Enclosure 1

Marked-Up Technical Specifications

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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 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 power distribution subsystem(s).

Automatic load sequencers for Train A and Train B ESF buses shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required offsite circuit inoperable.	A.1 Perform SR 3.8.1.1 for required OPERABLE offsite circuit. AND	1 hour AND Once per 8 hours thereafter (continued)

NOTE

The Standby Auxiliary Transformer (SAT) is available for application to only one of the four 4.16 kV ESF buses at any given time for Units 1 and 2 for use in accordance with Specification 3.8.1 as either an offsite source or to meet the requirements of an LCO 3.8.1 condition.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.2	Declare required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable.	24 hours from discovery of no offsite power to one train concurrent with inoperability of redundant required feature(s)
	AND		
	A.3	Restore required offsite circuit to OPERABLE status.	72 hours AND ~~8~~ 14 days from discovery of failure to meet LCO
B. One DG inoperable.	B.~~1~~ 2	Perform SR 3.8.1.1 for the required offsite circuit(s).	1 hour AND
	AND		Once per 8 hours thereafter
			(continued)
	B.1	Verify SAT available.	1 hour AND Once per 8 hours thereafter
	AND		

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.~~2~~ 3 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 incperability of redundant required feature(s)
	AND	
	B.~~3~~.1 4 Determine OPERABLE DG is not inoperable due to common cause failure.	24 hours
	OR	
	B.~~3~~.2 4 Perform SR 3.8.1.2 for OPERABLE DG.	24 hours
	AND	
	B.~~4~~ 5 Restore DG to OPERABLE status.	~~72 hours~~ ~~AND~~ ~~6 days from discovery of failure to meet LCO~~

(continued)

14 days from discovery of failure to meet LCO

C. Required Action B.1 and associated Completion Time not met.	C.1 Restore DG to OPERABLE status.	72 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~C~~. D Two required offsite circuits inoperable.	~~C~~.1 D Declare required feature(s) inoperable when its redundant required feature(s) is inoperable.	12 hours from discovery of Condition D concurrent with inoperability of redundant required features
	AND	
	~~C~~.2 D Restore one required offsite circuit to OPERABLE status.	24 hours
~~D~~. E One required offsite circuit inoperable. AND One DG inoperable.	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems — Operating," when Condition ~~D~~ E is entered with no AC power source to one or more trains. ----------	
	~~D~~.1 E Restore required offsite circuit to OPERABLE status.	12 hours
	OR	
	~~D~~.2 E Restore DG to OPERABLE status.	12 hours
~~E~~. F Two DGs inoperable.	~~E~~.1 F Restore one DG to OPERABLE status.	2 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
~~F~~. G One automatic load sequencer inoperable.	F.1	Restore automatic load sequencer to OPERABLE status.	12 hours
~~G~~. H Required Action and Associated Completion Time of Condition A, B, C, D, E, ~~or~~ F, or G not met.	G.1	Be in MODE 3.	6 hours
	AND		
	G.2	Be in MODE 5.	36 hours
~~H~~. I Three or more required AC sources inoperable.	H.1	Enter LCO 3.0.3.	Immediately

OR

Required Action B.2, B.3, B.4.1, B.4.2, or B.5 and associated Completion Time not met.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.1.1	Verify correct breaker alignment and indicated power availability for each required offsite circuit.	7 days
SR 3.8.1.2	----------NOTES---------- 1. Performance of SR 3.8.1.7 satisfies this SR. 2. All DG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading. 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. ---------- Verify each DG starts from standby conditions and achieves steady state voltage ≥ 4025 V and ≤ 4330 V, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	31 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
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 ≥ 6800 kW and ≤ 7000 kW.	31 days
SR 3.8.1.4	Verify each day tank contains ≥ 650 gal of fuel oil.	31 days
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 tanks to the day tank.	31 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.7	----------NOTE---------- All DG starts may be preceded by an engine prelube period. ---------- Verify each DG starts from standby condition and achieves in ≤ 11.4 seconds, voltage ≥ 4025 V and ≤ 4330 V, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	184 days
SR 3.8.1.8	----------NOTE---------- Credit may be taken for unplanned events that satisfy this SR. ---------- Verify each DG rejects a load ≥ its associated single largest post accident load, and: a. Following load rejection, the frequency is ≤ 64.5 Hz; b. Within 3 seconds following load rejection, the voltage is ≥ 3750 V and ≤ 4330 V or ≤ 4550 V when performing the test synchronized with offsite power; and c. Within 3 seconds following load rejection, the frequency is ≥ 58.8 Hz and ≤ 61.2 Hz.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.9	----------NOTE---------- Credit may be taken for unplanned events that satisfy this SR. ---------- Verify each DG operating as close as practicable to 3390 kVAR while maintaining voltage ≤ 4330 V does not trip and voltage is maintained ≤ 5000 V during and following a load rejection of ≥ 6800 kW and ≤ 7000 kW.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.10	----------NOTES---------- 1. All DG starts may be preceded by an engine prelube period. 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 on an actual or simulated loss of offsite power signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; c. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤ 11.5 seconds, 2. energizes auto-connected shutdown loads through automatic load sequencer, 3. maintains steady state voltage ≥ 3750 V and ≤ 4330 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)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.11	----------NOTES---------- 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR. ---------- Verify on an actual or simulated Engineered Safety Feature (ESF) actuation signal each DG auto-starts from standby condition and: a. In ≤ 11.4 seconds after auto-start and during tests, achieves voltage ≥ 3750 V and ≤ 4330 V; b. In ≤ 11.4 seconds after auto-start and during tests, achieves frequency ≥ 58.8 Hz and ≤ 61.2 Hz; 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.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.12	----------NOTE---------- This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR. ---------- 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; b. Generator differential current; and c. Low lube oil pressure;	18 months
SR 3.8.1.13	----------NOTES---------- 1. Momentary transients outside the kW and kVAR load ranges do not invalidate this test. 2. Credit may be taken for unplanned events that satisfy this SR. ---------- Verify each DG operates for ≥ 24 hours while maintaining voltage ≤ 4330 V: a. For ≥ 2 hours loaded ≥ 7600 kW and ≤ 7700 kW and operating as close as practicable to 3730 kVAR; and b. For the remaining hours of the test loaded ≥ 6800 kW and ≤ 7000 kW and operating as close as practicable to 3390 kVAR.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.14	----------NOTES---------- 1. This Surveillance shall be performed within 5 minutes of shutting down the DG after the DG has operated ≥ 2 hours loaded ≥ 6800 kW and ≤ 7000 kW. Momentary transients outside of load range do not invalidate this test. 2. All DG starts may be preceded by an engine prelube period. ---------- Verify each DG starts and achieves, in ≤ 11.4 seconds, voltage ≥ 4025 V, and ≤ 4330 V and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	18 months
SR 3.8.1.15	----------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. ---------- 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 3.8.1.16	----------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. ---------- 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 3.8.1.17	----------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. ---------- Verify interval between each sequenced load block is within ± 10% of design interval for each load sequencer.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.18	----------NOTES---------- 1. All DG starts may be preceded by an engine prelube period. 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 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 buses; b. Load shedding from emergency buses; and c. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤ 11.5 seconds, 2. energizes auto-connected emergency loads through load sequencer, 3. achieves steady state voltage: ≥ 3750 V and ≤ 4330 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 3.8.1.19	Verify fuel transfer pump transfers fuel from each fuel storage tank to the day tank of each diesel via the installed cross-connection lines.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.20	----------NOTE---------- All DG starts may be preceded by an engine prelube period. ---------- Verify when started simultaneously from standby condition, each DG achieves, in ≤ 11.4 seconds, voltage ≥ 4025 V and ≤ 4330 V, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	10 years

