first two hours of the 24 hour test is conducted at a load band equivalent to 105% to 110% of the DG continuous duty rating.

P_{45} ITS LCO 3.8.1, and its associated Conditions and Required Actions are modified to reflect the Byron and Braidwood design. Byron and Braidwood design includes a normal and reserve qualified circuit to each 4.16 kV bus. The normal circuits are via the unit system auxiliary transformers (note either unit transformer can supply both buses via the use of disconnect links). The reserve circuits are via the opposite unit SATs via the opposite unit's 4.16 kV buses. This design affords additional redundancy in certain scenarios. ITS LCO 3.8.1 reflects the requirement of 2 circuits per bus. ITS LCO 3.8.1 Conditions A and C are modified to reflect the allowance for one or more buses with one (Condition A) or two (Condition C) circuits to be inoperable. ITS LCO 3.8.1 Condition D provides Required Actions of either restore the DG in 12 hours or restore the required qualified circuits in 12 hours. The proposed restoration time is consistent with the discussions provided in Regulatory Guide 1.93, "Availability of Electric Power Sources". Therefore this change does not have a adverse impact on safety.

P_{45} (continued)

Regulatory Guide 1.93, Discussion B.2 discusses when the available offsite AC Sources are two less than the LCO that this degradation level means that the offsite power system does not have the capability to effect a safe shutdown. For Byron and Braidwood, if the normal and reserve qualified circuits for one bus are inoperable and the other bus' qualified circuits are Operable. The offsite power system does have the capability to effect a safe shutdown.

Regulatory Guide 1.93, Discussion B.3 discusses when the available offsite AC Sources are one less than the LCO and the available onsite AC Sources are one less than the LCO that this degradation level means that individual redundancy in both the offsite power system and the onsite AC power system is lost. In addition, Discussion B.3 provides an example of the failure of an emergency power distribution bus that is energized by either the single available offsite circuit or the single available onsite AC supply could render all emergency AC power ineffective. For Byron and Braidwood, if the normal and reserve qualified circuits for one bus are inoperable and the associated DG is inoperable, this situation is similar to the B.3 discussion, in that a failure of an emergency power distribution bus could render all emergency AC power ineffective. However, in the situation where the normal and reserve qualified circuits for one bus are inoperable and the DG associated with the opposite bus is inoperable, a failure of an emergency power distribution bus would not render all emergency AC power ineffective. Regulatory Guide 1.93, C.3 recommends a restoration time of 12 hours when the available offsite and onsite AC power sources are each one less than the LCO. In addition, NUREG-1431, LCO 3.8.9 Condition A Bases describes that in the case of a division without AC power (no offsite power to the division and the associated DG inoperable), that "it is imperative that the unit operator's attention be focused on minimizing the potential for loss of power to the remaining division by stabilizing the unit, and on restoring power to the affected division." In this scenario, NUREG-1431 LCO 3.8.9 Condition A allows 8 hours to restore the bus. ITS LCO 3.8.1 Condition G is modified to reflect the scenarios where entering LCO 3.0.3 would be appropriate.

P_{46} The Bases for LCO 3.8.6 were revised to add a discussion for the existing LCO ACTIONS Table Note. The Note states, "Separate condition entry is allowed for each battery." The bases do not contain any discussion of this Note. This is consistent with TSTF-203.

RWC

P_{47} Due to the relative large size of the inter-cell connectors, the present inter-cell resistance readings vary from 8 to 15 μohms. Addition of the 20% criteria would require action or assessment for deviations as small as 2 μohms. This deviation is outside the accuracy of the test equipment and the measuring techniques. Therefore, this statement is being deleted from the ITS Bases.

RAI 3.8.1-7

P_{48} As stated in STS Bases for SR 3.8.1.3, there are no power factor requirements established by the SR. The substitution of operation between 0 and 1000 kVARs in place of the power factor references is a plant specific limitation. This limitation ensures that in the event of a full load reject during testing, the resulting voltage transient will not exceed the vendor recommended maximum value of 5000 V. While operating outside the stated kVAR band, a full load reject may result in a voltage transient that exceeds 5000 V.

