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SOUTHERN COMPANY
Energy to Serve Your World™

October 28, 2004

Docket Nos.: 50-424
50-425

NL-04-1537

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Vogtle Electric Generating Plant
Response to Request for Additional Information Regarding
Technical Specification Revision Request
DC Sources and TSTF-360, Revision 1

Ladies and Gentlemen:

On October 13, 2003, Southern Nuclear Operating Company (SNC) submitted a proposed change to the Vogtle Electric Generating Plant (VEGP) Unit 1 and Unit 2 Technical Specifications (TS). The proposed changes would revise TS Limiting Conditions for Operation (LCO) 3.8.4, "DC Sources – Operating," LCO 3.8.5, "DC Sources – Shutdown," and LCO 3.8.6, "Battery Cell Parameters." The proposed changes are based on Industry/TSTF Standard Technical Specification Change Traveler TSTF-360, Revision 1.

On August 3, 2004, and August 25, 2004, SNC discussed the proposed changes with the NRC staff via telephone conferences and additional information was requested by the NRC staff. SNC responses to the NRC staff's questions are enclosed.

This letter contains no NRC commitments. If you have any questions, please advise.

(Affirmation and signature are on the following page.)

A001

Mr. D. E. Grissette states he is a Vice President of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and to the best of his knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

Don E. Grissette

Sworn to and subscribed before me this 28 *day of* October, *2004.*

Angela R Stone
Notary Public

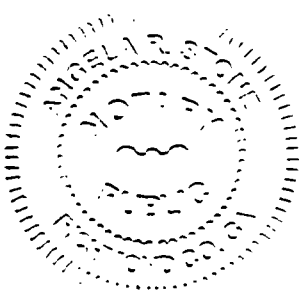
My commission expires: 12-26-06

DEG/NJS/daj

Enclosure: VEGP Response to RAI Regarding TSTF-360, Revision 1

cc: Southern Nuclear Operating Company
Mr. J. T. Gasser, Executive Vice President
Mr. W. F. Kitchens, General Manager – Plant Vogtle
RType: CVC7000

U. S. Nuclear Regulatory Commission
Dr. W. D. Travers, Regional Administrator
Mr. C. Gratton, NRR Project Manager – Vogtle
Mr. G. J. McCoy, Senior Resident Inspector – Vogtle



Enclosure

Vogtle Electric Generating Plant
Response to Request for Additional Information Regarding
DC Sources and TSTF-360, Revision 1

Vogtle Electric Generating Plant
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NRC Request 1

"In the licensee's October 13, 2004[1] submittal, it is stated that if a SBO [Station Blackout] were to occur during the time that the battery of system C was inoperable, the capability to provide auxiliary feedwater would be adversely affected.

Additionally, in the licensee's October 13, 2004 submittal, manual action is credited for successful operation (when Battery C is unavailable) of the Turbine Driven Auxiliary Feedwater Pump (TDAFWP).

As stated above, GDC 17 requires, in part, that nuclear power plants have provisions to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear unit, the loss of power from the transmission network, or the loss of power from the onsite electric power supplies. GDC 17 also requires that the onsite electric power supplies, including the batteries, and the onsite electric distribution system, shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure.

Furthermore, the initial conditions of Design Basis Accident (DBA) and transient analyses in the Vogtle FSAR, Chapter 6, and the FSAR Chapter 15, assume that 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 unit. This includes maintaining the 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

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

Since Battery C would be unable to perform its safety function when called upon during the proposed extended battery Completion Time, how much time is required to manually operate the TDAFWP? Additionally, if Battery C was declared inoperable, would an operator be stationed at the TDAFWP?