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources — Operating

BASES

BACKGROUND

The unit Class 1E AC Electrical Power Distribution System AC sources consist of the offsite power sources (preferred power sources, normal and alternate(s)), 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 (trains) so that the loss of any one group does not prevent the minimum safety functions from being performed. Each train has connections to two offsite power sources and a single DG.

Offsite power is supplied to the unit switchyard from the transmission network by seven transmission lines. From the switchyard, two electrically and physically separated circuits provide AC power, normally through step down reserve auxiliary transformers (RATS), to the 4.16 kV ESF buses. In addition to the two offsite circuits described above, the 13.8 kV standby auxiliary transformer (SAT) provides an additional qualified offsite source. A detailed description of the offsite power network and the circuits to the Class 1E ESF buses is found in the FSAR, Chapter 8 (Ref. 2).

An offsite circuit consists of all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network or the 13.8 kV SAT to the onsite Class 1E ESF bus(es).

The offsite power circuit which provides AC power through the SAT feeds the SAT through a direct buried cable. The buried cable originates at Georgia Power Company's Plant Wilson and can be powered by either the 230 kV grid system or from any combination of the Plant Wilson's (6) 60 MVA units of combustion turbine electrical generators. Both

(continued)

BASES

BACKGROUND (continued)

methods of supplying power utilize the Plant Wilson switchyard 13.8 kV power system. Two of the Plant Wilson combustion turbines have an enhanced black start capability (can be started without offsite power). The SAT is a "swing" or common offsite power source capable of connecting to any safety bus on either unit.

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the transformer supplying offsite power to the onsite Class 1E Distribution System. Within 1 minute after the initiating signal is received, all automatic and permanently connected loads needed to recover the unit or maintain it in a safe condition are returned to service via the load sequencer.

The onsite standby power source for each 4.16 kV ESF bus is a dedicated DG. DGs A and B are dedicated to ESF buses A and B, respectively. A DG starts automatically on a safety injection (SI) signal 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, in response to the undervoltage signal, a sequencer strips nonpermanent loads from the ESF bus. When the DG is tied to the ESF bus, loads are then sequentially connected to its respective ESF bus by the automatic load sequencer. 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 preferred 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 returned to service in a predetermined sequence in order to prevent overloading the DG in the process. Within 1 minute after the initiating

(continued)

BASES

BACKGROUND (continued)

signal is received, all loads needed to recover the unit or maintain it in a safe condition are returned to 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 7000 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.

APPLICABLE SAFETY ANALYSES

The initial conditions of DBA and transient analyses in the FSAR, 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 unit. This results in maintaining at least one train 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; and

b. A worst case single failure.

The AC sources satisfy Criterion 3 of NRC Policy Statement.

LCO

Two qualified circuits between the 230 kV grid system and the onsite Class 1E Electrical Power System and separate and independent DGs for each train ensure availability of the required power to shut down the reactor and maintain it in a

(continued)

BASES

LCO (continued)

safe shutdown condition after an anticipated operational occurrence (AOO) or a postulated DBA.

Qualified offsite circuits are those that are described in the FSAR and are part of the licensing basis for the unit.

In addition, one required automatic load sequencer per train must be OPERABLE. The automatic load sequencers are required to provide the system response to both an SI signal and a loss of or degraded ESF bus voltage condition.

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

Offsite circuit #1 and #2 each consist of a RAT fed from separate lines from the 230 kV switchyard. Each RAT can supply either 4160 V ESF bus. In addition to these circuits, there is also a 13.8/4.16 kV SAT which may be manually connected to supply power to any one of the 4.16 kV ESF buses for Units 1 and 2 in place of any RAT. The SAT receives power from the Georgia Power Company Plant Wilson switchyard.

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 11.5 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 Surveillances, e.g., capability of the DG to revert to standby status on an 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 train must be separate and independent (to the extent possible) of the AC sources in the other

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LCO (continued)

train. For the DGs, separation and independence are complete.

For the offsite AC sources, separation and independence are to the extent practical. A circuit may be connected to more than one ESF bus while the bus is being transferred to the other circuit.

APPLICABILITY

The AC sources and sequencers 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."

INSERT 1 →

ACTIONS

A.1

To ensure a highly reliable power source remains with one offsite circuit inoperable, it is necessary to verify the OPERABILITY of the remaining required offsite circuit on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action not met. However, if a second required circuit fails SR 3.8.1.1, the second offsite circuit is inoperable, and Condition ~~D~~ C, for two offsite circuits inoperable, is entered.

A.2

Required Action A.2, which only applies if the train cannot be powered from an offsite source, is intended to provide assurance that an event coincident with a single failure of the associated DG will not result in a complete loss of

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PAGE B 3.8-5

A Note prior to the ACTIONS table prompts the user that when the SAT is being applied in accordance with LCO 3.8.1 as an offsite circuit for an ESF bus or to meet the requirements of an LCO 3.8.1 Condition (SAT available) for an ESF bus, it is not "available" for any of the other three 4.16 kV ESF buses during that time. The SAT is available when it is:

- Operable in accordance with plant procedures;
- Not being applied to any of the four 4.16 kV ESF buses for Units 1 and 2 in accordance with Specification 3.8.1 as either an offsite source or to meet the requirements of an LCO 3.8.1 Condition; and,
- Not providing power to the other unit when that unit is in MODE 5 or 6 or defueled.

BASES

ACTIONS

A.2 (continued)

safety function of critical redundant required features. These features are powered from the redundant AC electrical power train. This includes motor driven auxiliary feedwater pumps. Single train systems, such as turbine driven auxiliary feedwater pumps, may not be included.

