8.0 ELECTRIC POWER

8.1 INTRODUCTION

8.1.1 UTILITY GRID DESCRIPTION

→(DRN 05-1767, R14-A)
The transmission grid of Entergy Louisiana, LLC, which consists of over 2,200 miles of line operating at voltages from 69 to 500 kV (shown on Figure 8.1-1) interchanges power with Waterford 3.

→(DRN E9900733)
The Entergy Louisiana, LLC grid is a part of the Entergy Electric System and is directly interconnected with the grid of each of the other operating companies as shown on Figure 8.1-2. In addition, Entergy Louisiana, LLC's grid is interconnected with three other companies which are not part of the Entergy Electric System. These are: Central Louisiana Electric Company, Southwestern Electric Power Company and Mississippi Power Company. Entergy Louisiana, LLC is also a member of the Southeastern Electric Reliability Council.
←(DRN E9900733)

Through these connections, Entergy Louisiana, LLC is interconnected with the other utility systems in the United States and operates in parallel with them.
←(DRN 05-1767, R14-A)

8.1.2 OFFSITE POWER SYSTEM

Power is supplied from the main generator to the Waterford 3 switching station through two main transformers which are in parallel. From the switching station, two overhead lines transmit power to the Waterford switchyard, which is the point of connection to the grid.

The Plant Electric Power Distribution System receives power under normal operating conditions from the main generator through two unit auxiliary transformers.

For start-up and shutdown, when the main generator is unavailable, power is obtained through two start-up transformers from the grid through the switchyard transmission lines and the switching station.

When Waterford 3 is not operating, an additional path of supply from the switching station to the Plant Electric Power Distribution System may be made available by opening links in the generator main leads and by using the main transformers and unit auxiliary transformers instead of the start-up transformers.

A simplified one line diagram of the switchyard is given in Figure 8.1-4 and of the switching station in Figure 8.1-5. The Main One Line Diagram is shown in Drawings G285 and G286. The Offsite Power System is discussed more fully in Section 8.2.

8.1.3 ONSITE POWER SYSTEM

→(DRN E9900733)
The Onsite Power System consists of three 4.16 kV ESF buses (3A3-S, 3B3-S, and 3AB3-S), two diesel generators (3A-S and 3B-S), several 480 V power centers (supplying motor loads directly and through motor control centers), three 125 V dc batteries, five 125 V dc buses (3A-DC-S, 3B-DC-S, 3AB-DC-S, 3A1-DC-S and 3B1-DC-S), and several 480 V and 208Y/120V power distribution panels.
←(DRN E9900733)

The Main One Line Diagram, Figure 8.1-7, shows the Onsite Power System configuration.
→ (DRN 99-0682)
Power for safety related loads is normally supplied by the non-safety related 4.16 kV buses (3A2 and 3B2) of the Offsite Power System. Should offsite power from either of these buses be lost, the Onsite Power System will receive power automatically from the appropriate diesel generator. Non-safety related loads (excluding loads identified in Table 8.3-1) will be automatically disconnected from the safety Onsite Power System. Each ESF bus (3A3-S or 3B3-S) is redundant to the other; each can supply sufficient power to its safety related loads to enable safe shutdown, or to mitigate the consequences of a design basis accident. The third bus, 3AB3-S, may be connected to either 3A3-S or 3B3-S, but never to both. Therefore 3AB3-S is not considered as a third, separate source of ESF power. (This bus serves to supply power to safety related loads which are standby to safety related loads on buses 3A3-S and 3B3-S.)
← (DRN 99-0682)
→ (DRN 99-0733)
The Plant Electric Power Distribution System Loads are given in Table 8.1-2. The ac safety loads are shown in Table 8.1-1. The dc safety loads are listed in Tables 8.3-3, 8.3-4 and 8.3-5. The 120 V ac and 125 V dc one line diagrams are shown in Drawing 287, Sheet 1.
← (DRN 99-0733)
The third of a kind ESF electrical system shown on Figure 8.1-9 consists of:

a)	4.16 kV Switchgear 3AB3-S	(power)
b)	480V Switchgear 3AB31-S	(power)
c)	125V d-c System 3AB	(control)
d)	120V a-c and 125V d-c	(instrumentation)

Item c contains battery 3AB-S and does not have interconnections with the SA or SB 125V d-c systems.

Item d derives the low level power for instrumentation from items a and b through necessary step down transformers and from item c.

Control power for items a and b is obtained from item c.