SNC Response

In the event of an SBO, control room operators would enter Procedure 19100-C, ECA-0.0 Loss of All AC Power. Step 4 of this procedure verifies that AFW flow greater than 570 gpm is being supplied to the steam generators. If that is not the case, and the TDAFWP

[1] Note that the actual date of the submittal was October 13, 2003.

cannot be operated normally due to governor or DC power failure, then the procedure directs that an operator be dispatched to attempt local manual control of the TDAFWP. Based on a conservative, bounding evaluation of the plant response while AFW is being established via local manual control of the TDAFWP, there would be at least 30 minutes available to support this operator action. Control Room Operators are trained to accomplish manual control of the TDAFWP via a Job Performance Measure (JPM). Since the operators would enter Procedure 19100-C immediately upon recognition of a loss of AC power to the emergency buses, and verification of AFW flow occurs very early in this procedure (step 4), the first three steps being verify reactor trip, verify turbine trip, and check if reactor coolant system is isolated, respectively, the operators should be able to identify the need to take manual control of the TDAFWP quickly. Under these circumstances, manual control of the TDAFWP should be accomplished within approximately 30 minutes. Therefore, there is no need to station an operator at the TDAFWP during the time that Battery C is inoperable for the proposed extended Completion Time.

NRC Request 2

"Prior to utilizing the battery Completion Time greater than 2 hours, would the Standby Auxiliary Transformer be verified available (similar to Required Action B.2 of LCO 3.8.1 Condition B)?"

SNC Response

SNC proposes to revise our submittal, specifically the "INSERT: 3.8.4 ACTIONS". A new insert, a new mark-up of LCO 3.8.4, appropriate Bases changes and clean-typed pages are provided with this response. A new Condition A is proposed that would be applicable to batteries A and B only, and Required Action A.1 would have the following new Note:

> "Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources – Operating," for emergency diesel generator made inoperable by inoperable battery A or B."

Because battery A is required for emergency diesel generator (EDG) A to start and flash the generator field, and similarly for battery B and EDG B, it is appropriate to enter LCO 3.8.1, Condition B, due to the extended Completion Time for restoring an inoperable battery. This would invoke LCO 3.8.1, Required Action B.2 to verify that the standby auxiliary transformer (SAT) is available within one hour and once per 12 hours thereafter.

For batteries C and D, a new Condition B includes a Required Action B.1 to verify that the SAT is available within one hour and once per 12 hours thereafter. Because batteries C and D do not impact the operability of the EDGs, a separate Condition was required in order to invoke the Required Action to verify the availability of the SAT. These additional proposed changes to the Technical Specifications do not alter the conclusions of the No Significant Hazards Consideration Evaluation provided in our October 13, 2003 submittal pursuant to 10 CFR 50.92.

NRC Request 3

When a battery is declared inoperable, would you declare required feature(s) supported by the inoperable battery inoperable when the redundant required feature(s) are inoperable (similar to Required Action B.3 of LCO 3.8.1 condition B)?

SNC Response

With respect to batteries A and B, this concern is addressed by the response to NRC Request 2, above. By entering LCO 3.8.1, Condition B, for the EDG made inoperable by battery A or B, this will invoke Required Action B.3 which addresses redundant features. With respect to batteries C and D, the Safety Function Determination Program is invoked by LCO 3.0.6 and Specification 5.5.15. LCO 3.0.6 requires that when a supported system LCO is not met due to a support system LCO not being met, the Conditions and Required Actions associated with this supported system are not required to be entered. However, additional evaluations and limitations may be required in accordance with Specification 5.5.15, "Safety Function Determination Program (SFDP)." If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered. For example, batteries C and D power the inverters that supply power to the residual heat removal (RHR) system suction isolation valves. Consider the case where one of the units is in Mode 4 in a condition where both trains of RHR were required to meet LCO 3.4.6, RCS Loops – Mode 4. One train of RHR is in operation as required by the LCO, and the other train is in standby with its loop suction isolation valves closed. If the battery (C or D) that supports the standby train becomes inoperable, and subsequently the operating (opposite train) RHR loop becomes inoperable, the SFDP should identify that condition as a potential loss of safety function.