The Completion Time for Required Action A.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. The train has no offsite power supplying it loads; and

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

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

Discovering no offsite power to one train of the onsite Class 1E Electrical Power Distribution System coincident with one or more inoperable required support or supported features, or both, that are associated with the other train that has offsite power, results in starting the Completion Times for the Required Action. Twenty-four hours is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

The remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to Train A and Train B of the onsite Class 1E Distribution System. The 24 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 24 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

(continued)

BASES

ACTIONS (continued)

A.3

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 required offsite circuit inoperable, the reliability of the offsite system is degraded, and the potential for a loss of offsite power is increased, with attendant potential for a challenge to the unit safety systems. In this Condition, however, the remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to the onsite Class 1E Distribution System.

The 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 A.3 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition A is entered while, for instance, a DG is inoperable and that DG is subsequently returned OPERABLE, the LCO may already have been not met ~~for~~ up to 11 days ~~72 hours~~. This could lead to a total of ~~144 hours~~ 14 days, since initial failure to meet the LCO, to restore the offsite circuit. At this time, a DG could again become inoperable, the circuit restored OPERABLE, and an additional ~~72 hours~~ ~~(for a total of 9 days)~~ 3 days, or 14 days depending on SAT availability, allowed prior to complete restoration of the LCO. The ~~8~~ 14 day Completion Time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "AND" connector between the 72 hour and ~~8~~ 14 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

Tracking the ~~8~~ 14 day Completion Time is a requirement for beginning the Completion Time "clock" that is in addition to the normal Completion Time requirements. With respect to the ~~8~~ 14 day Completion Time, the "time zero" is specified as commencing at the time LCO 3.8.1 was initially not met, instead of at the time Condition A was entered. This results in the requirement when in this Condition to track

(continued)

BASES

ACTIONS

A.3 (continued)

the time elapsed from both the Condition A "time zero" and the "time zero" when LCO 3.8.1 was initially not met.

INSERT 2 →

B.~~1~~2

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

B.~~2~~3

Required Action B.~~1~~3 is intended to provide assurance that a loss of offsite power, during the period that a DG is inoperable, does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related trains. This includes motor driven auxiliary feedwater pumps. Single train systems, such as turbine driven auxiliary feedwater pumps, are not included. 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~~3 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 train (Train A or Train B) is inoperable.

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PAGE B 3.8-8

B.1

The 13.8/4.16 kV Standby Auxiliary Transformer (SAT) is a qualified offsite circuit that may be connected to the onsite Class 1E distribution system independently of the RATs and may be utilized to meet the LCO 3.8.1 requirements for an offsite circuit. Its availability permits an extension of the allowable out-of-service time for a DG to 14 days from the discovery of failure to meet LCO 3.8.1. The SAT is available when it is:

- Operable in accordance with plant procedures;
- Not being applied to any of the four 4.16 kV ESF buses for Units 1 and 2 in accordance with Specification 3.8.1 as either an offsite source or to meet the requirements of an LCO 3.8.1 Condition; and,
- Not providing power to the other unit when that unit is in MODE 5 or 6 or defueled.

When one or more of these criteria are not satisfied, the SAT is not available. These criteria are structured to ensure that the SAT is available as an alternate offsite source to support the extended DG Completion Time of 14 days. Therefore, when a DG is inoperable, it is necessary to verify the availability of the SAT within one hour and once per 8 hours thereafter. If Required Action B.1 is not met or the status of the SAT changes after Required Action B.1 is initially met, Condition C must be entered concurrently.

BASES

ACTIONS

B.~~2~~3 (continued)

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.

Discovering one required DG inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the OPERABLE DG, 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 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~~4.1 and B.~~3~~4.2

Required Action B.~~3~~4.1 provides an allowance to avoid unnecessary testing of the OPERABLE DG. 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~~F 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~~4.1 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.

(continued)

BASES

ACTIONS

B.~~3~~4.1 and B.~~3~~4.2 (continued)

In the event the inoperable DG is restored to OPERABLE status prior to completing either B.~~3~~4.1 or B.~~3~~4.2, the applicable plant procedures will continue to require the evaluation of the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in Condition B.

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

The availability of the SAT provides an additional AC source which permits operation to continue for a period not to exceed 14 days from discovery of failure to meet the LCO.

B.~~4~~5

~~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 enhanced reliability and availability OPERABLE DG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The ~~72 hour~~ 14 day 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~~ offsite Completion Time for Required Action B.~~4~~5 also establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition B is entered while, for instance, an offsite circuit is inoperable ~~and that circuit is subsequently restored OPERABLE,~~ the LCO may already have been not met for up to 72 hours. However, this could lead to a total of ~~144 hours~~ 17 days, since initial failure to meet the LCO, to restore ~~the DG~~ compliance with the LCO (i.e., restore the DG). ~~At this time, an offsite 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 ~~8~~ 14 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~~ (and consequently Condition E) are entered

If the offsite circuit is restored within the required 72 hours,

(continued)

BASES

ACTIONS B.~~1~~5 (continued)

concurrently. ~~The "AND" connector between the 72 hour and Completion Times means that Completion Times apply simultaneously, and the more restrictive Completion Time must be met.~~

Tracking the ~~8~~14-day Completion Time is a requirement for beginning the Completion Time "clock" that is in addition to the normal Completion Time requirements. With respect to the Completion Time, the "time zero" is specified as commencing at the time LCO 3.8.1 was initially not met, instead of at the time Condition B was entered. This results in the requirement when in this Condition to track the time elapsed from both the Condition B "time zero" and the "time zero" when LCO 3.8.1 was initially not met.

INSERT 3 →

D ~~C~~.1 and ~~C~~D.2

Required Action ~~C~~D.1, which applies when two offsite circuits are inoperable, is intended to provide assurance that an event with a coincident single failure will not result in a complete loss of redundant required safety functions. The Completion Time for this failure of redundant required features is reduced to 12 hours from that allowed for one train without offsite power (Required Action A.2). The rationale for the reduction to 12 hours is that Regulatory Guide 1.93 (Ref. 6) allows a Completion Time of 24 hours for two required offsite circuits inoperable, based upon the assumption that two complete safety trains are OPERABLE. When a concurrent redundant required feature failure exists, this assumption is not the case, and a shorter Completion Time of 12 hours is appropriate. These features are powered from redundant AC safety trains. This includes motor driven auxiliary feedwater pumps. Single train features, such as turbine driven auxiliary pumps, are not included in the list.

The Completion Time for Required Action ~~C~~D.1 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required

(continued)

INSERT 3
TO
PAGE B 3.8-11

C.1

If the availability of the SAT cannot be verified and/or maintained in accordance with Required Action B.1, the DG must be restored to OPERABLE status within 72 hours. The 72-hour Completion Time begins upon entry into Condition C. However, the total time to restore an inoperable DG cannot exceed 14 days (per the Completion Time of Required Action B.5).

