ABB
ASEA BROWN BOVERI

January 14, 1992
LD-92-001

Docket No. 52-002

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Subject: Response to NRC Requests for Additional Information

Reference: A) Letter, Electrical Systems Branch RAIs, T. V. Wambach (NRC) to E. H. Kennedy (C-E), dated July 29, 1991

B) Letter LD-91-067, E. H. Kennedy (C-E) to T. V. Wambach (NRC), dated December 20, 1991

Dear Sirs:

Reference A) requested additional information for the NRC staff review of the Combustion Engineering Standard Safety Analysis Report - Design Certification (CESSAR-DC). Reference B) provided responses to a number of those questions. Enclosure I to this letter provides additional responses to Reference A) questions along with corresponding revisions to CESSAR-DC. Enclosure II provides a list of questions to which responses will be provided separately.

Should you have any questions on the enclosed material, please contact me or Mr. Stan Ritterbusch of my staff at (203) 285-5206.

Very truly yours,

COMBUSTION ENGINEERING,

E. H. Kennedy
Manager
Nuclear Systems Licensing

EHK:lw
Enclosures: As Stated

cc: J. Trotter (EPRI)
T. Wambach (NRC)

9201210255 920114
PDR ADOCK 05200002
A PDR

ABB Combustion Engineering Nuclear Power

Combustion Engineering, Inc.
1000 Prospect Hill Road
Post Office Box 500
Windsor, Connecticut 06095-0500
Telephone (203) 688-1911
Fax (203) 285-9512
Telex 99297 COMBEN WSOR

210052

D032
1/1

Enclosure I to
LD-92-001

RESPONSE TO NRC REQUESTS FOR ADDITIONAL INFORMATION
ELECTRICAL SYSTEMS BRANCH

Question 430.6

Your description of the offsite power system is incomplete. To facilitate (8.2) our review of the offsite power system, the SSAR should be revised to include the following items.

A. Interface requirements for users's application which incorporates CESSAR-DC design for the offsite circuits from the utility - CESSAR-DC interface out to the utility grid system which is outside the CESSAR-DC standard plant scope.

B. The physical and electrical separation between the circuits associated with the combustion turbine generator and other offsite circuits including instrumentation and control circuits.

C. Capacity and capability of each offsite circuit to supply connected loads.

Response 430.6

A. Interface requirements for the offsite power system will be summarized along with other system interface requirements in Section 1.9 of CESSAR-DC to be submitted in February 1992 as discussed in a letter to Mr. Dennis M. Crutchfield from E. H. Kennedy, dated October 22, 1991.

B. Physical and electrical separation of "X" and "Y" circuits shall be maintained between the combustion turbine generator and offsite circuits. Cables shall not be routed together and shall be separated such that a failure in one system does not impact the other.

See attached revised CESSAR-DC, Section 8.3.1.4.5.2.

C. Each of the two offsite power circuits to the two switchyards shall have sufficient capacity, be continuously energized, and be available to supply power to the plant safety-related systems within a few seconds following a loss of coolant accident (LOCA) to assure that core cooling, containment integrity, and other vital safety functions are maintained. The two offsite power circuits also have sufficient capacity to accept the unit's generated power or supply all non-safety related loads when the unit is offline.

See attached revised CESSAR-DC, Section 8.2.1.1.

HAVING SUFFICIENT CAPACITY, BE CONTINUOUSLY ENERGIZED, AND AVAILABLE TO SUPPLY POWER TO THE PLANT SAFETY-RELATED SYSTEMS WITHIN A FEW SECONDS FOLLOWING A LOSS OF COOLANT ACCIDENT (LOCA) TO ASSURE THAT CORE COOLING, CONTAINMENT INTEGRITY, AND OTHER VITAL SAFETY FUNCTIONS ARE MAINTAINED.

8.2 OFFSITE POWER SYSTEM E

8.2.1 SYSTEM DESCRIPTIONS

8.2.1.1 Utility Grid System

The utility grid system, which is not within the scope of the System 80+ Standard Design, may consist of interconnected hydro, fossil fueled and nuclear plants supplying energy to the service area at various voltages. The grid transmission system is also a source of reliable and stable power for the onsite power distribution system. The grid system design must include at least two preferred power circuits, each ~~capable of supplying the plants' necessary safety loads and other equipment.~~ I E

8.2.1.2 Utility Grid and Switchyard Interconnections

The switchyard is connected to the primary transmission system by overhead transmission lines. Figure 8.2-1 depicts a typical interconnection of the switchyard and onsite power.