According to Specification 5.5.15, the SFDP shall contain the following:

a. Provisions for cross train checks to ensure a loss of the capability to perform the safety function assumed in the accident analysis does not go undetected;

b. Provisions for ensuring the plant is maintained in a safe condition if a loss of function condition exists;

c. Provisions to ensure that an inoperable supported system's Completion Time is not inappropriately extended as a result of multiple support system inoperabilities; and

d. Other appropriate limitations and remedial or compensatory actions.

A loss of safety function exists when, assuming no concurrent single failure, a safety function assumed in the accident analysis cannot be performed. For the purpose of this program, a loss of safety function may exist when a support system is inoperable, and:

a. A required system redundant to the system(s) supported by the inoperable support system is also inoperable; or

b. A required system redundant to the system(s) in turn supported by the inoperable supported system is also inoperable; or

c. A required system redundant to the support system(s) for the supported systems (a) and (b) above is also inoperable.

The SFDP identifies where a loss of safety function exists. If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered.

Note that the following is a new insert to replace the corresponding insert provided with our October 13, 2003 submittal. In addition, a new marked-up page 3.8.4-1 is provided along with appropriate Bases changes. Clean-typed replacements for the affected pages are also provided.

INSERT: 3.8.4 ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One DC electrical power source inoperable due to inoperable battery A or B.	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources – Operating," for emergency diesel generator made inoperable by inoperable battery A or B. ---------- A.1 Restore DC electrical power source to OPERABLE status	 24 hours
B. One DC electrical power source inoperable due to inoperable battery C or D.	B.1 Verify SAT available AND B.2 Restore DC electrical power source to OPERABLE status	1 hour AND Once per 12 hours thereafter 24 hours

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources – Operating

LCO 3.8.4 Four class 1E 125 V DC electrical power sources shall be OPERABLE.

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

INSERT: 3.8.4 ACTIONS

source

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
CA. One DC electrical power source inoperable.	CA.1	Restore DC electrical power ~~subsystem~~ to OPERABLE status.	2 hours
DB. Required Action and Associated Completion Time not met.	DB.1	Be in MODE 3.	6 hours
	AND		
	DB.2	Be in MODE 5.	36 hours

for reasons other than Condition A or B

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is ~~≥ 126 V on float charge.~~	7 days

(continued)

greater than or equal to the minimum established float voltage.

for reasons other than Condition A or B

BASES (continued)

ACTIONS

CA.1

INSERT: 3.8.4 ACTIONS Bases

Condition CA represents one train with a loss of ability to completely respond to an event, and/or a potential loss of ability to remain energized during normal operation. The 2 hour limit is consistent with the allowed time for an inoperable DC distribution system train.

If one of the required DC electrical power sources is inoperable (e.g., inoperable battery, inoperable battery charger, or inoperable battery charger and associated inoperable battery), the remaining DC electrical power source 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 source 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 source and, if the DC electrical power source is not restored to OPERABLE status, to prepare to effect an orderly and safe unit shutdown.

sources have

could

minimum necessary DC electrical sources to mitigate a worst case accident

DB.1 and DB.2

If the inoperable DC electrical power source 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. The Completion Time to bring the unit to MODE 5 is consistent with the time required in Regulatory Guide 1.93 (Ref. 8).

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1

Verifying battery terminal voltage while on float charge for the batteries helps to ensure the effectiveness of the

(continued)

INSERT: 3.8.4 ACTION Bases

A.1

Condition A represents one DC electrical source inoperable due to an inoperable battery A or B. Because battery A is necessary for emergency diesel generator (EDG) A to start and for generator field flashing, and similarly battery B for EDG B, Required Action A.1 is modified by a Note directing that the applicable Conditions and Required Actions of LCO 3.8.1 be entered for the EDG made inoperable by the inoperable battery. In addition, with either battery A or B inoperable, the associated DC bus is being supplied by the OPERABLE battery charger. Any event that results in a loss of the AC bus supporting the battery charger will also result in loss of DC to the associated 120 V vital AC bus. Recovery of the AC bus supporting the charger, especially if it is due to a loss of offsite power, will be hampered by the fact that many of the components necessary for the recovery (e.g., diesel generator control and field flash, AC load shed and diesel generator output circuit breakers, etc.) likely rely upon the battery. In addition, the energization transients of any DC loads that are beyond the capability of the battery charger and normally require the assistance of the battery will not be able to be brought online. The 24 hour limit allows sufficient time to effect restoration of an inoperable battery given that the majority of the conditions that lead to battery inoperability (e.g., loss of battery charger, battery cell voltage less than 2.07 V, etc.) are identified in Specifications 3.8.4, 3.8.5, and 3.8.6 together with additional specific completion times.