The Completion Time of 72 hours (in the absence of the SAT) is consistent with Regulatory Guide 1.93 (Ref. 6). The 72-hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and low probability of a DBA occurring during this period.

BASES

ACTIONS

~~E~~D.1 and ~~E~~D.2 (continued)

Action the Completion Time only begins on discovery that both:

a. All required offsite circuits are inoperable; and

b. A required feature is inoperable.

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

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition ~~E~~D for a period that should not exceed 24 hours. This level of degradation means that the offsite electrical power system does not have the capability to effect a safe shutdown and to mitigate the effects of an accident; however, the onsite AC sources have not been degraded. This level of degradation generally corresponds to a total loss of the immediately accessible offsite power sources.

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

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

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

With both of the required offsite circuits inoperable, sufficient onsite AC sources are available to maintain the unit in a safe shutdown condition in the event of a DBA or transient. In fact, a simultaneous loss of offsite AC sources, a LOCA, and a worst case single failure were postulated as a part of the design basis in the safety

(continued)

BASES

ACTIONS

D.1 and D.2 (continued)

analysis. Thus, the 24 hour Completion Time provides a period of time to effect restoration of one of the offsite circuits commensurate with the importance of maintaining an AC electrical power system capable of meeting its design criteria.

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

E.1 and E.2

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

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

In Condition E, 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 D (loss of both required offsite circuits). This difference in reliability is offset by the susceptibility of this power system configuration to a single bus or switching failure. The 12 hour Completion Time takes into account the capacity and capability of the

(continued)

BASES

ACTIONS

E.1 and E.2 (continued)

remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

F.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, however, the time allowed for continued operation is severely restricted. The intent here is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

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

G.1

The sequencer(s) is an essential support system to both the offsite circuit and the DG associated with a given ESF bus. Furthermore, the sequencer is on the primary success path for most major AC electrically powered safety systems powered from the associated ESF bus. The sequencers are required to provide the system response to both an SI signal and a loss of or degraded ESF bus voltage signal. Therefore, loss of an ESF bus sequencer affects every major ESF system in the train. The 12 hour Completion Time provides a period of time to correct the problem commensurate with the importance of maintaining sequencer OPERABILITY. This time period also ensures that the

(continued)

BASES

ACTIONS

G ~~F~~.1 (continued)

probability of an accident (requiring sequencer OPERABILITY) occurring during periods when the sequencer is inoperable is minimal.

H H ~~G~~.1 and ~~G~~.2

If the inoperable AC electric power sources or an automatic load sequencer 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.

I ~~H~~.1

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

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 accordance with the recommendations of Regulatory Guide 1.9 (Ref. 3), Regulatory Guide 1.108 (Ref. 9), and Regulatory Guide 1.137 (Ref. 10), as addressed in the FSAR.

(continued)

Enclosure 2
Supplemental Information
(Further Justification for Proposed VEGP EDG Extended AOT)

Common Mode Failure (Single point of vulnerability) of Wilson/Vogtle Interconnection Design:

There is no single point of vulnerability that exists whereby a "likely" weather-related event or single active failure could disable any portion of the onsite emergency AC power sources or the preferred offsite power sources and simultaneously fail Plant Wilson power sources or components. The only common points between the standby auxiliary transformer (SAT) and the onsite emergency power sources (EDGs) are the individual emergency 4.16 kV 1E safety busses. They do not share a common bus breaker.

The Wilson/SAT underground line is not normally connected to the VEGP electrical distribution system, but is isolated from plant centered faults and disturbances. There is no common mode failure mechanism that could disable both the preferred and alternate offsite power sources and the SAT/Wilson underground line. Since the two designs are not normally interconnected, if a fault were to occur in the normal offsite power sources (i.e., reserve auxiliary transformer (RAT) cable bus, safety bus circuit breaker or disconnect switch), or a fault were to occur specific to the SAT or SAT cable bus, the other source would be unaffected. Protective relaying on both the RAT and SAT assures faults are isolated and alarmed. Therefore, for a fault in the normal alignment, the SAT could not be connected into the faulted bus until it had been cleared. Train and unit separation are still provided, and the fault only results in one train of one unit being unavailable for SAT alignment. The other bus and both busses of the other unit would still be available for connection to the SAT for emergency shutdown. For example, a failure of either the disconnect switch, cable bus, or supply breaker would render one preferred offsite power source (RAT) and the SAT unavailable for use on that train of associated shutdown loads. Also as another alternative, under emergency conditions the unit's other RAT can be aligned to supply power to that bus through the alternate 4.16 kV 1E safety bus tie breakers.

The SAT/Wilson line interconnection is protected from likely weather-related events such as lightning and severe thunderstorms accompanied by high winds by the direct buried cable, the structural integrity of the SAT cable bus work and disconnect switches to withstand these types of high winds, and protective relaying provided for isolating faults. Also the distance that separates VEGP and Wilson minimizes the likelihood of loose debris from VEGP, or the same weather-related event, from causing Wilson to be incapable of providing safe shutdown power for VEGP.

VEGP and Wilson switchyards are separated by approximately one mile. The Vogtle-Wilson underground interconnecting power feed and associated transformer (SAT) share common disconnect switches, cable bus, and 4.16 kV 1E safety bus supply breaker with each of the VEGP normal preferred power sources (RATs). The only weather-related event which could disable both the normal offsite power sources and remove all aspects of alternative power source routes that the SAT cable bus provides (i.e. cross connecting an EDG through the SAT cable bus and

disconnect switches, regardless of the Plant Wilson Combustion Turbine or switchyard condition) is a "direct strike" extremely severe tornado. This is not a likely event based upon the historical frequency of tornadoes reported in the VEGP area. The annual frequency of a tornado striking the area of the VEGP low voltage switchyard that encompasses the RAT and Wilson/SAT cable bus design is 1.649 E-04/yr, and the frequency of a tornado having sufficient strength to irretrievably damage this area is 5.473 E-5.

Calculated from the VEGP IPEEE model, the tornado striking frequency, f_t, at the area of the VEGP low voltage switchyard that encompasses the RAT and SAT/Wilson cable bus design, can be estimated by the following expression:

$$f_t = n * (W_tL_t + W_tZ_1 + L_tZ_2 + A_p) / A \quad \text{where:}$$

f_t = the annual frequency of a tornado striking the plant,
p_d = probability of a damaging tornado (f_2 - greater than or equal to 113 mph)
n = the mean number of tornado occurrences per year in the reference area,
W_t = the mean width of a tornado in miles,
L_t = the mean length of a tornado in miles,
Z_1 = projection of Vogtle switchyard in tornado length direction in miles,
Z_2 = projection of Vogtle switchyard in tornado width direction in miles,
A_p = area of Vogtle switchyard in square miles, and
A = the reference area where the plant is located and over which tornado data is accumulated.