Items a and b receive power, either from system SA or system SB. The dead bus transfer is made from the main control room. To accomplish this and meet the single failure criterion, eight breakers have been provided. These breakers are: (Refer to Figure 8.1-9)

Breaker No. 1 - Tie breaker from 4.16KV swgr 3A3-S to 3AB3-S
Breaker No. 2 - Tie breaker from 4.16KV swgr 3AB3-S to 3A3-S
Breaker No. 3 - Tie breaker from 4.16KV swgr 3B3-S to 3AB3-S
Breaker No. 4 - Tie breaker from 4.16KV swgr 3AB3-S to 3B3-S
Breaker No. 5 - Tie breaker from 480V swgr 3A31-S to 3AB31-S
Breaker No. 6 - Tie breaker from 480V swgr 3AB31-S to 3A31-S
Breaker No. 7 - Tie breaker from 480V swgr 3B31-S to 3AB31-S
Breaker No. 8 - Tie breaker from 480V swgr 3AB31-S to 3B31-S

When the two position selector switch is in position A, breakers No. 1, No. 2, No. 5 and No. 6 are closed (the rest are open), and when it is in position B, breakers No. 3, No. 4, No. 7 and No. 8 are closed (the rest are open).

Following is the sequence of events for a transfer from System SA to SB.

a) Trip breaker No. 1 and No. 5 from the main control room. These breakers are operated by one control switch.

b) Move two position selector switch from position A to B. Breaker No. 2 and No. 6 will trip and breaker No. 4 and No., 8 will close, if breakers No. 1, No. 5, No. 3 and No. 7 are open. The latter condition is monitored and controlled by undervoltage relays 27 in the line side of breaker No. 2, No. 4, No. 6 and No. 8. 4.16KV breakers No. 2 and No. 4 are interlocked electrically and also, 480V breakers No. 6 and No. 8, so that both of a kind cannot be closed at the same time.

c) Close breakers No. 3 and No. 7 from the main control room. These breakers are operated by one control switch.

The control switch of breakers No. 1 and No., 5 are key interlocked with the control switch of breakers No. 3 and No. 7. Keys may be removed only in the trip position.

Transfer from system SB to SA involves the same eight breakers described above and it is accomplished in a similar manner with the same requirements imposed on transferring from system SA to SB.

It should be noted that breaker No. 1 and No. 5 receive control power from 125V dc system SA, whereas breaker No. 3 and No. 7 from 125V dc system SB. The balance of the breakers, i.e., No. 2, No. 4, No. 6, and No. 8 receive control power from 125V dc system SAB. Therefore, there is no control device or instrumentation in system SAB requiring power from system SA or SB.

→(DRN E9900733)
All power, control and instrumentation cabling are routed in separate raceway systems i.e., SA, SB, and SAB, which are color coded for identification.
←(DRN E9900733)

8.1.4 DESIGN BASES

8.1.4.1 Offsite Power System

The Offsite Power System is designed to:

a) Provide a reliable source of auxiliary power for start-up, operation and shutdown of the plant.

→(DRN 05-1767, R14-A)
b) Provide for transmission of the station output to the Entergy Louisiana, LLC grid.
←(DRN 05-1767, R14-A)

→ (DRN E9900733)

c) Comply with NRC General Design Criterion 17 (Electric Power Systems) by providing two electrically and physically independent transmission circuits from the grid to the Plant Electric Power Distribution System; each circuit is designed to be available within a few seconds following a design basis accident to assure that vital safety functions are maintained.

← (DRN E9900733)

d) Minimize the probability that loss of one line will cause loss of the other or of the Onsite Power System.

→ (DRN E9900733)

Appendix 8.1A provides the results of a Station Blackout (SBO) Evaluation performed for Waterford 3 in accordance with the requirements of 10CFR50.63. The evaluation demonstrates that equipment will be functional such that Waterford 3 can safely cope with an SBO for four hours.

← (DRN E9900733)

8.1.4.2 Onsite Power System

The Onsite Power System is designed to:

a) Provide a reliable source of auxiliary power for safe shutdown of reactor, assuming loss of offsite power and single failure in the Onsite Power System.

b) Provide independent, redundant and testable power supplies, each with its own distribution system, so that the required safety function can be performed by either power supply, assuming a single failure in the other power supply or in its distribution system.

c) Provide for testing the operability and functional performance of the components of each system and of the systems themselves.

d) Be capable of withstanding the effects of the design basis wind, tornado, flood and earthquake without loss of power to safety related components essential to safe shutdown or to maintenance in a safe condition.

e) Minimize the probability that loss of one onsite power supply or of its distribution system will cause loss of the other onsite supply, of the other onsite distribution system or of the Offsite Power System.

Details of seismic design and testing are provided in Section 3.10.