8.2.1.3 Station Switchyard

Transmission lines from the primary transmission system shall terminate in the switchyard with provisions for additional lines to be added in the future. Additionally, the Main Unit and Standby Auxiliary Transformers are tied to the switchyard by separate and independent overhead lines.

The entire switchyard, including the power circuit breakers, cabling system, AC and DC auxiliary power systems, protective relaying system, and control system shall be divided into two preferred power buses designated 1 and 2. These designations shall be consistent with the preferred power feeder designations. Additionally, the incoming transmission lines shall be also assigned to power buses in such a way as to separate the associated cabling, protective relaying, and controls for each circuit transmission line into two distinct sources of offsite power.

The switchyard design shall provide redundant offsite power feed capability to the nuclear unit.

8.2.1.3.1 Switchyard 480V AC Auxiliary Power System

A 480V AC Auxiliary Power System shall be provided in the switchyard to supply a reliable source of continuous AC power for the power circuit breaker auxiliaries, battery chargers, relay house air conditioning, and switchyard lighting.

PHYSICAL AND ELECTRICAL SEPARATION OF "X" AND "Y" CIRCUITS SHALL BE MAINTAINED BETWEEN THE COMBUSTION TURBINE GENERATOR AND THE OFFSITE CIRCUITS. CABLES SHALL NOT BE ROUTED TOGETHER AND SHALL BE SEPARATED SUCH THAT A FAILURE IN ONE SYSTEM DOES NOT IMPACT THE OTHER.

8.3.1.4.5.2 Cable Separation

The minimum separation between Class 1E cables and between Class 1E and Non-Class 1E cables meets the intent of Regulatory Guide 1.75.

8.3.1.5 Cable Derating and Cable Tray Fill

8.3.1.5.1 Cable Derating

The cable ampacities for both AC and DC power cables are derated per IEEE Standard S-135 and IPCEA P-46-426 to assure minimum degradation of cable insulation caused by high temperatures should the cables be loaded to their maximum ampacity rating.

The maximum ampacities for all power cables are determined by multiplying the appropriate cable manufacturer's IPCEA cable ampacity rating by 0.7.

8.3.1.5.2 Cable Tray Fill Criteria

The cable tray fill criterion for those trays containing power cables allows only one single layer of power cables to be routed in any tray, and, in general, separation of one-quarter the diameter of the larger cable is maintained between adjacent power cables within a tray.

The cable tray fill criterion for those trays containing instrumentation and control cables is that the cross-sectional area of these cables will not exceed the usable cross-sectional area of the tray.

E

8.3.1.6 Fire Protection and Detection

The fire protection system provided in the unit is discussed in Section 9.5.1.

All openings for cable and cable tray runs in fire rated walls and floors are protected consistent with the rating of the wall or floor. The barrier openings are protected with approved devices such as fire dampers and fire stopping material of Class C (3/4 hour) for openings in one hour fire barriers and Class B (1-1/2 hours) for openings in two hour fire barriers and Class A (3 hours) for openings in three hour fire barriers.

Question 430.7 (8.2.1)