B.1, B.2 and B.3

Condition B represents one DC electrical source inoperable due to an inoperable battery C or D. Neither batteries C nor D are necessary for the EDGs to start and for generator field flashing. However, they are required for breaker control power, instrumentation, RHR suction isolation valve inverters, etc. Therefore, it is prudent to verify the availability of the standby auxiliary transformer (SAT), and Required Action B.1 does that within 1 hour and once per 12 hours thereafter. With either battery C or D inoperable, the associated DC bus is being supplied by the OPERABLE battery charger. Any event that results in a loss of the AC bus supporting the battery charger will also result in loss of DC to the associated 120 V vital AC bus. Recovery of the AC bus supporting the charger, especially if it is due to a loss of offsite power, may be hampered by the fact that components necessary for the recovery likely rely upon the battery. The 24 hour limit allows sufficient time to effect restoration of an inoperable battery given that the majority of the conditions that lead to battery inoperability (e.g., loss of battery charger, battery cell voltage less than 2.07 V, etc.) are identified in Specifications 3.8.4, 3.8.5, and 3.8.6 together with additional specific completion times.

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources – Operating

LCO 3.8.4 Four class 1E 125 V DC electrical power sources shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One DC electrical power source inoperable due to inoperable battery A or B.	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources – Operating," for emergency diesel generator made inoperable by inoperable battery A or B. ---------- A.1 Restore DC electrical power source to OPERABLE status.	24 hours
B. One DC electrical power source inoperable due to inoperable battery C or D.	B.1 Verify SAT available AND B.2 Restore DC electrical power source to OPERABLE status.	1 hour AND Once per 12 hours thereafter 24 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One DC electrical power source inoperable for reasons other than Condition A or B.	C.1 Restore DC electrical power source to OPERABLE status.	2 hours
D. Required Action and Associated Completion Time not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is greater than or equal to the minimum established float voltage.	7 days
SR 3.8.4.2	Verify the battery charger supplies: ≥ 400 amps for System A and B ≥ 300 amps for System C, and ≥ 200 amps for System D at greater than or equal to the minimum established float voltage for ≥ 8 hours for Systems A and B and ≥ 3 hours for Systems C and D. OR Verify each battery charger can recharge the battery to the fully charged state within 12 hours while supplying the largest combined demands of the various continuous steady state loads, after a battery discharge to the bounding design basis event discharge state.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.3	----------NOTES---------- 1. The modified performance discharge test in SR 3.8.6.6 may be performed in lieu of the service test in SR 3.8.4.3. 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. ---------- 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

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.4 DC Sources—Operating

BASES

BACKGROUND

There are four safety features 125 VDC systems (identified A, B, C, and D) per unit. Each system has a 59-cell lead calcium battery, switchgear (electrically operated drawout circuit breakers), two redundant battery chargers, and 125 VDC distribution panels (molded case circuit breakers). Systems A, B, and C each have a 125 VDC motor control center for motor operated valves. There is no capability to connect the DC systems between themselves, between Unit 1 and Unit 2 systems, or between the safety features systems and the nonsafety features systems. Table B 3.8.4-1 shows the DC sources and train associations. The 125 VDC systems A and C form the train A safety features DC system and their associated battery chargers receive power from two Class 1E train A motor control centers. The 125 VDC systems B and D form the train B safety features DC system and their battery chargers receive power from two Class 1E train B motor control centers.