8.1.4.3 Criteria, Codes and Standards

The electrical systems and equipment for the plant which are safety related are designed, manufactured, tested, installed and maintained to meet the requirements of the applicable NRC General Design Criteria, in accordance with the following IEEE Standards, as modified by the following NRC Regulatory Guides. Wherever alternative approaches are used to meet the intent of some specific recommendations of Regulatory Guides and IEEE Standards, the method of attaining an acceptable level of safety is found in the full discussion of these documents in Subsection 8.3.1.2.

a) The applicable General Design Criteria, as listed in 10CFR50, Appendix A, are discussed in Section 3.1.

b) NRC Regulatory Guides:

1) 1.6, Independence Between Redundant (Onsite) Power Sources and Between Their Distribution Systems (3/10/71)
→ (DRN E9900733, LBDCR 14-010, R308)
2) 1.9**, Selection of Diesel Generator Set Capacity for Standby Power Supplies (3/10/71 and 03/07)
← (DRN E9900733, LBDCR 14-010, R308)
3) 1.22, Periodic Testing of Protection System Actuation Functions (2/17/72)

4) 1.29, Seismic Design Classification (8/73)

5) 1.30, Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment (8/11/72)

6) 1.32, Use of IEEE Std 308-1971, "Criteria for Class 1E Electric Systems for Nuclear Power Generating Stations (8/11/72)

7) 1.40, Qualification Tests of Continuous-Duty Motors Installed Inside the Containment of Water-Cooled Nuclear Power Plants (3/16/73)

8) 1.41, Preoperational Testing of Redundant Onsite Electric Power Systems to Verify Proper Load Group Assignments (3/16/73)

9) 1.53, Application of the Single-Failure Criterion to Nuclear Power Plant Protection Systems (6/73)

10) 1.62, Manual Initiation of Protective Actions (10/73)

11) 1.63, Electric Penetration Assemblies in Containment Structures for Water-Cooled Nuclear Power Plants (1/74)

12) 1.73, Qualification Tests of Electric Valve Operators Installed Inside the Containment of Nuclear Power Plants (1/74)

13) 1.75*, Physical Independence of Electric Systems (1/75)

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* Indicates that Waterford 3 has taken exception to or interprets the Regulatory Guide. These alternate ways of meeting the intent of the Regulatory Guide are discussed in Subsection 8.3.1.2.
→(DRN E9900733)
** See FSAR Section 9.5.4 and the applicable Technical Specification and TS Bases for a discussion of Diesel Generator Fuel Oil Storage and Transfer Systems.
←(DRN E9900733)

15) 1.81, Shared Emergency and Shutdown Electric Systems for Multi-Unit Nuclear Power Plants (6/74) (not applicable to Waterford 3)

16) 1.89, Qualification of Class 1E Equipment for Nuclear Power Plants (11/74)

→(DRN E9900733)

17) 1.93, Availability of Electric Power Sources (12/74)

←(DRN E9900733)

c) Institute of Electrical and Electronics Engineers (IEEE) Standards:

1) IEEE Standard 279-1971, Protection Systems for Nuclear Power Generating Stations, Criteria for

2) IEEE Standard 308-1971, Criteria for Class 1E Electric Systems for Nuclear Power Generating Stations.

→(DRN E9900733)

3) IEEE Standard 317-1972, Electric Penetration Assemblies in Containment Structures for Nuclear Power Generating Stations.

←(DRN E9900733)

4) IEEE Standard 336-1971, Installation, Inspection and Testing Requirements for Instrumentation and Electric Equipment During The Construction of Nuclear Power Generating Stations.

5) IEEE Standard 338-1971, IEEE Standard Criteria for the Periodic Testing of Nuclear Power Generating Station Class 1E Power and Protections Systems.

6) IEEE Standard 344-1971, IEEE Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations.

7) IEEE Standard 384-1974, Criteria for Separation of Class 1E Equipment and Circuits.

→(LBDCR 14-010, R308)

8) IEEE Standard 387-1972 and 387-1995, Criteria for Diesel Generator Units Applied as Standby Power Supplies for Nuclear Power Stations.

←(LBDCR 14-010, R308)

9) IEEE Standard 415-1976, Guide for planning of Pre-Operational Testing Programs for Class 1E Power Systems for Nuclear Power Generating Stations.

10) IEEE Standard 450-1980, Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations.

→(DRN 05-1767, R14-A)

d) In addition to the above, all transmission lines and substations are designed and constructed in accordance with applicable industry standards, including those of the Entergy Louisiana, LLC. All electrical equipment, both onsite and offsite, is designed and manufactured to applicable ANSI, NEMA, IEEE and other industry standards.