RAI 3.8.5-1

P_{49} The proposed Bases are modified to reflect plant specific design and to clarify the DC Sources-Shutdown and Inverter-Shutdown LCOs to reflect more specific requirements for each subsystem. As written, the NUREG LCO requirements imply that a full complement of battery and charger are required for both subsystems. Similarly, for inverters, a DC battery-backed inverter is required for both divisions or trains. The requirements for the second subsystem should be relaxed to require either a battery or a charger and either DC input or regulated AC input. This level of DC Source and Inverter requirements will continue to assure that sufficient power is available to support the response to events postulated during shutdown conditions in the event of a loss of offsite power or a single failure. This change is consistent with the initial philosophy of the ITS NUREGs and is an added restriction (beyond CTS LCO 3.8.2.2 and CTS LCO 3.8.3.2) which is not required by the CTS. Refer to LCO JFD P_{31}.

NO SIGNIFICANT HAZARDS EVALUATION
ITS SECTION 3.8 - ELECTRICAL POWER SYSTEMS

TECHNICAL CHANGE - LESS RESTRICTIVE "Specific"
("L_{18}" Labeled Comments/Discussions)

Not used.

Deleted in Revision L.

TECHNICAL CHANGE - LESS RESTRICTIVE "Specific"
("L_{19}" Labeled Comments/Discussions)

Commonwealth Edison Company (ComEd) has evaluated each of the proposed Technical Specification changes identified as "Technical Change - Less Restrictive (Specific)" in accordance with the criteria set forth in 10 CFR 50.92 and has determined that the proposed changes do not involve a significant hazards consideration.

The bases for the determination that the proposed changes do not involve a significant hazards consideration is an evaluation of these changes against each of the criteria in 10 CFR 50.92. The criteria and the conclusions of the evaluation are presented below.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

   The DC batteries are not considered as initiators of any analyzed event, therefore, this change has no impact on the probability of an event previously analyzed. As such, the probability of occurrence for a previously analyzed accident is not significantly increased.

   The consequences of a previously analyzed event are dependent on the initial conditions assumed for the analysis, and the availability and successful functioning of the equipment assumed to operate in response to the analyzed event, and the setpoints at which these actions are initiated. This change continues to assure the performance of the batteries is as credited. As a result, no analyses assumptions are violated. Eliminating the verification of battery electrolyte temperature to be above a minimum (60°F) after a battery discharge is acceptable because a large discharge of the battery will tend to heat the battery electrolyte not reduce the temperature. In addition, only requiring verification of the average electrolyte temperature of the representative cells instead of all connected cells is consistent with testing requirements of IEEE-450. Therefore, there is adequate assurance that the batteries will remain capable of supporting their intended function with this change. Based on this evaluation, there is no significant increase in the consequences of a previously analyzed event.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

   The proposed change does not involve a physical alteration of the plant. No new equipment is being introduced, and installed equipment is not being operated in a new or different manner. There is no change being made to the parameters within which the plant is operated. There are no setpoints, at which protective or mitigative actions are initiated, affected by this change. This change will not alter the manner in which equipment operation is initiated. No alteration in the procedures which ensure the plant remains within analyzed limits is being proposed, and no change is being made to the procedures relied upon to respond to an off-normal event. As such, no new failure modes are being introduced. The change does not alter assumptions made in the safety analysis and licensing basis. Therefore, the change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

   The margin of safety is established through equipment design, operating parameters, and the setpoints at which automatic actions are initiated. Sufficient equipment remains available to actuate upon demand for the purpose of mitigating an analyzed event. The proposed change involves eliminating the verification of battery electrolyte temperature to be above a minimum (60°F) after a battery discharge. This is acceptable because a large discharge of the battery will tend to heat the battery electrolyte not reduce the temperature. In addition, the ITS SR has been brought into compliance with IEEE-450 by requiring verification of the average electrolyte temperature of the representative cells instead of all connected cells. Therefore, there is adequate assurance that the batteries will remain capable of supporting their intended function with this change. There is no detrimental impact on any equipment design parameter, and the plant will still be required to operate within prescribed limits. Therefore, the change does not involve a significant reduction in the margin of safety.

RAI 3.8.7-1

TECHNICAL CHANGE - LESS RESTRICTIVE "Specific"
("L_{20}" Labeled Comments/Discussions)

Not used.

RAI 3.8.7-1

Deleted in Revision L.

<u>TECHNICAL CHANGE - LESS RESTRICTIVE "Specific"</u>
("L_{21}" Labeled Comments/Discussion)

Not used.

Deleted in Revision L.