The 125 VDC systems A, B, C, and D supply DC power to channels 1, 2, 3, and 4, respectively, and are designated as Class 1E equipment in accordance with the applicable sections of Institute of Electrical and Electronic Engineers (IEEE) Standard 308 (Ref. 1). As required by 10 CFR 50, Appendix A, GDC 17 (Ref. 2), the DC electrical power system is designed so that no single failure in any 125 VDC system will result in conditions that will prevent the safe shutdown of the reactor plant. The plant design and circuit layout from these DC systems provide physical separation of equipment, cabling, and instrumentation essential to plant safety. Each 125 VDC battery is separately housed in a ventilated room apart from its chargers and distribution equipment. All the components of the 125 VDC Class 1E systems are housed in Category 1 structures.

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

(continued)

BASES

BACKGROUND (continued)

Batteries are sized in accordance with IEEE 485 (Ref. 3) to have sufficient capacity to supply the required loads for a loss of coolant/ loss of offsite power (LOCA/LOSP) duration of 2 3/4 hours and a station blackout (SBO) duration of 4 hours. For LOSP/LOCA, they are sized at a minimum temperature of 70°F; their initial capacity was increased by 10% for load growth and 25% for aging. The required final (end of duty cycle and end of life) battery cell voltages for each load group have been analyzed to demonstrate that adequate voltage is provided to the loads. The battery voltage specifications are discussed in detail for each load group in FSAR, Chapter 8 (Ref. 4).

The battery cells are of flooded lead acid construction with a nominal specific gravity of 1.215. This specific gravity corresponds to an open circuit battery voltage of approximately 121.8 V for a 59 cell battery (i.e., cell voltage of 2.065 volts per cell (Vpc)). The open circuit voltage is the voltage maintained when there is no charging or discharging. Once fully charged with its open circuit voltage ≥ 2.065 Vpc, the battery cell will maintain its capacity for 30 days without further charging per manufacturer's instructions. Optimal long term performance however, is obtained by maintaining a float voltage 2.20 to 2.25 Vpc. This provides adequate over-potential, which limits the formation of lead sulfate and self discharge. The nominal float voltage of 2.23 Vpc corresponds to a total float voltage output of 131.6 V for a 59 cell battery as discussed in the FSAR, Chapter 8 (Ref. 4).

Each 125 VDC battery is provided with two battery chargers, each of which is sized to supply the continuous (long term) demand on its associated DC system while providing sufficient power to replace 110% of the equivalent ampere-hours removed from the battery during a design basis battery discharge cycle within a 12 hour period after charger input power is restored. Normally, both battery chargers are on line with load sharing circuitry to ensure that the DC load is properly shared between the two chargers. Only one charger is required OPERABLE to support the associated DC power system. The sizing of each battery charger meets the requirements of IEEE 308 (Ref. 1) and Regulatory Guide 1.32 (Ref. 5).

The battery chargers are normally in the float-charge mode. Float-charge is the condition in which the charger is supplying the connected loads and the battery cells are receiving adequate current to optimally charge the battery. This assures the internal losses of a battery are overcome and the battery is maintained in a fully charged state.

(continued)

BASES

BACKGROUND (continued)

When desired, the chargers can be placed in the equalize mode. The equalize mode is at a higher voltage than the float mode and charging current is correspondingly higher. The battery charger is operated in the equalize mode after a battery discharge or for routine maintenance. Following a battery discharge, the battery recharge characteristic accepts current at the current limit of the battery charger (if the discharge was significant, e.g., following a battery service test) until the battery terminal voltage approaches the charger voltage setpoint. Charging current then reduces exponentially during the remainder of the recharge cycle. Lead-calcium batteries have recharge efficiencies of greater than 95%, so once at least 105% of the ampere-hours discharged have been returned, the battery capacity would be restored to the same condition as it was prior to the discharge. This can be monitored by direct observation of the exponentially decaying charging current or by evaluating the amp-hours discharged from the battery and amp-hours returned to the battery.

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."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the FSAR, Chapter 6 (Ref. 6), and in the FSAR, 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 unit. This includes maintaining the 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.