Based on tornado data from the National Severe Storm Forecast Center, there were 52 tornadoes during a 42-year history (from June 1951 to May 1993) in a 36-mile radius of the Vogtle site (latitude 33° 08' 30" N, longitude 81° 45' 46"). The mean tornado path length and width of the 52 events is 4.125 and 0.05 miles, respectively, and the reference area (within the 36-mile radius) is approximately 4070 square miles. The Vogtle 230-kV low voltage switchyard where the SAT is located has dimensions of approximately 54 ft by 424 ft (0.0102 mi by 0.0803 mi). Assuming the maximum projections possible, Z_2 and Z_1 are 0.081 mi and 0.02 mi, respectively. Applying the equation above, the tornado striking frequency at the Vogtle low voltage switchyard is as follows:

$$\begin{aligned} f_t &= n * (W_tL_t + W_tZ_1 + L_tZ_2 + A_p) / A \\ &= (52/42)\,[\,(0.05)(4.125) + (0.05)(0.02) + (4.125)(0.081) + (0.0102)(0.0803)\,] / 4070 \\ &= 1.649\text{ E-4/yr} \end{aligned}$$

The fraction of tornadoes that would be expected to have a wind speed of 113 mph or greater is 1-0.6681. Therefore, the frequency of a tornado of sufficient strength to severely damage the RAT and SAT/Wilson line cable bus design in the low voltage switchyard is as follows:

f_d = 1.649 E-4 (1-0.6681)
= 5.473 E-5

Therefore, a tornado of sufficient size and strength to completely remove all LOSP recovery benefits provided by the Wilson/SAT design is not considered to be a likely weather related event.

The Plant Wilson Combustion Turbine (CT) facility is a completely self-sufficient, independent electrical generation facility. Even though the Plant Wilson CTs do not generate for a majority of the time, the Plant Wilson switchyard and station service are continuously energized from the Southern Electric System grid. Plant Wilson's switchyard is connected to the Southern Electric System Grid by two overhead transmission lines: (1) the Waynesboro, Ga. 230 kV transmission line entering the Wilson switchyard from the south; and (2) a second 230 kV transmission line entering the Wilson switchyard from the north and connected to the VEGP high voltage switchyard "breaker and a half scheme" bus. A loss of either one of these overhead lines would not cause the failure of the Wilson/SAT underground line as a potential source of power for safe shutdown of VEGP.

Plant Wilson has no common auxiliary power, fuel, equipment, or shared systems and/or components with VEGP. The only connections between the two facilities are the underground SAT power feed, two 13.8 kV overhead power lines and one 230 kV transmission line. Sufficient protective relaying has been provided to assure that any fault of these interconnected lines is isolated. The ground mats for the two facilities have been electrically connected to negate possible ground potential difference between the two sites and the interconnecting ground cable has been sized to withstand the predicted potential ground fault current.

Wilson/SAT Above Ground/Overhead Exposure:

The Plant Wilson "above-ground/overhead" exposed Wilson/SAT interconnection including lines, bus work, circuit breakers, disconnect switches, transformers, and overhead connections to support black-start operations on Combustion Turbine A or B is approximately 610 ft. This distance is measured from either Combustion Turbine A or B until it enters the direct buried cable. At Plant Wilson the overhead run covers an approximate area of 100 by 330 feet. Approximately one mile from Plant Wilson in the VEGP low voltage switchyard, the "above-ground/overhead" exposed Wilson/SAT interconnection including lines, bus work, circuit breakers, disconnect switches, transformer, and overhead connections is approximately 540 ft. This includes a horizontal run parallel to the turbine building of 424 feet with a 22 ft branch to the SAT Switchgear, a 15 ft branch to the 1A RAT disconnect, a 30 foot branch to the 1B RAT disconnect, a 32 ft branch to the 2B RAT disconnect and a 18 foot branch to the 2A RAT disconnect. Therefore the total maximum combined "above-ground/overhead" exposed Wilson/SAT interconnection is approximately 1150 ft.

The cable bus located in the VEGP low voltage yard is designed for 40 years expected life, outdoor installation, exposure to direct sunlight, a maximum normal ambient temperature of 40 degrees C, a maximum 24 hour average ambient temperature of 30 degrees C, and 120 mph wind. This cable bus is in a metal enclosed raceway except for the connections to the disconnect switches and the switchgear.

The disconnect switches are designed for 60 mph open-or-close operation, 90 mph gusts, 80 mph winds, and 3.3 inches of snow or 1.5 inches of ice.

Finally, the historical wind data recorded at the VEGP meteorological tower indicates the highest recorded wind speed at VEGP is 62 mph which is within the design capabilities of the Wilson/SAT line and components.

Station Blackout (SBO) Susceptibility and Criteria :

Performing EDG maintenance on-line increases a plant's potential for a SBO while at power because it increases the time period an EDG is unavailable. Therefore it is prudent to review the criteria and methodology for determining a plant's required station blackout coping duration and methodology. Per RG 1.155 and NUMARC 87-00, a plant's susceptibility to SBO is based upon the site's frequency of losing offsite power, the design characteristics of the on-site emergency AC (EAC) system, and its reliability.

A site's frequency of losing offsite power per SBO criteria is categorized given the facility's Offsite Power Design Characteristic Group. The determination of the offsite power design characteristic group is based upon:

(1) determining the site's susceptibility to grid-related loss of offsite power (LOSP) events;
(2) estimated frequency of LOSP due to extremely severe weather (i.e. ESW group);
(3) determination of the estimated frequency LOSP due to severe weather (i.e. SW group); and
(4) evaluation of the independence of the off-site power group.

(1) Grid related loss of offsite power events are defined as LOSPs that are strictly associated with the loss of the transmission and distribution system due to insufficient generating capacity, excessive loads, or dynamic instability. Note: although grid failure may also be caused by other factors, such as severe weather conditions or brush fires, these events are not considered grid related events since they are caused by external events. The average frequency of grid related events is approximately .020 per site-year, with most events isolated to a few systems. According to NUREG-1032 and supported by a review of VEGP site and Southern Company transmission system records which indicate no major

grid disturbances resulting in a LOSP at VEGP, the average occurrence for the majority of systems is about once per 100 site-years. (Reference Calculations NX3AD04 and NX3AD05)

Even with the infrequent possibility of a grid related LOSP, the SAT/Wilson line is expected to be unaffected, available, and fully capable for connection to VEGP for supply of safe shutdown loads to one or both units.

(2) The estimated frequency of LOSP due to extremely severe weather (ESW) is determined by the annual expectation of storms at the site with wind velocities greater than or equal to 125 mph. These events are normally associated with the occurrence of great hurricanes where high wind speeds may cause widespread transmission system unavailability for extended periods.