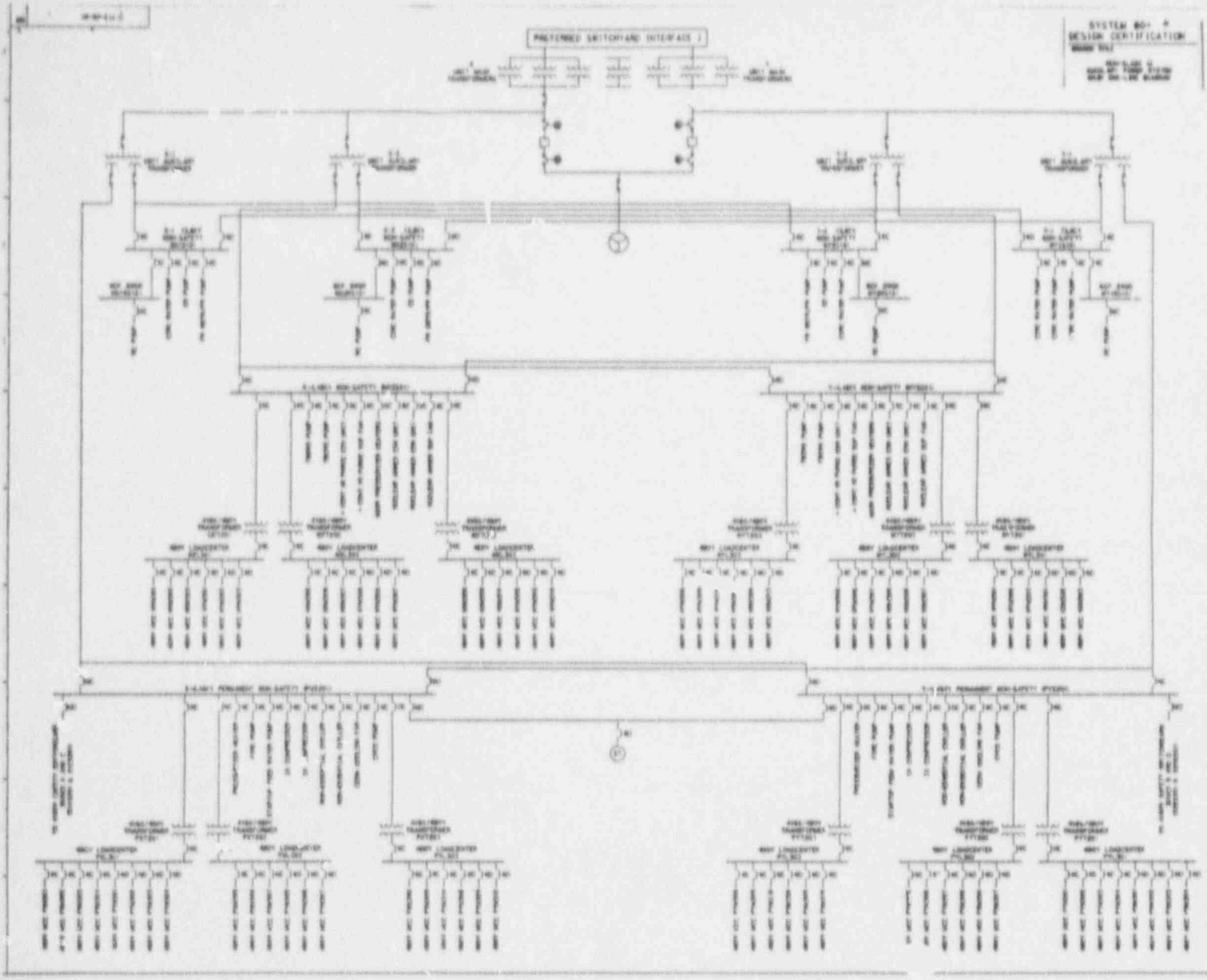
Based on information presented in Subsection 8.2.1.5, it appears that the immediate offsite power circuit will be provided by a backfeed from the transmission network through the main transformer and two unit auxiliary transformers to the Class 1E distribution system. To initiate this backfeed, the main generator must be disconnected from the transmission network by a generator breaker. In order to utilize this immediate offsite source, describe how the main generator breaker meets the specific guidelines of Appendix A to SRP Section 8.2. In addition, revise your SSAR to describe the mode of operation of the two immediate offsite power sources.