←(DRN 05-1767, R14-A)

→(DRN E9900733)

TYPICAL EQUIPMENT CONNECTED TO SAFETY RELATED POWER SOURCES

←(DRN E9900733)

UNID	Description of Load	Nameplate

Security-Related Information
Table Withheld Under 10 CFR 2.390

→ (DRN E9900733)

TYPICAL EQUIPMENT CONNECTED TO SAFETY RELATED POWER SOURCES

← (DRN E9900733)

UNID	Description of Load	Nameplate

Security-Related Information Table Withheld Under 10 CFR 2.390

→ (DRN E9900733, R11)

TYPICAL EQUIPMENT CONNECTED TO SAFETY RELATED POWER SOURCES

← (DRN E9900733, R11)

UNID	Description of Load	Nameplate

Security-Related Information
Table Withheld Under 10 CFR 2.390

→ (DRN E9900733, R11)

TYPICAL EQUIPMENT CONNECTED TO SAFETY RELATED POWER SOURCES

← (DRN E9900733, R11)

UNID	Description of Load	Nameplate

Security-Related Information
Table Withheld Under 10 CFR 2.390

→ (DRN E9900733, R11)

TYPICAL EQUIPMENT CONNECTED TO SAFETY RELATED POWER SOURCES

← (DRN E9900733, R11)

UNID	Description of Load	Nameplate

Security-Related Information
Table Withheld Under 10 CFR 2.390

→(DRN E9900733, R11)

TYPICAL EQUIPMENT CONNECTED TO SAFETY RELATED POWER SOURCES

←(DRN E9900733, R11)

UNID	Description of Load	Nameplate

Security-Related Information
Table Withheld Under 10 CFR 2.390

TABLE 8.1-2 (Sheet 1 of 4) Revision 304 (06/10)

→ (DRN E9900733)

TYPICAL AUXILIARY LOADING

Item No.	Quant.	Description	Rating of Each Load(3) (V) (hp)	Division A Normal Load* (hp)(3) (kVA)	Division B Normal Load* (hp)(3) (kVA)

Security-Related Information
Table Withheld Under 10 CFR 2.390

← (DRN E9900733; EC-19206, R304)

Item No.	Quant.	Description	Rating of Each Load(3)	Division A Normal Load*	Division B Normal Load*

Security-Related Information
Table Withheld Under 10 CFR 2.390

➔(DRN E9900733)

Item No.	Quant.	Description	Rating of Each Load(3) (V) (hp)	Division A Normal Load* (hp)(3) (kVA)	Division B Normal Load* (hp)(3) (kVA)

Security-Related Information
Table Withheld Under 10 CFR 2.390

Item No.	Quant.	Description	Rating of Each Load(3) (V) (hp)	Division A Normal Load* (hp)(3) (kVA)	Division B Normal Load* (hp)(3) (kVA)

Security-Related Information
Table Withheld Under 10 CFR 2.390

TABLE 8.1-3 (Sheet 1 of 7)

FSAR CROSS-REFERENCE OF DISCUSSION OF SRP ACCEPTANCE CRITERIA FOR ELECTRIC POWER

CRITERIA		FSAR DISCUSSION OFFSITE POWER SYSTEM (8.2)	ONSITE STANDBY AC POWER SUPPLY (DG SETS) (8.3.1)	ESF AC POWER DISTRIBUTION SYSTEM (8.3.1)	ESF DC POWER DISTRIBUTION SYSTEM (8.3.2)	REMARKS
I. REGULATORY GUIDES[2]						
a. RG 1.6-1971	Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution Systems	N/A	8.3.1.2.3	8.3.1.2.3	8.3.2.2.1.3	Compliance is indicated in FSAR Subsection 8.1.4.3.
→(LBDCR 14-010, R308) b. RG 1.9-1971 RG 1.9 2007	Selection of Diesel Generator Set Capacity for Standby Power Supplies	N/A	8.3.1.2.4	N/A	N/A	Compliance is indicated in FSAR Subsection 8.1.4.3.
←(LBDCR 14-010, R308) c. RG 1.22-1972	Periodic Testing of Protection System Actuation Functions	N/A	(1)	(1)	(1)	Compliance is indicated in FSAR Subsection 8.1.4.3. See Surveillance Requirements in (Technical Specifications)
d. RG 1.29-1973	Seismic Design Classification	N/A	8.3.1.2.6	8.3.1.2.6	(1)	
e. RG 1.30-1972	Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment	N/A	T 17.2-1	T 17.2-1	T 17.2-1	Compliance is indicated in FSAR Subsection 8.1.4.3
f. RG 1.32-1972	Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants	(1)	(1)	8.3.1.2.8	8.3.2.2.1.4	Compliance is indicated in FSAR Subsection 8.1.4.3
g. RG 1.40-1973	Qualification Test of Continuous Duty Motor Installed Inside the Containment of Water-cooled Nuclear Power Plants	N/A	N/A	(1)	N/A	Compliance is indicated in FSAR Subsection 8.1.4.3