For VEGP the frequency of extremely severe weather of wind velocities greater than or equal to 125 mph causing a LOSP is 6.0 E-4, which places VEGP into the ESW group 2.

As a precautionary measure VEGP will consult extended weather forecasts prior to entering extended EDG AOTs. However for the occurrence of a severe weather event such as a hurricane where it is not reasonable to foresee such an event for an extended period in advance, VEGP has in place administrative controls which require the units to be placed in shutdown to at least Mode 3 within 2 hours prior to projected 74 mph sustained winds reaching the site. With these types of severe weather preparatory controls in place the increased risk of having a severe weather event with one EDG in an extended AOT is minimized.

(3) The estimated frequency of LOSP due to severe weather for VEGP is based upon the items below and is calculated to be 9.74 E-4.

- The annual expectation of snowfall for VEGP is 2 inches = (h_1) ;
- According to NUMARC 87-00, the annual expectation of tornadoes of severity with wind speeds greater than or equal to 113 mph at VEGP is 3.6 E-5 events per square mile = (h_2);
- The annual expectation of storms at VEGP with wind velocities between 75 and 124 mph is 2.2 E-2 events per square mile = (h_3);
- Given that VEGP is not located on the coast, the annual expectation of storms with significant salt spray is zero = (h_4);
- Multiple rights of way for transmission lines, VEGP factor of 12.5 = (b)

$$f = (1.3\ E\text{-}4)\ h_1 + (b \times h_2) + (0.012)\ h_3 + (c \times h_4)$$
$$f = (1.3\ E\text{-}4)2 + (12.5 \times 3.6\ E\text{-}5) + (0.012)0.022 + (0)$$
$$f = 9.74\ E\text{-}4$$

These factors are combined to determine the frequency (f) of LOSP at VEGP due to severe weather and is calculated as 9.74E-4. Since this frequency is less than 0.0033, VEGP falls into the category of a SBO severe weather group facility = 1. This category reflects that VEGP is one of the nuclear facilities which is least susceptible to LOSP due to severe weather. Therefore the Wilson/SAT interconnection design given its weather tolerant design, the small amount of time the EDGs will be in an extended AOT, and the increased power availability supplied from Wilson to Vogtle for emergency safe shutdown purposes, will further reduce the likelihood of a severe weather induced LOSP.

(4) The VEGP offsite power system design is in the "11/2" group since all offsite power sources are connected to the unit's safe shutdown buses through two or more electrically connected switchyards and there are no required manual or automatic transfers of safe shutdown buses to the preferred or alternate offsite sources.

From the factors for determining VEGP's susceptibility to LOSP, VEGP is a P1 facility. Offsite Power source configuration "P1" is defined as sites characterized by redundant and independent power sources that are considered less susceptible to LOSP as a result of plant-centered and weather initiated events.

As a comparison, another nuclear facility (as discussed in the April 22, 1996, meeting on this subject) was recently granted an EDG extension based upon a similar design as VEGP's. This facility is categorized as a "P2" facility, whose off-site power sources are less redundant or independent, or that are more susceptible to extended off-site power losses due to weather-initiated events or more frequent losses due to plant-centered events.

Onsite Emergency AC System Design Characteristics and SBO Contribution:

The Onsite Electrical Distribution System Design for VEGP is classified as a "C" emergency AC (EAC) power design per NUMARC 87-00 SBO criteria. This category is characterized as having a typical *redundant and independent* emergency AC power source for safe shutdown equipment. The target EDG reliability for VEGP is 95 % and is based upon having a nuclear unit average EDG reliability for the last 20 demands greater than 0.90. The GPC goal is to maintain the average EDG reliability for each unit equal to or better than the established target reliability of 95%. The latest EDG reliability data that follows supports that VEGP is maintaining the EDGs above the target reliability level.

NOTE: As a comparison, another nuclear facility (as discussed in the April 22, 1996, meeting on this subject) was recently granted an EDG extension based upon a similar design as VEGP's. This facility is categorized as having an onsite electrical distribution system of "D" design. "D" is an EAC configuration having the lowest level of independence and redundancy in EAC sources powering safe shutdown equipment per the SBO NUMARC 8700 criteria. Since this facility has a P2 offsite power system design and a "D" EAC design group, this facility is required to commit to a higher EDG reliability of 0.975 than VEGP's 0.95 and this facility is an 8 hour SBO duration facility given its increased vulnerability.

Current VEGP EAC Reliability Data as of April 29, 1996:

EDG 1A

Failures in the last 20 and 100 valid tests: 1/20 and 2/100

Reliability in the last 50 and 100 valid tests
(Per NRC and NUMARC 87-00 requirements):

Start Reliability (SR)	=	50/50 and 99/100
Load Run (LR)	=	49/50 and 99/100
Reliability (50)	=	SR X LR
	=	1 X 0.98
	=	0.98
Reliability (100)	=	SR X LR
	=	0.99 X 0.99
	=	0.98

EDG 1B

Failures in the last 20 and 100 valid tests: 1/20 and 2/100

Reliability in the last 50 and 100 valid tests
(Per NRC and NUMARC 87-00 requirements):

Start Reliability (SR)	=	49/50 and 99/100
Load Run (LR)	=	50/50 and 99/100

EDG 1B (continued)

Reliability (50)	=	SR X LR
	=	0.98 X 1
	=	0.98
Reliability (100)	=	SR X LR
	=	0.99 X 0.99
	=	0.98

EDG 2A

Failures in the last 20 and 100 valid tests: 1/20 and 1/100

Reliability in the last 50 and 100 valid tests
(Per NRC and NUMARC 87-00 requirements):

Start Reliability (SR)	=	49/50 and 99/100
Load Run (LR)	=	50/50 and 100/100
Reliability (50)	=	SR X LR
	=	0.98 X 1
	=	0.98
Reliability (100)	=	SR X LR
	=	0.99 X 1
	=	0.99

EDG 2B

Failures in the last 20 and 100 valid tests: 1/20 and 2/100

Reliability in the last 50 and 100 valid tests
(Per NRC and NUMARC 87-00 requirements):

Start Reliability (SR)	=	50/50 and 99/100
Load Run (LR)	=	49/50 and 99/100
Reliability (50)	=	SR X LR
	=	1 X 0.98
	=	0.98

EDG 2B (continued)

Reliability (100)	=	SR X LR
	=	0.99 X 0.99
	=	0.98

Justification for Use of Availability Data Instead of CT Reliability Data:

The Plant Wilson CTs are operated on a regular test schedule and are frequently utilized for peaking power when demand warrants. Since the SAT/Wilson power line is continuously energized from either the Southern Company Transmission & Distribution Grid or from any combination of Wilson's CT generation, it is considered to be an on-line system, i.e. the system is normally operated. With the Plant Wilson switchyard normally energized and its availability approaching 99.9%, and the CT generation availability of 97%, an overall 95% or better availability for the Wilson/SAT line is fully expected to be maintained in the future. Strict reliability data per NSAC-108 is not available for the Wilson combustion turbines and is not considered to be an option at this time. Performance characteristics are tracked for Plant Wilson by CT availability and is a better indicator of its ability to perform when needed for VEGP. A mechanism already exists to track and trend this type data if needed, and any time a CT fails to generate upon demand it is considered to be unavailable and reported as such.