Response 430.7

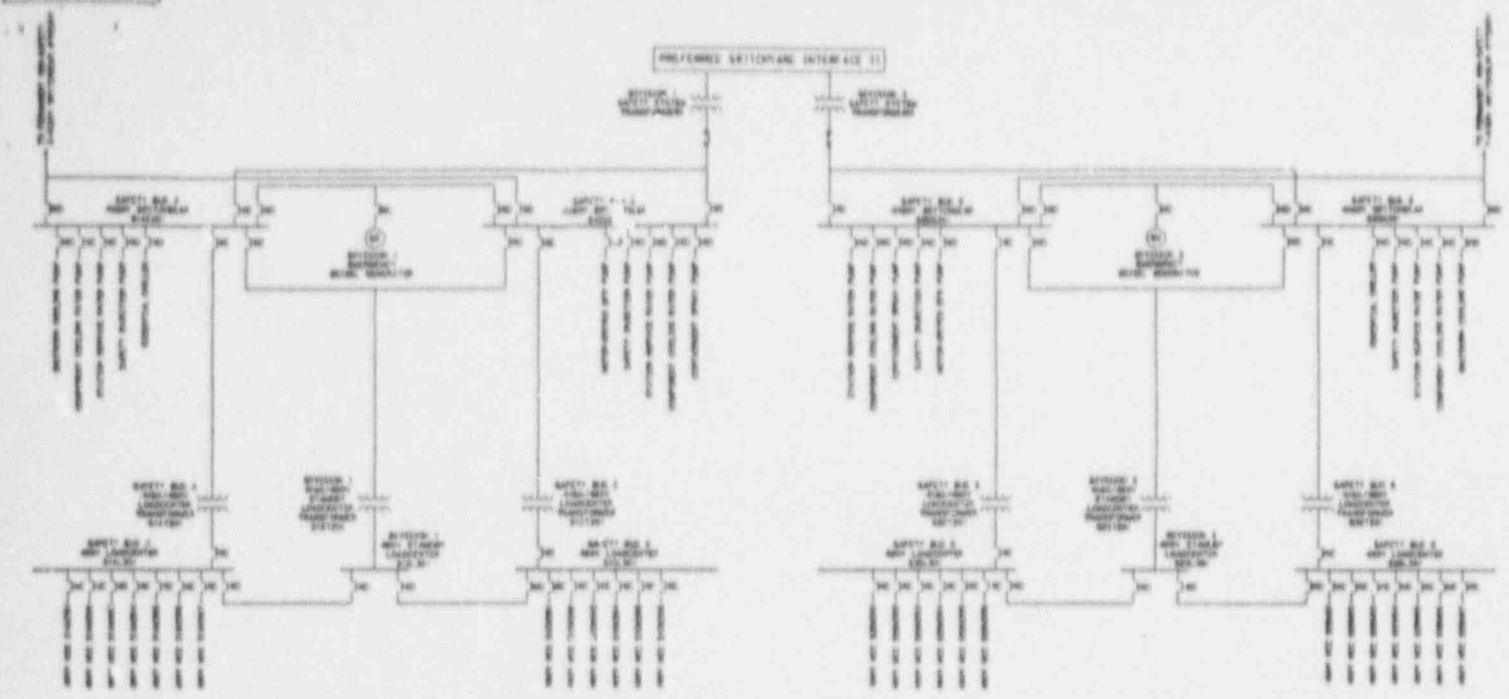
Any main generator breaker will undergo verification testing similiar to the testing performed for the generator breakers at the Duke Power McQuire Nuclear Plant. This testing will ensure the generator breakers can interrupt maximum fault current and operate properly during steady-state operation, power system transients, and major fault conditions. The following will be added as a future amendment to CESSAR-DC, Section 8.2.1.5 to state this fact and to describe the operation of offsite power sources:

"The redundant Class 1E Distribution Systems shall receive power backfed from the transmission lines through two dedicated safety systems transformers. The Class 1E Distribution System shall also be capable to being fed from permenent non-safety distribution systems mentioned below as a secondary means of receiving power. Prior to and during startup of the nuclear unit, the onsite non-safety distribution systems shall receive power backfed from the grid through half-sized main generator transformers and unit auxiliary transformers. These backfeeds are initiated by opening two generator circuit breakers and associated disconnect switches to isolate the main generator from the main step-up and unit auxiliary transformers. The generator circuit breakers are located on each side of the isolated phase bus between the main generator and the connection points of the unit main and auxiliary transformers.