TABLE 8.1-3 (Sheet 2 of 7) Revision 9 (12/97)

CRITERIA		FSAR DISCUSSION OFFSITE POWER SYSTEM (8.2)	ONSITE STANDBY AC POWER SUPPLY (DG SETS) (8.3.1)	ESF AC POWER DISTRIBUTION SYSTEM (8.3.1)	ESF DC POWER DISTRIBUTION SYSTEM (8.3.2)	REMARKS
I. REGULATORY GUIDES (Cont'd)						
h. RG 1.41-1973	Preoperational Testing of Redundant Onsite Electric Power Systems to Verify Proper Load Group Assignments	N/A	8.3.1.2.10	8.3.1.2.10	8.3.1.2.10	Compliance is indicated in FSAR Subsection 8.1.4.3
→ i. Deleted ←						
j. RG 1.53-1973	Application of the Single-Failure Criterion to Nuclear Power Plant Protection Systems	N/A	7.2.3.3.5	7.2.3.3.5	7.2.3.3.5	Compliance is indicated in FSAR Subsection 8.1.4.3
k. RG 1.62-1973	Manual Initiation of Protective Actions	N/A	(1)	(1)	(1)	Compliance is indicated in FSAR Subsection 8.1.4.3
l. RG 1.63-1973	Electric Penetration Assemblies in Containment Structures for Water-Cooled Nuclear Power Plants	N/A	N/A	8.3.1.1.4	8.3.1.1.4	Compliance is indicated in FSAR Subsection 8.1.4.3
m. RG 1.68-1978	Preoperational and Initial Startup Test Programs for Water-Cooled Power Reactors	N/A	14.2.7.13	14.2.7.13	14.2.7.13	
n. RG 1.70-1975	Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants, Rev. 2	(1)	(1)	(1)	(1)	Compliance is indicated in FSAR Subsection 1.1

TABLE 8.1-3 (Sheet 3 of 7)

CRITERIA		FSAR DISCUSSION OFFSITE POWER SYSTEM (8.2)	ONSITE STANDBY AC POWER SUPPLY (DG SETS) (8.3.1)	ESF AC POWER DISTRIBUTION SYSTEM (8.3.1)	ESF DC POWER DISTRIBUTION SYSTEM (8.3.2)	REMARKS
I. REGULATORY GUIDES (Cont'd)						
n. RG 1.73-1974	Qualification Tests of Electric Valve Operators Installed Inside the Containment of Nuclear Power Plants	N/A	N/A	3.9.3.2.2	N/A	Compliance is indicated in FSAR Subsection 8.1.4.3
o. RG 1.75-1975	Physical Independence of Electric System	N/A	8.3.1.2.13	8.3.1.2.13	8.3.1.2.13	Compliance is indicated in FSAR Subsection 8.1.4.3
p. RG 1.89-1974	Qualification of Class 1E Equipment for Nuclear Power Plants	N/A	3.10.2 and 3.11.2	3.10.2 and 3.11.2	3.10.2 and 3.11.2	Compliance is indicated in FSAR Subsection 8.1.4.3
q. RG 1.93-1974	Availability of Electric Power Sources	16.3/4.8	16.3/4.8	16.3/4.8	16.3/4.8	Compliance is indicated in FSAR Subsection 8.1.4.3
II. IEEE STANDARDS						
a. IEEE Std 279-1971	Criteria for Protection System for Nuclear Power Generating Stations	N/A	N/A	8.3.1.2.14	8.3.1.2.14	Compliance is indicated in FSAR Subsection 8.1.4.3
b. IEEE Std 308-1971	Criteria for Class 1E Electric Power Systems for Nuclear and Power Generating Stations	8.3.1.2.15 and 8.3.2.2.1.5	8.3.1.2.15 and 8.3.2.2.1.5	8.3.1.2.15 and 8.3.2.2.1.5	8.3.2.1.15 and 8.3.2.2.1.5	Compliance is indicated in FSAR Subsection 8.1.4.3
c. IEEE Std 317-1972	Electric Penetration Assemblies in Containment Structures for Nuclear Power Generating Stations	N/A	N/A	8.3.1.1.4	8.3.1.1.4	Compliance is indicated in FSAR Subsection 8.1.4.3

TABLE 8.1-3 (Sheet 4 of 7)