Supporting Information

For Southern Company generation and transmission planning purposes, System Planning models combustion turbine facilities, like Plant Wilson, with an equivalent forced outage rate (EFOR) of 3.0 percent. These combustion turbine EFORs are demand related for peak-season, that is, these EFORs estimate the probability of a facility not meeting generation demands when called upon, as opposed to a unit EFOR. Therefore for a Southern Company combustion turbine facility like Plant Wilson the peak season availability is considered to be at least 97 %. The numbers are supported by current internal data and actual CT generation availability reports. Historical operational and performance data for each of the six CTs at Plant Wilson is available in Generating Availability Data Systems (GADS) since 1970.

The Southern Company reports and tracks their generating plants' performance utilizing GADS which is a performance tracking methodology developed by the North American Electric Reliability Council (NERC). GADS maintains complete operating histories on more than 4,400 generating units representing 92 % of the installed generating capacity in North America. GADS is a voluntary industry program, open to all investor-owned, municipal, cooperative and federal utilities operating generating facilities in North America. The purpose of GADS, is to establish a program for compilation and maintenance of an accurate, dependable, and comprehensive database capable of monitoring the performance of electric generating units and major pieces of equipment. GADs utilizes standard terminology for defining performance by following IEEE

Standard 762, "Definitions for Reporting Electric Generating Unit Reliability, Availability and Productivity.

GADS data for Plant Wilson are reported on a monthly basis for each CT at Plant Wilson by VEGP responsible personnel. The typical types of data recorded and retrievable from GADS are outage lengths and types, events, event causes, deratings, reserve shutdowns, non-curtailing equipment outages, actual and net unit generation. From this type of data, performance reports indicating equivalent forced outage rates and equivalent availability rates can be obtained.

(Testing Plan) *- Testing of Wilson CTs*

VEGP does not take credit for either the additional and diverse connection to the Southern Electric System grid continuously available via the Plant Wilson switchyard or the CT's at Plant Wilson as AAC power sources in the SBO coping analysis. Therefore when recently tested, the time required to black-start a CT and connect to VEGP for safe shutdown purposes was not recorded. Currently, there are no plans to repeat this test. However, VEGP management recognizes the need to train and test the ability of operators to perform this function within an acceptable time period on a periodic basis. Therefore, VEGP will conduct a combustion turbine black-start demonstration once every two years.

The current Plant Wilson "practice" is to start and run one CT once a week, at full capacity, for approximately one hour. Therefore, each CT is "exercised" at least once every six weeks, and the diesel generator is also run on a regular basis. During these weekly CT exercise runs, the starting and cranking of the CT(s) are not timed, nor are they black-started. The CTs are normally started from power supplied by the grid. During peak seasons when the CTs have been running to meet generation demand, the weekly testing is not performed.

Prior to an anticipated run, a CT is placed on turning gear for approximately two hours prior to the eventual cranking, fuel ignition, and electrical generation. In an emergency, the turning gear is not necessary, however it is a preferred method for continued long term operation and equipment maintenance. (The turning gear motors are DC motors and would be unaffected by a Plant Wilson LOSP.)

Timeliness of Availability While in an EDG Extended AOT:

Background: Per 10 CFR 50.2, Station Blackout (SBO) is defined as "the complete loss of alternating current (ac) electric power to the essential and non essential switchgear busses in a nuclear power plant (i.e., loss of offsite electric power system concurrent with turbine trip and unavailability of the onsite emergency ac power system). Station blackout does not include the loss of available ac power to busses fed by station batteries through batteries inverters or by alternate ac sources as defined in this section, ..." In accordance with 10 CFR 50.63 requirements, and plant specific design and analysis, VEGP is an AC independent, 4 hour, SBO

coping facility. The addition of the SAT and Wilson underground power feed was not designed in order to meet any specific NRC SBO regulatory requirements or NUMARC 87-00 alternate AC (AAC) source criteria in hopes of changing the VEGP SBO coping strategy. The Wilson/SAT line is designed and has been approved as meeting the requirements of 10 CFR 50 Appendix A, General Design Criteria 17, a qualified offsite power source. Vogtle is maintaining its AC independent, 4 hour, SBO coping strategy.

Timeliness With a SBO at Vogtle and No LOSP at Wilson:

The SAT power feed circuit provides an additional and diverse connection to the Southern Electric System grid. The SAT power feed circuit is immediately available as an energized line to the Vogtle low voltage switchyard provided the Wilson switchyard is still energized. The SAT power feed can be manually realigned and connected to feed any one of either VEGP unit's safe shutdown loads within 1 hour. The SAT underground power feed remains continuously energized.

During the initial stages of an SBO at Vogtle, there would be indication of a de-energized SAT power feed (i.e. LOSP at Wilson) with the design of a common SAT switchgear trouble annunciator in the VEGP Unit 1 Control Room. The decision to utilize the SAT as a potential immediate offsite source, or try to recover a grid connection through the RAT, would rely heavily on system dispatcher input and diagnosis, and both VEGP and Plant Wilson specific equipment status and operator staffing levels. The restoration of power following an SBO at Vogtle is addressed in the Vogtle Emergency Operating Procedure, 19100-C Loss of All AC Power and the System Dispatcher's procedure "Vogtle Safe Shutdown Procedure".

Timeliness With a SBO at Vogtle and a LOSP at Wilson:

Under these circumstances, i.e. Wilson experiencing a LOSP, the SAT power feed circuit would become de-energized and cause a Unit 1 Control Room common SAT switchgear trouble alarm. Although restoration of offsite power by the system dispatcher would simultaneously proceed given their grid restoration plan, a black-start of one of the Wilson CTs would then become an immediate option for VEGP personnel to implement in order to expedite the supply of Plant Vogtle with safe shutdown power, via the SAT.