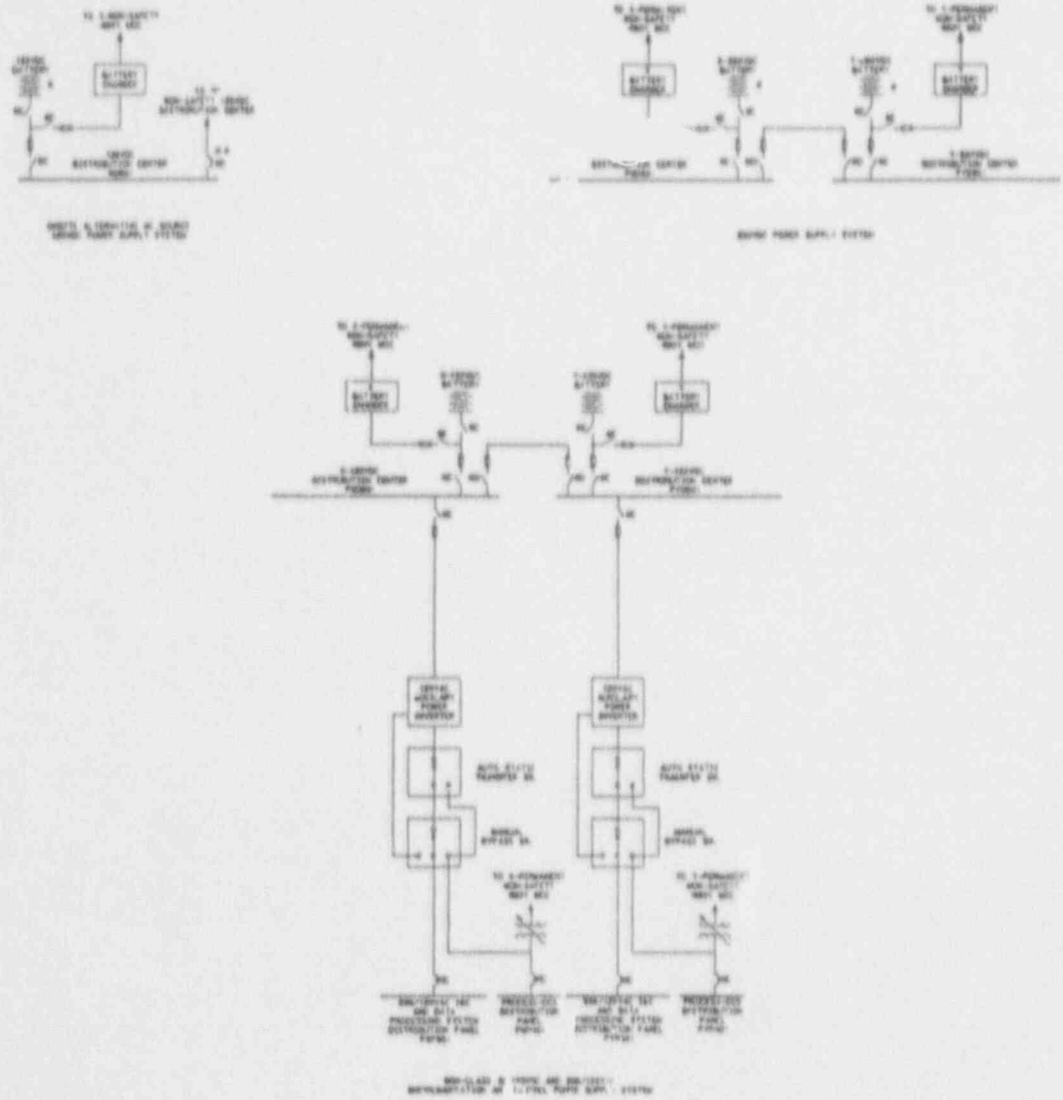
Any generator circuit breaker used to provide immediate access of the onsite power systems to offsite power systems will meet the guidelines of Appendix A to SRP Section 8.2. They will have the capability to interrupt the systems maximum fault current and function properly during steady-state