NO SIGNIFICANT HAZARDS EVALUATION
ITS SECTION 3.8 - ELECTRICAL POWER SYSTEMS

TECHNICAL CHANGE - LESS RESTRICTIVE "Specific"
("L_{24}" Labeled Comments/Discussions)

Commonwealth Edison Company (ComEd) has evaluated each of the proposed Technical Specification changes identified as "Technical Change - Less Restrictive (Specific)" in accordance with the criteria set forth in 10 CFR 50.92 and has determined that the proposed changes do not involve a significant hazards consideration.

The bases for the determination that the proposed changes do not involve a significant hazards consideration is an evaluation of these changes against each of the criteria in 10 CFR 50.92. The criteria and the conclusions of the evaluation are presented below.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

   The DGs are not considered as initiators of any analyzed event, therefore, this change has no impact on the probability of an event previously analyzed. As such, the probability of occurrence for a previously analyzed accident is not significantly increased.

   RAI 3.8.1-21

   The consequences of a previously analyzed event are dependent on the initial conditions assumed for the analysis, and the availability and successful functioning of the equipment assumed to operate in response to the analyzed event, and the setpoints at which these actions are initiated. This change continues to assure the performance of the DGs is as credited. The allowance for momentary transients above the stated voltage limit immediately following a load rejection does not impact the ability of the test to determine appropriate DG response. An initial very high, very short duration voltage spike is expected. Therefore, the proposed change does not result in a significant increase in the consequences of a previously analyzed event.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

The proposed change does not involve a physical alteration of the plant. No new equipment is being introduced, and installed equipment is not being operated in a new or different manner. There is no change being made to the parameters within which the plant is operated. There are no setpoints, at which protective or mitigative actions are initiated, affected by this change. This change will not alter the manner in which equipment operation is initiated. No alteration in the procedures which ensure the plant remains within analyzed limits is being proposed, and no change is being made to the procedures relied upon to respond to an off-normal event. As such, no new failure modes are being introduced. The change does not alter assumptions made in the safety analysis and licensing basis. Therefore, the change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

The margin of safety is established through equipment design, operating parameters, and the setpoints at which automatic actions are initiated. Sufficient equipment remains available to actuate upon demand for the purpose of mitigating an analyzed event. The proposed change involves the addition of a Note to the DG full load reject test. Based on plant experience and discussions with the DG manufacturer, immediately following a DG full load reject, there is an initial very high, very short duration voltage spike (as high as 8000-9000 volts). The DG vendor has indicated that the momentary spike does not result in generator damage. The installed plant instrumentation does not necessarily pick up this initial voltage spike due to the extremely short duration of the voltage spike. However, without such an allowance, if sensitive instrumentation were used (in the future) during a DG full load rejection, and this momentary voltage spike was detected, the DG SR would not be met. As a result, Condition B of ITS LCO 3.8.1 would be entered, even though the DG responded as expected. In addition, Condition B requires performance of ITS SR 3.8.1.2 on the remaining OPERABLE DG, which would not be necessary. There is no detrimental impact on any equipment design parameter, and the plant will still be required to operate within prescribed limits. Because this allowance reflects the expected DG response and potentially prevents unnecessary DG starts the change does not involve a significant reduction in the margin of safety.

TECHNICAL CHANGE - LESS RESTRICTIVE "Specific"
("L_{29}" Labeled Comments/Discussions)

Commonwealth Edison Company (ComEd) has evaluated each of the proposed Technical Specification changes identified as "Technical Change - Less Restrictive (Specific)" in accordance with the criteria set forth in 10 CFR 50.92 and has determined that the proposed changes do not involve a significant hazards consideration.

The bases for the determination that the proposed changes do not involve a significant hazards consideration is an evaluation of these changes against each of the criteria in 10 CFR 50.92. The criteria and the conclusions of the evaluation are presented below.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

   The proposed change deletes the "during shutdown," scheduling limitation. This detail of testing (scheduling limitation) is not considered as the initiator of any analyzed event. A start of a DG is not assumed as an initiator of any previously analyzed event. Therefore, this change has no impact on the probability of an event previously analyzed. As such, the probability of occurrence for a previously analyzed accident is not significantly increased.