CRITERIA		FSAR DISCUSSION OFFSITE POWER SYSTEM (8.2)	ONSITE STANDBY AC POWER SUPPLY (DG SETS) (8.3.1)	ESF AC POWER DISTRIBUTION SYSTEM (8.3.1)	ESF DC POWER DISTRIBUTION SYSTEM (8.3.2)	REMARKS
II. IEEE STANDARDS (Cont'd)						
d. IEEE Std 323-1971	Standard General Guide for Qualifying Class 1E Electrical Equipment for Nuclear Power Generating Stations	N/A	3.11.2	3.11.1	8.3.2.2 and 3.11.2	
e. IEEE Std 334-1971	Type Test of tinuous-Duty Class 1E Motors for Nuclear Power Generating Stations	N/A	N/A	3.11.2	N/A	
f. IEEE Std 336-1971	Installation, Inspection and Testing Requirements for Instrumentation and Electrical Equipment During the Construction of Nuclear Power Generating Stations	N/A	8.3.1.2.17	8.3.1.2.17	8.3.1.2.17	Compliance is indicated in FSAR Subsection 8.1.4.3
g. IEEE Std 338-1971	Criteria for the Periodic Testing of Nuclear Power Generating Station Protection Systems	N/A	N/A	8.3.1.2.18	N/A	Compliance is indicated in FSAR Subsection 8.1.4.3
h. IEEE Std 344-1971	Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations	N/A	(1)	(1)	(1)	Compliance is indicated in FSAR Subsection 8.1.4.3

TABLE 8.1-3 (Sheet 5 of 7)

CRITERIA		FSAR DISCUSSION OFFSITE POWER SYSTEM (8.2)	ONSITE STANDBY AC POWER SUPPLY (DG SETS) (8.3.1)	ESF AC POWER DISTRIBUTION SYSTEM (8.3.1)	ESF DC POWER DISTRIBUTION SYSTEM (8.3.2)	REMARKS
II. IEEE STANDARDS (Cont'd)						
i. IEEE Std 379-1972	Guide for he Application of the Single Failure Criterion to Nuclear Power Generating Station Protection Systems	N/A	7.2.2.3.2 and 7 2.2.3.5	7.2.2.3 2 and 7.2.2.3.5	7.2.2.3.2 and 7.2.2.3.5	
j. IEEE Std 384-1974	Criteria for Separation of Class 1E Equipment and Circuits	N/A	8.3.1.2.19	8.3.1.2.19	8.3.1.2.19	Compliance is indicated in FSAR Subsection 8.1.4.3
→(LBDCR 14-010, R308)						
k. IEEE Std 387-1972 IEEE Std 387-1995	Criteria for Diesel-Generator Units Applied as Standby Power Supplies for Nuclear Power Stations	N/A	8.3.1.2 20	N/A	N/A	Compliance is indicated in FSAR Subsection 8.1.4.3
←(LBDCR 14-010, R308)						
l. IEEE Std 415-1976	Guide for Planning of Pre-Operational Testing Programs for Class 1E Power Systems for Nuclear Power Generating Stations	N/A	14.2.7 23	14.2.7.23	14.2.7 23	Compliance is indicated in FSAR Subsection 8.1.4.3
m. IEEE Std 450-1980	Recommended Practice for Maintenance, Tes ing and Replacement of Large Lead Storage Batteries for Generating Stations and Substations	N/A	N/A	N/A	8.3.2.2.1.6	Compliance is indicated in FSAR Subsection 8.1.4.3
III. BRANCH TECHNICAL POSITIONS						
a. BTP ICSB 2 (PSB)	Diesel-Generator Reliability Qualification Testing	N/A	N/A	N/A	N/A	The Waterford 3 Diesel Generators are of the same type (CES Model KSV-16-T) as those used at the Susquehana units. Therefore, this BTP is not applicable to Waterford.

TABLE 8.1-3 (Sheet 6 of 7)

CRITERIA		FSAR DISCUSSION OFFSITE POWER SYSTEM (8.2)	ONSITE STANDBY AC POWER SUPPLY (DG SETS) (8.3.1)	ESF AC POWER DISTRIBUTION SYSTEM (8.3.1)	ESF DC POWER DISTRIBUTION SYSTEM (8.3.2)	REMARKS
III. BRANCH TECHNICAL POSITIONS (Cont'd)						
b. BTP ICSB 6 (PSB)	Capacity Test Requirements of Station Batteries-Technical Specifications	N/A	N/A	N/A	8.3.2.1.8	Battery tests will be performed as outlined BTP ICSB 6 at the intervals stated in the Technical Specifications
c. BTP ICSB 8 (PSB)	Use of Diesel-Generator Sets for Peaking	N/A	N/A	N/A	N/A	Waterford does not make use of the diesel-generator sets for peaking.
d. BTP ICSB 11 (PSB)	Stability of Offsite Power Systems	N/A	N/A	N/A	N/A	The Louisiana Power & Light grid system has interties with that of Middle South Services. Discussions of the grid system may be found in FSAR Section 8.1 and 8.2
e. BTP ICSB 15 (PSB)	Reactor Coolant Pump Breaker Qualification	N/A	N/A	N/A	N/A	Reactor coolant pumps are discussed in FSAR Subsection 5.4.1
f. BTP ICSB 17 (PSB)	Diesel Generator Protective Trip Circuit Bypass	N/A	8.3.1.1.2.11(c)	N/A	N/A	
g. BTP ICSB 18 (PSB)	Application of the Single Failure Criterion to Manually-Controlled Electrically-Operated Valves	N/A	N/A	N/A	N/A	Manually-Controlled, Electrically Operated Valves are discussed FSAR Subsec-16.3/4.5.2
h. BTP ICSB 21	Guidance for Application of RG 1.47	7.5.1.8 and 7.5.2.8	7.5.1.8 and 7.5.2.8	7.5.1.8 and 7.5.2.8	7.5.1.8 and 7.5.2.8	