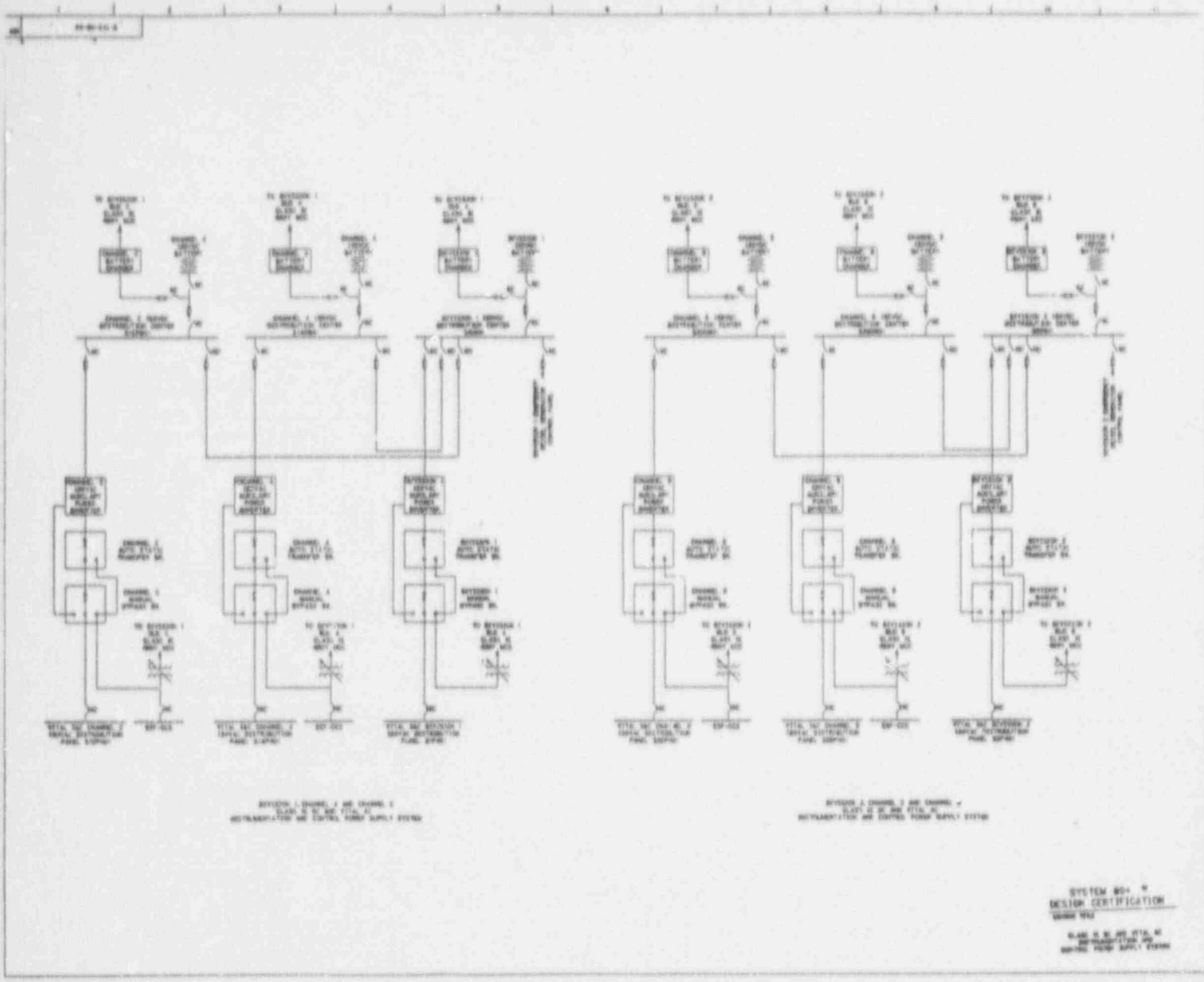
SYSTEM 80+
DESIGN CERTIFICATION
PREFERRED SWITCHYARD INTERFACE



SYSTEM 80+
DESIGN CERTIFICATION



SYSTEM 80+
DESIGN CERTIFICATION


SYSTEM 80+
DESIGN CERTIFICATION

Question 430.16

There is no interface criteria provided for the location of standby auxiliary transformer in the SSAR. The staff requires that the standby auxiliary transformer should be separated from the main and unit auxiliary transformer to the maximum extent practical (preferably on different sides of the building) in order to minimize the common effects of fire or environmental effects such as lightning on their operation. Please provide this information.

Response 430.16

Figure 8.3.1-1, the unit main power system one-line, has been revised thereby deleting the standby auxiliary transformer. The new one-line shows two safety system transformers which now directly feed the safety buses. These transformers are physically separated such that no fire nor environmental effect shall disable both the safety and non-safety offsite sources.

See RAI 430.9 revised CESSAR section 8.2.1.3.

Question 430.23

Identify all non-Class 1E loads and their kW ratings that can be powered from EDGs and identification of the extra kW capacity available to supply non-Class 1E loads during the various modes of plant operation. In addition, describe how non-Class 1E loads are isolated from the safety buses.

Response 430.23

Table 8.3.1-4, "Electrical Bus Loads," which will be added to CESSAR-DC in the next amendment, lists typical electrical bus loads for the Safety Buses, the Permanent Non-Safety Buses, and the Non-Safety Buses. Of these, selected loads at operator's discretion on the Permanent Non-Safety (non-Class 1E) Buses may be powered from the Emergency Diesel Generators. This tabular load listing is not a finalized version, as indicated by the footnote: "The loads given in this table are typical. Actual loads are site-dependent based on the equipment procured. Therefore, the site-specific SAR shall make appropriate adjustments and evaluations as necessary."

The following statement from current CESSAR-DC, Section 8.3.1.1.4 states the CESSAR-DC philosophy and goals of EDG sizing to meet expected loads:

"The emergency diesel generator is designed and sized with sufficient capacity to operate all the needed engineered safety feature and emergency shutdown loads powered from its respective Class 1E Safety Division bus."