The recovery from a SBO at Vogtle by application of the SAT power feed has been added to both the plant emergency operating procedures and the system dispatchers plan for restoration of offsite safe shutdown power to Vogtle. Currently the most logical order to be used by the system dispatcher for restoring offsite power to VEGP is; (1) connection via a RAT to the first available and capable source including a system interconnection,

(2) direct connection via a RAT to GPC fossil fired electric steam generating facility, Plant Harlee Branch, if its generating capacity is sufficient, (3) direct connection to GPC black-start capable Wallace Dam Hydroelectric plant, and (4) connection through either a RAT, or the SAT, to Plant Wilson Combustion Turbine Facility. However this is only a "suggested" logical order and the system dispatcher and VEGP plant operators may make different decisions or begin parallel implementation of all methods in the plan to assure the most timely restoration of power is met. The restoration of power following an SBO at Vogtle is addressed in the Vogtle Emergency Operating Procedure, 19100-C Loss of All AC Power, and the System Dispatcher's procedure "Vogtle Safe Shutdown Procedure."

Two of the six CTs at Wilson have been recently modified with enhanced black-start capability, making them a high priority for use under this scenario. One of these two Wilson CTs has been recently successfully black-start tested. The time required to perform this function has never been officially recorded and is highly dependent upon a variety of factors, such as: the type and severity of the initiating event; the qualified operator staffing available; receipt of system dispatcher switching orders and clearances; verification of available transmission lines; and the possible need to accommodate for supplemental emergency lighting and communications equipment. The time necessary for a CT black-start is minimized by following the precautionary measures noted in Attachment 1 and is expected to be less than four hours. This envelopes VEGP's analysis for coping with a SBO for four hours utilizing station batteries and inverters. The 2.5 MW diesel generator at Wilson is also capable of being aligned to Vogtle for supplying supplemental power to the battery chargers for extending battery coping capability beyond 4 hours if necessary.

SAT/Wilson Line Maintenance Rule Application:

At this time the Maintenance Rule performance criteria for the Wilson/SAT line is being tracked as an "*offsite power source*" and as a function of Technical Specifications 3.8.1.1 and 3.8.1.2 "AC Sources," such that the total LCO time is less than 75 hrs/cycle, no LOSP events due to maintenance factors occur, no more than 2 maintenance preventable functional failures (MPFF) occur per 2 fuel cycles and no repetitive MPFFs are experienced.

When VEGP is granted an extended EDG AOT based upon the availability of the Wilson/SAT line it will be included into the Maintenance Rule and its total availability tracked with a performance acceptance criteria of greater than or equal to 95 %.

IPE Re-analysis for Alternative Power Source Paths:

Although GPC considers the preceding justification to be sufficient for extending the DG AOT, the following PRA information is being provided at the request of the NRC during our April 22, 1996, meeting.

A recent supplemental analysis has been performed utilizing the IPE model to take advantage of other alternative uses of the Wilson/SAT design which have not previously been included. These alternatives include cross connecting an EDG between units utilizing the SAT cable bus for safe shutdown purposes and a slight seismic credit for the use of the bus work in the low voltage switchyard.

The probability of a station blackout (SBO) event for VEGP without any benefit from the addition of the SAT/Wilson line is 1.23 E-4. Given the enhanced LOSP recovery capability provided by the addition of the SAT/Wilson line and the existing EDG AOT of 3 days, the probability of an SBO is reduced by 90 % to 1.23 E-5. With the EDG AOT extended to 14 days, the probability of an event SBO decreases by 85 % to 1.85 E-5.

With the addition of the SAT/Wilson line for enhanced LOSP and/or SBO recovery capability, and an EDG AOT of 3 days, VEGP CDF decreases by 44.3 % from the original IPE base case. With the addition of the SAT/Wilson line for enhanced LOSP and/or SBO recovery capability and an EDG AOT of 14 days, VEGP CDF decreases by 41.3 % from the original IPE base case.

Attachment 1 to Enclosure 2

Administrative Precautionary Measures - <u>Wilson Plan</u>

- ***If a VEGP EDG is out of service for maintenance the following actions will be performed prior to exiting from a 3 day EDG AOT into a 14 day (extended) EDG AOT and, where applicable, during the 14 day EDG AOT***

  The SAT will be verified as available by verifying voltage level at the SAT 13.8 kV circuit breaker cubicle prior to, and at least once every 8 hours while in the extended EDG AOT.

  Insure all equipment between the SAT and the disconnect switch in the Vogtle low voltage switchyard is available and functional prior to and at least once every 12 hours thereafter, while in the EDG AOT.

  No further elective equipment maintenance or testing which increases the likelihood of a plant transient will be performed while in the EDG AOT.

  An EDG extended AOT will not be entered for scheduled maintenance purposes if severe weather conditions are expected.

  No elective maintenance will be performed within the Wilson substation which would challenge the 13.8 kV SAT connection.

  The Waynesboro 230kV offsite power connection to the Wilson substation will be in service.

  Verify either the A or B Wilson CT units have been successfully run within the past 6 weeks. A CT run is accomplished by tieing a CT to the transmission network for generation purposes.

  Verify the diesel generator at Wilson has been started and run at least six weeks prior to entering the Vogtle extended EDG AOT.

  Fuel for 11 days (14 days -3 days) for 1 CT, as a minimum, will be available at Plant Wilson.

  No elective maintenance or testing will be performed on the Plant Wilson cranking diesel or the A or B CT units.

  A combustion turbine trained operator will be on duty at VEGP or Plant Wilson.

Administrative Precautionary Measures - <u>Wilson Plan</u>

- ***If an offsite source (a RAT) connected to the 4.16 kV 1E safety bus associated with the out of service EDG is lost***

  The SAT 13.8 kV underground connection will used to restore the affected bus.

  The GPC Transmission Maintenance Services (TMS) department will be immediately notified to assist in restoring the affected RAT

  The System Dispatcher/ PCC will be notified that Vogtle is aligning one 4.16 kV 1E safety bus to Plant Wilson through the SAT

- ***If a CT black-start appears to be necessary during the extended EDG AOT, e.g. impending extremely severe weather or the Southern Electric System has been identified as being potentially unstable due to events in the system, the following action will be taken.***

  An operator will report to Plant Wilson and prepare for a CT black-start by placing at least one CT on turning gear. Under these conditions, a CT has been demonstrated to be capable of being black-started within 1 hour. The alignment of the Wilson/SAT line to VEGP for safe shutdown purposes can be performed parallel to a CT black-start and has also been demonstrated to be accomplished within 1 hour.

- ***If a SBO were to occur at Vogtle during the extended EDG AOT.***

  An operator will report to Plant Wilson and black-start a CT if necessary, or prepare for a CT black-start by placing at least one CT on turning gear. This provides assurance that a CT is available for safe shutdown purposes within the 4 hour SBO coping analysis for VEGP.

  The system dispatcher/PCC will initiate the restoration of offsite power to Vogtle utilizing the "Vogtle Safe Shutdown Procedure."