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

(continued)

BASES (continued)

LCO

The DC electrical power sources, each source consisting of one battery, battery charger, and the corresponding control equipment and interconnecting cabling supplying power to the associated bus within the train 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 DC electrical power source does not prevent the minimum safety function from being performed (Ref. 4).

An OPERABLE DC electrical power source requires the battery and one charger per battery 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 the Bases for LCO 3.8.5, "DC Sources— Shutdown."

ACTIONS

A.1

Condition A represents one DC electrical source inoperable due to an inoperable battery A or B. Because battery A is necessary for emergency diesel generator (EDG) A to start and for generator field flashing, and similarly battery B for EDG B, Required Action A.1 is modified by a Note directing that the applicable Conditions and Required Actions of LCO 3.8.1 be entered for the EDG made inoperable by the inoperable battery. In addition, with either battery A or B inoperable, the associated DC bus is being supplied by the OPERABLE battery charger. Any event that results in a loss of the AC bus supporting the

(continued)

BASES

ACTIONS

A.1 (continued)

battery charger will also result in loss of DC to the associated 120 V vital AC bus. Recovery of the AC bus supporting the charger, especially if it is due to a loss of offsite power, will be hampered by the fact that many of the components necessary for the recovery (e.g., diesel generator control and field flash, AC load shed and diesel generator output circuit breakers, etc.) likely rely upon the battery. In addition, the energization transients of any DC loads that are beyond the capability of the battery charger and normally require the assistance of the battery will not be able to be brought online. The 24 hour limit allows sufficient time to effect restoration of an inoperable battery given that the majority of the conditions that lead to battery inoperability (e.g., loss of battery charger, battery cell voltage less than 2.07 V, etc.) are identified in Specifications 3.8.4, 3.8.5, and 3.8.6 together with additional specific completion times.

B.1 and B.2

Condition B represents one DC electrical source inoperable due to an inoperable battery C or D. Neither batteries C nor D are necessary for the EDGs to start and for generator field flashing. However, they are required for breaker control power, instrumentation, RHR suction isolation valve inverters, etc. Therefore, it is prudent to verify the availability of the standby auxiliary transformer (SAT), and Required Action B.1 does that within 1 hour and once per 12 hours thereafter. With either battery C or D inoperable, the associated DC bus is being supplied by the OPERABLE battery charger. Any event that results in a loss of the AC bus supporting the battery charger will also result in loss of DC to the associated 120 V vital AC bus. Recovery of the AC bus supporting the charger, especially if it is due to a loss of offsite power, may be hampered by the fact that components necessary for the recovery likely rely upon the battery. The 24 hour limit allows sufficient time to effect restoration of an inoperable battery given that the majority of the conditions that lead to battery inoperability (e.g., loss of battery charger, battery cell voltage less than 2.07 V, etc.) are identified in Specifications 3.8.4, 3.8.5, and 3.8.6 together with additional specific completion times.

C.1

Condition C represents one train with a loss of ability to completely respond to an event, and/or a potential loss of ability to remain

(continued)

BASES

ACTIONS

C.1 (continued)

energized during normal operation. The 2 hour limit is consistent with the allowed time for an inoperable DC distribution system train.

If one of the required DC electrical power sources is inoperable for reasons other than Condition A or B (e.g., inoperable battery charger or inoperable battery charger and associated inoperable battery), the remaining DC electrical power sources have the capacity to support a safe shutdown and to mitigate an accident condition. Since a subsequent worst case single failure could, however, result in the loss of the minimum necessary DC electrical sources to mitigate a worst case accident, 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 source and, if the DC electrical power source is not restored to OPERABLE status, to prepare to effect an orderly and safe unit shutdown.

D.1 and D.2

If the inoperable DC electrical power source 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. The Completion Time to bring the unit to MODE 5 is consistent with the time required in Regulatory Guide 1.93 (Ref. 8).