The word "bus" in the above statement will be amended to "buses," since there are two safety buses (A and C, B and D) per division.

Capacity margin will be provided based on the EPRI recommendation of 10% of continuous rating. A statement specifying this will be added to CESSAR-DC in a future amendment.

Non-Class 1E loads are isolated from the plant safety loads by two normally open breakers, which when closed connect the Safety Buses to the Permanent Non-Safety Buses according to the configuration illustrated on Figure 8.3.1-1 of CESSAR-DC (Figure 8.3.1-1 is being revised by Amendment J to respond to RAI 430.13). The Permanent Non-Safety Buses may receive power from the EDGs by manually closing these breakers once the buses have been verified to be deenergized.

"A 10 percent capacity margin based on the continuous rating of the EDG will be applied in the initial EDG procurement specification.

A. All relays and other momentary duty type operating devices associated with the protective relaying of the onsite power system are tested to determine individual performance characteristics, and assure repeatability of design settings, under various simulated conditions. This ensures device integrity.

B. All relay sensors such as current and potential transformers are tested for correct and reliable outputs.

C. All interconnecting wiring and cabling is inspected for proper installation and connections.

D. All protective relaying systems are tested under necessary simulated conditions to verify correct operation in preferred, alternate and abnormal modes. E

The 120V AC Vital Power System is normally powered from inverters which are in use during normal operation. The continuous operation of the inverters is indicative of their operability and functional performance since accident conditions will not substantially change their load.

8.3.1.1.4 Class 1E Emergency Diesel Generators I

Each Division of the 4,160V AC Class 1E Auxiliary Power System is supplied with emergency standby power from an independent emergency diesel generator. The emergency diesel generator is designed and sized with sufficient capacity to operate all the needed engineered safety feature and emergency shutdown loads powered from its respective Class 1E Safety Division buses. E I E

Each emergency diesel generator is designed to attain rated voltage and frequency within 20 seconds and to begin accepting sequenced loads after receipt of a start signal to meet the response times assumed in Chapter 15 analyses. Refer to Table 8.3.1-2 for loading sequence and bases. The characteristics of the generator exciter and voltage regulator provide satisfactory starting and acceleration of sequenced loads and ensures rapid voltage recovery when starting large motors. The generator voltage and frequency excursions between sequencing steps are in compliance with the intent of Regulatory Guide 1.9. I E

Each emergency diesel generator and its associated auxiliaries are installed in separate rooms and are protected against tornadoes, external missiles, and seismic phenomena. The diesel rooms are protected with firewalls which are designed to prevent the spread of fire from one diesel room to the redundant diesel room. Refer to Section 9.5.9 for a description of the diesel room sump pump. I

TABLE 8.3.1-4
ELECTRICAL BUS LOADS*

Component	Load (KW)
4.16 KV Safety Bus A:	
Safety Injection Pump	755
Station Service Water Pump	933
Component Cooling Water Pump	1037
Shutdown Cooling Pump	448
Fuel Pool Exhaust Fan	63
Essential Chiller	216
Balance of Other Loads	440
	Safety Bus A Total = 3892 KW
4.16 KV Safety Bus C:	
Safety Injection Pump	755
Motor-Driven EFW Pump	635
Containment Spray Pump	448
Station Service Water Pump	933
Component Cooling Water Pump	1037
Subsphere Exhaust Fan	13
Spent Fuel Pool Cooling Pump	56
Balance of Other Loads	447

*The loads given in this table are typical. Actual loads are site-dependent based on the equipment procured. Therefore, the site-specific SAR shall make appropriate adjustments and evaluations as necessary.

TABLE 8.3.1-4
ELECTRICAL BUS LOADS*

Component	Load (KW)
	Safety Bus C Total = 4324 KW
4.16 KV Safety Bus B:	
Safety Injection Pump	755
Station Service Water Pump	933
Component Cooling Water Pump	1037
Shutdown Cooling Pump	448
Fuel Pool Exhaust Fan	63
Essential Chiller	216
Balance of Other Loads	440
	Safety Bus B Total = 3892 KW
4.16 KV Safety Bus D:	
Safety Injection Pump	755
Motor-Driven EFW Pump	635
Containment Spray Pump	448
Station Service Water Pump	933
Component Cooling Water Pump	1037
Subsphere Exhaust Fan	13
Spent Fuel Pool Cooling Pump	56

*The loads given in this table are typical. Actual loads are site-dependent based on the equipment procured. Therefore, the site-specific SAR shall make appropriate adjustments and evaluations as necessary.