   The consequences of a previously analyzed event are dependent on the initial conditions assumed for the analysis, the availability and successful functioning of the equipment assumed to operate in response to the analyzed event, and the setpoints at which these actions are initiated. Sufficient equipment remains available to mitigate the consequences of previously analyzed events. This change does not affect the performance of any credited equipment. This detail of testing (scheduling limitation) is not an analysis assumption. Based on this evaluation, there is no significant increase in the consequences of a previously analyzed event.

TECHNICAL CHANGE - LESS RESTRICTIVE "Specific"
("L_{30}" Labeled Comments/Discussion)

Commonwealth Edison Company (ComEd) has evaluated each of the proposed Technical Specification changes identified as "Technical Change - Less Restrictive (Specific)" in accordance with the criteria set forth in 10 CFR 50.92 and has determined that the proposed changes do not involve a significant hazards consideration.

The bases for the determination that the proposed changes do not involve a significant hazards consideration is an evaluation of these changes against each of the criteria in 10 CFR 50.92. The criteria and the conclusions of the evaluation are presented below.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

   The consequences of a previously analyzed event are dependent on the initial conditions assumed for the analysis, the availability and successful functioning of the equipment assumed to operate in response to the analyzed event, and the setpoints at which these actions are initiated. The successful functioning of the batteries is not impacted by reducing the temperature limits from greater than 60°F to include 60°F. The manufacturer has tested the batteries and performed load sizing calculations supporting the 60°F limit. The temperature limit is consistent with the battery room temperature limits, thus providing added assurance that the environment the batteries are subjected to is consistent with the battery design and operational requirements. In addition, the CTS required that "connected" cells were to be used to perform the battery electrolyte temperature surveillance. The STS has adopted the new IEEE 450 testing requirements which now use a "representative" cell sample to perform the same testing. The "representative" cell sampling provides assurance as the "connected" cell method that the battery average electrolyte temperature is maintained above 60°F. The "representative" cell sampling is an industry and NRC accepted method as described by IEEE 450. Changing the temperature limit to include 60°F and changing the sampling criteria from connected cells to representative cells does not result in the batteries ability to perform their intended safety function in the event of an accident in which they are called upon. Based on this evaluation, there is no significant increase in the consequences of a previously analyzed event.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

The proposed change does not involve a physical change or alteration of the plant. No new equipment is being introduced, and installed equipment is not being operated in a new or different manner. There is no change being made to the parameters within which the plant is operated. There are no setpoints, at which protective or mitigative actions are initiated or affected by this change. This change will not alter the manner in which equipment operations is initiated, nor will the function demands on credited equipment be changed. No alteration in the procedures which ensure the plant remains within analyzed limits is being proposed, and no change is being made to the procedures relied upon to respond to an off-normal event. As such, no new failure modes are being introduced. The change does not alter assumptions made in the safety analysis and licensing basis. Therefore, the change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

The margin of safety is established through equipment design, operating parameters, and the setpoints at which automatic actions are initiated. Sufficient equipment remains available to actuate upon demand for the purpose of mitigating an analyzed event. The proposed change, extends the temperature limit from just above 60°F to include 60°F and requires testing by a "representative" cell sampling in accordance with IEEE 450 versus using a "connected" cell sampling method. This change is consistent with the manufacturer's recommendation and supported by specific battery sizing calculations. In addition, the temperature limit is consistent with the environmental conditions of the rooms in which the batteries are housed. This change in temperature limit has no detrimental impact on any equipment design parameter, and the plant will still be required to operate within prescribed limits. Therefore, the change does no involve a significant reduction in the margin of safety.

TECHNICAL CHANGE - LESS RESTRICTIVE "Specific"
("L_{31}" Labeled Comments/Discussion)

Commonwealth Edison Company (ComEd) has evaluated each of the proposed Technical Specification changes identified as "Technical Change - Less Restrictive (Specific)" in accordance with the criteria set forth in 10 CFR 50.92 and has determined that the proposed changes do not involve a significant hazards consideration.