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1

Verifying battery terminal voltage while on float charge for the batteries helps to ensure the effectiveness of the battery chargers, which support the ability of the batteries to perform their intended function. Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery and maintain the battery in a fully charged state while supplying the continuous steady state loads of the associated

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1 (continued)

DC subsystem. On float charge, battery cells will receive adequate current to optimally charge the battery. The voltage requirements are based on the nominal design voltage of the battery and are consistent with the minimum float voltage established by the battery manufacturer (2.20 Vpc times the number of connected cells for the battery terminal voltage). This voltage maintains the battery plates in a condition that supports maintaining the grid life (expected to be approximately 20 years). The 7 day Frequency is consistent with manufacturer recommendations and IEEE-450 (Ref. 9).

SR 3.8.4.2

This SR verifies the design capacity of the battery chargers (Ref. 4). According to Regulatory Guide 1.32 (Ref. 5), the battery charger supply is recommended to be based on the largest combined demands of the various steady state loads and the charging capacity to restore the battery from the design minimum charge state to the fully charged state, irrespective of the status of the unit during these demand occurrences. The minimum required amperes and duration ensures that these requirements can be satisfied.

This SR provides two options. One option requires that each battery charger be capable of supplying the necessary current for each system at the minimum established float voltage for 8 hours for systems A and B and 3 hours for systems C and D. The ampere requirements are based on the output rating of the chargers. The voltage requirements are based on the charger voltage level after a response to a loss of AC power. The time period is sufficient for the charger temperature to have stabilized and to have been maintained for at least 2 hours.

The other option requires that each battery charger be capable of recharging the battery after a service test coincident with supplying the largest combined demands of the various continuous steady state loads (irrespective of the status of the plant during which these demands occur). This level of loading may not normally be available following the battery service test and will need to be supplemented with additional loads. The duration for this test may be longer than the charger sizing criteria since the battery recharge is affected by

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SURVEILLANCE REQUIREMENTS

SR 3.8.4.2 (continued)

float voltage, temperature, and the exponential decay in charging current. The systems A and B batteries are recharged when the measured charging current is ≤ 2 amps. The system C and D batteries are recharged when the measured charging current is ≤ 1 amp.

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.

For a battery charger with charger output aligned to the associated 1E 125 VDC bus, 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 3.8.4.3

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. 5) and Regulatory Guide 1.129 (Ref. 10), 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.

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. Examples of unplanned events may include:

1. Unexpected operational events which cause the equipment to perform the function specified by this Surveillance, for which adequate documentation of the required performance is available; and

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.3 (continued)

2. Post Corrective maintenance testing that requires performance of this Surveillance in order to restore the component to OPERABLE, provided the maintenance was required, or performed in conjunction with maintenance required to maintain OPERABILITY or reliability.

REFERENCES

1. IEEE-308-1978.
2. 10 CFR 50, Appendix A, GDC 17.
3. IEEE-485-1983, June 1983.
4. FSAR, Chapter 8.
5. Regulatory Guide 1.32, February 1977.
6. FSAR, Chapter 6.
7. FSAR, Chapter 15.
8. Regulatory Guide 1.93, December 1974.
9. IEEE-450-1975 and 1987.
10. Regulatory Guide 1.129, December 1974

Table B 3.8.4-1
DC Sources

TYPE	VOLTAGE	TRAIN A	TRAIN B
DC sources	125 V	System A Battery 1/2AD1B One charger 1/2AD1CA or 1/2AD1CB *Bus powered by system A 1/2AD1	System B Battery 1/2BD1B One charger 1/2BD1CA or 1/2BD1CB *Bus powered by system B 1/2BD1
	125 V	System C Battery 1/2CD1B One charger 1/2CD1CA or 1/2CD1CB *Bus powered by system C 1/2CD1	System D Battery 1/2DD1B One charger 1/2DD1CA or 1/2DD1CB *Bus powered by system D 1/2DD1

* Operability requirements for the buses are addressed in Specifications 3.8.9, Distribution Systems — Operating, or 3.8.10, Distribution Systems — Shutdown.