TABLE 8.1-3 (Sheet 7 of 7)

CRITERIA		FSAR DISCUSSION OFFSITE POWER SYSTEM (8.2)	ONSITE STANDBY AC POWER SUPPLY (DG SETS) (8.3.1)	ESF AC POWER DISTRIBUTION SYSTEM (8.3.1)	ESF DC POWER DISTRIBUTION SYSTEM (8.3.2)	REMARKS
IV. 10 CFR PART 50						
a. 10 CFR 50.34	Contents of Applications: Technical Information	N/A	N/A	N/A	N/A	Waterford is in compliance with this part
b. 10 CFR 50.36	Technical Specifications	N/A	N/A	N/A	N/A	Waterford is in compliance with this part. See FSAR Chapter 16 (Technical Specifications)
c. 10 CFR 50.55a	Codes and Standards	N/A	N/A	N/A	N/A	Waterford is in compliance with this part
V. GENERAL DESIGN CRITERIA						
	All General Design Criteria are discussed in FSAR Section 3.1					

Notes:

(1) Criteria as applicable to this section is found in the other referenced sections.

(2) Discussions of general compliance with Regulatory Guides is indexed in FSAR Section 1.8.

N/A - Not Applicable

APPENDIX 8.1A

STATION BLACKOUT EVALUATION

EVALUATION

LP&L performed an evaluation, EC-E89-016, for Waterford 3 for a Station Blackout (SBO) in accordance with 10CFR50.63 using the guidance in NUMARC 87-00 and Regulatory Guide 1.155. There were no hardware changes required for Waterford 3 to cope with an SBO for four hours. Procedural changes are implemented to enhance the ability of Waterford 3 to cope with an SBO. The plant specific evaluation for Waterford 3 demonstrates that equipment will be functional such that Waterford 3 can safely cope with an SBO for four hours.

→(DRN E990733)
The Nuclear Utility Group on Station Blackout (NUGSBO), Nuclear Utility Management Resource Council (NUMARC), the NRC, and various technical consulting firms endeavored for several years to resolve the technical issues for an SBO. The resolution addressed the margins of safety, potential malfunctions and accident types, probabilities of malfunctions and accidents, and consequences. The resolution for SBO was established and documented in 10CFR50.63, NUMARC 87-00, and Regulatory Guide 1.155. The plant specific evaluation for Waterford 3 was performed in accordance with the foregoing documents. The Waterford 3 evaluation was independently verified by Entergy technical personnel and reviewed and approved by cognizant personnel.
←(DRN E990733)

The SBO industry resolution, Waterford 3 plant specific evaluation, and independent review and approval of the effort provide additional defense in depth that Waterford 3 will be able to cope with an SBO and that an unreviewed safety question does not exist.

DISCUSSION

The results of the evaluation are summarized below, (Applicable NUMARC 87-00 sections are shown in parenthesis).

A. Proposed Station Blackout Duration

→(DRN E990733)
NUMARC 87-00, Section 3, was used to determine a proposed SBO duration of four hours.