The bases for the determination that the proposed changes do not involve a significant hazards consideration is an evaluation of these changes against each of the criteria in 10 CFR 50.92. The criteria and the conclusions of the evaluation are presented below.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

   The consequences of a previously analyzed event are dependent on the initial conditions assumed for the analysis, the availability and successful functioning of the equipment assumed to operate in response to the analyzed event, and the setpoints at which these actions are initiated. Operability of the Diesel Generator (DG) is demonstrated and verified through successful completion of specific Surveillance Requirements (SR). The CTS SR 4.8.1.1.2.a.5), requires that the DG is synchronized and loaded to greater than or equal to 5500 kW in accordance with the manufacturer's recommendations. ITS SR 3.8.1.3, Note 1, allows for the DG to be gradually loaded as recommended by the manufacturer. Allowing the DG to be gradually loaded reduces degradation through mechanical stress and wear to the DG. Gradual loading of the DG will still be in accordance with the manufacturer's recommendations, therefore, ensuring that the DG is not operated in a condition outside its design. Complying with ITS SR 3.8.1.3, will still verify that the DG is OPERABLE and will perform its intended safety function. Based on this evaluation, there is no significant increase in the consequences of a previously analyzed event.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

   The proposed change does no involve a physical change or alteration of the plant. No new equipment is being introduced, nor is any installed equipment being modified. The DG will be gradually loaded during testing which is different from the CTS SR. However, the ITS SR is still in compliance with the manufacturer's recommendations, ensuring that the DG will not be tested outside its design. There is no change being made to the parameters within which the plant is operated. There are no setpoints, at which protective or mitigative actions are initiated or affected by this change. This change will not alter the manner in which equipment operations are initiated, nor will the function demands on credited equipment be changed. No alteration in the procedures that ensure the plant remains within analyzed limits is being proposed or any procedures relied upon to respond to an off-normal event. As such, no new failure modes are being introduced. The change does not alter assumptions made in the safety analysis or licensing basis. Therefore, the change does not create the possibility of a new or different kind of accident form any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

   The margin of safety is established through equipment design, operating parameters, and setpoints at which automatic actions are initiated. Sufficient equipment remains available to actuate upon demand for the purpose of mitigating an analyzed event. The proposed change, allows the DG to be gradually loaded in accordance with the manufacturer's recommendations. This SR still verifies OPERABILITY of the DG while reducing unnecessary degradation and wear, thus prolonging the life of the DG. Therefore, the change does not involve a significant reduction in the margin of safety.

TECHNICAL CHANGE - LESS RESTRICTIVE "Specific"
("L_{32}" Labeled Comments/Discussion)

Commonwealth Edison Company (ComEd) has evaluated each of the proposed Technical Specification changes identified as "Technical Change - Less Restrictive (Specific)" in accordance with the criteria set forth in 10 CFR 50.92 and has determined that the proposed changes do not involve a significant hazards consideration.

The bases for the determination that the proposed changes do not involve a significant hazards consideration is an evaluation of these changes against each of the criteria in 10 CFR 50.92. The criteria and the conclusions of the evaluation are presented below.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

   The consequences of a previously analyzed event are dependent on the initial conditions assumed for the analysis, the availability and successful functioning of the equipment assumed to operate in response to the analyzed event, and the setpoints at which these actions are initiated. CTS 4.8.2.1.2.f) footnote requires that the battery capacity is greater than 100% of rated capacity. ITS 3.8.4.8 requires that the battery capacity is ≥ 100% of rated capacity. Although declaring the battery OPERABLE when the rated capacity is exactly 100% is not allowed by CTS, it is allowed by both the battery manufacturer and the ITS. With the rated capacity at 100%, the battery will still be able to perform its intended function. Based on this evaluation, there is no significant increase in the consequences of a previously analyzed event.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

The proposed change does no involve a physical change or alteration of the plant. No new equipment is being introduced, nor is installed equipment being modified. Allowing the batteries to be declared OPERABLE when the rated capacity is exactly 100% is still in compliance with the manufacturer's recommendations There is no change being made to the parameters within which the plant is operated. There are no setpoints, at which protective or mitigative actions are initiated or affected by this change. This change will not alter the manner in which equipment operations is initiated, nor will the function demands on credited equipment be changed. No alteration in the procedures when endure the plant remains within analyzed limits is being proposed, and no change is being made to the procedures relied upon to respond to an off-normal event. As such, no new failure nodes are being introduced. The change does not alter assumptions made in the safety analysis and licensing basis. Therefore, the change does not create the possibility of a new or different kind of accident form any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

The margin of safety is established through equipment design, operating parameters, and setpoints at which automatic actions are initiated. Sufficient equipment remains available to actuate upon demand for the purpose of mitigating an analyzed event. The proposed change, allows the batteries to be declared OPERABLE when their rated capacity is exactly 100% which is in accordance with the manufacturer's recommendations. Therefore, the change does not involve a significant reduction in the margin of safety.