The following plant factors were identified in determining the proposed station blackout duration:
←(DRN E990733)

1. AC Power Design Characteristic Group is P2 based on:

→(DRN 06-339, R14-B)

a. Expected frequency of grid-related Loss of Offsite Power (LOOP) - does not exceed once per 20 years (Section 3.2.1, Part 1A);

b. Estimated frequency LOOPs due to extremely severe weather, places the plant in ESW Group 4 (Section 3.2.1, Part 1B);

←(DRN 06-339, R14-B)

→(DRN 06-339, R14-B)

c. Estimated frequency of LOOPs due to severe weather places the plant in SW Group 2 (Section 3.2.1, Part 1C);

d. The offsite power system is in the I3 group (Section 3.2.1, Part 1D);

2. The emergency AC power configuration groups is "C" based on: (Section 3.2.2., Part 2C);

a. There are two (2) emergency AC power supplies not credited as alternate AC power sources (Section 3.2.2, Part 2A);

b. One (1) emergency AC power supply is necessary to operate safe shutdown equipment following a loss of offsite power (Section 3.2.2, Part 2B);

←(DRN 06-339, R14-B)

3. The target EDG reliability is 0.975.

a. A target EDG reliability of 0.975 was selected based on having a nuclear unit average EDG reliability for the last 50 demands greater than 0.94 consistent with NUMARC 87-00, Section 3.2.4.

B. SBO Procedure Description

Plant procedures have been reviewed and modified to meet the guidelines in NUMARC 87-00, Section 4, in the following areas:

1. AC power restoration per NUMARC 87-00, Section 4.2.2; LP&L Emergency Procedures for Restoration of Offsite Power to Waterford 3.

→(DRN E9900733)

2. Severe weather per NUMARC 87-00, Section 4.2.3; OP-901-S21 - Severe Weather and Flooding.

←(DRN E9900733)

Plant procedures have been reviewed and changes necessary to meet NUMARC 87-00 implemented in accordance with 10CFR50.63 in the following area:

1. Station blackout response per NUMARC 87-00, Section 4.2.1; OP-902-005 - Degraded Electrical Distribution Recovery Procedure.

C. Proposed Modifications and Schedule

The ability of Waterford 3 to cope with a station blackout for four hours in accordance with NUMARC 87-00, Section 3.2.5, and as determined in "Section A," was assessed using NUMARC 87-00, Section 7, with the following results:

1. Condensate Inventory for Decay Heat Removal (Section 7.2.1)

→(DRN E9900733; 04-1680, R14)

It was determined (using Section 7.2.1 of NUMARC 87-00) that approximately 106,300 gallons of water are required for decay heat removal and primary system cooldown to 400°F (emergency operating procedures address whether cooldown is necessary) for a four-hour station blackout coping period (NUMARC 87-00, Section 3.2.5). Since the minimum permissible condensate storage tank level required by Technical Specifications exceeds 106,300 gallons, adequate inventory is available.

←(DRN E9900733; 04-1680, R14)

2. Class 1E Battery(ies) Capacity (Section 7.2.2)

A battery capacity calculation verified that the Class 1E batteries have sufficient capacity to meet station blackout for four hours.

3. Compressed Air (Section 7.2.3)

Air-operated valves relied upon to cope with a station blackout for four hours can either be operated manually or have sufficient backup sources independent of the preferred and Class 1E power supply. Valves requiring manual operation or that need backup sources for operation are identified in plant procedures.

4. Effects of Loss of Ventilation (Section 7.2.4)

a. EFW Pump Room

The calculated steady state ambient air temperature for the steam driven EFW pump room during a station blackout induced loss of ventilation is 90°F. This temperature is below the threshold value of 120°F for dominant areas of concern requiring equipment operability analysis.

b. Control Room Complex for PWR

The assumption in NUMARC 87-00, Section 2.7.1, that the control room will not exceed 120°F during a station blackout has been assessed.

The control room at Waterford 3 does not exceed 120°F during station blackout. Therefore, the control room is not a dominant area of concern.

Reasonable assurance of the operability of station blackout equipment in the areas containing potential heat sources have been assessed using Appendix F to NUMARC 87-00 or the Topical Report. No modifications or associated procedures are required to provide reasonable assurance for equipment operability.

5. Containment Isolation (Section 7.2.5)

   The plant list of containment isolation valves was reviewed to verify that valves which must be capable of being closed or that must be operated (cycled) under station blackout conditions can be positioned (with indication) independent of the preferred and Class 1E power supplies. No plant modifications or additional procedure changes were required to ensure that appropriate containment integrity can be provided under SBO conditions.

6. Reactor Coolant Inventory (Section 2.5)

   The ability to maintain adequate reactor coolant system inventory to ensure that the core is cooled was assessed for four hours. A plant-specific analysis was used for this assessment. The expected rates of reactor coolant inventory loss under SBO conditions do not result in core uncovery in a SBO of four hours. Therefore, makeup systems in addition to those currently available under SBO conditions are not required to maintain core cooling.

The results of the SBO evaluation for Waterford 3 were provided to the NRC on April 14, 1989 via Reference 2.

Section 8.1A References

1 - Nuclear Management and Resources Council, "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors," NUMARC 87-00, November 1987.

2. - Louisiana Power and Light letter W3P89-0510 to USNRC, dated April 14, 1989.