TABLE 8.3.1-4
ELECTRICAL BUS LOADS*

Component	Load (KW)
Balance of Other Loads	447

Safety Bus D Total = 4324 KW

X - 4.16 KV Permanent Non-Safety Bus:

CVCS Pump	448
CEDM Cooling Fan	75
Containment Ventilation Fan	75
Containment Ventilation Fan	75
Non-Essential Chiller	719
Non-Essential Chiller	719
IA Compressor	262
IA Compressor	262
Non-Essential Lighting	270
Startup Feedwater Pump	635
Motor-Driven Fire Pump	232
Backup Pressurizer Heater	200
DG Starting Air Compressor	45
DG Starting Air Compressor	45
Miscellaneous Loads	204

X - Permanent Non-Safety Bus Total = 4266 KW

*The loads given in this table are typical. Actual loads are site-dependent based on the equipment procured. Therefore, the site-specific SAR shall make appropriate adjustments and evaluations as necessary.

TABLE 8.3.1-4
ELECTRICAL BUS LOADS*

Component	Load (KW)
Y - 4.16 KV Permanent Non-Safety Bus:	
CVCS Pump	448
CEDM Cooling Fan	75
Containment Ventilation Fan	75
Containment Ventilation Fan	75
Non-Essential Chiller	719
Non-Essential Chiller	719
IA Compressor	262
IA Compressor	262
Non-Essential Lighting	270
Startup Feedwater Pump	635
Motor-Driven Fire Pump	232
Backup Pressurizer Heater	200
EDG Starting Air Compressor	45
EDG Starting Air Compressor	45
Miscellaneous Loads	204

Y - Permanent Non-Safety Bus Total = 4266 KW

*The loads given in this table are typical. Actual loads are site-dependent based on the equipment procured. Therefore, the site-specific SAR shall make appropriate adjustments and evaluations as necessary.

TABLE 8.3.1-4
ELECTRICAL BUS LOADS*

Component	Load (KW)
X - 4.16 KV Non-Safety Bus:	
TBSWS Pump	224
TBCWS Pump	75
Containment High Purge Exhaust Unit	195
Containment High Purge Supply Fan	75
Nuclear Annex Exhaust Unit	115
Nuclear Annex Supply Fan	45
Main Pressurizer Heaters	2400
Miscellaneous Loads	300
X - Non-Safety Bus Total = 3429 KW	
Y - 4.16 KV Non-Safety Bus:	
TBSWS Pump	224
TBCWS Pump	75
Containment High Purge Exhaust Unit	195
Containment High Purge Supply Fan	75
Nuclear Annex Exhaust Units (2)	170
Nuclear Annex Supply Fan	157
Main Pressurizer Heaters	2400
Miscellaneous Loads	300

*The loads given in this table are typical. Actual loads are site-dependent based on the equipment procured. Therefore, the site-specific SAR shall make appropriate adjustments and evaluations as necessary.

TABLE 8.3.1-4
ELECTRICAL BUS LOADS*

Component	Load (KW)
Y - Non-Safety Bus Total = 3596 KW	
13.8 KV Non-Safety Bus X-1:	
RCP Switchgear	9574
FW Booster/FW Pump	17771
Condensate Pump	1878
Circulating Water Pump	2940
13.8 KV Non-Safety Bus X-1 Total = 32,163 KW	
13.8 KV Non-Safety Bus X-2:	
RCP Switchgear	9574
FW Booster/FW Pump	17771
Condensate Pump	1878
Circulating Water Pump	2940
13.8 KV Non-Safety Bus X-2 Total = 32,163 KW	

*The loads given in this table are typical. Actual loads are site-dependent based on the equipment procured. Therefore, the site-specific SAR shall make appropriate adjustments and evaluations as necessary.

TABLE 8.3.1-4
ELECTRICAL BUS LOADS*

Component	Load (KW)
13.8 KV Non-Safety Bus Y-1:	
RCP Switchgear	9574
FW Booster/FW Pump	17771
Condensate Pump	1878
Circulating Water Pump	2940
13.8 KV Non-Safety Bus Y-1 Total = 32,163 KW	
13.8 KV Non-Safety Bus Y-2:	
RCP Switchgear	9574
Circulating Water Pump	2940
Circulating Water Pump	2940
Circulating Water Pump	2940
13.8 KV Non-Safety Bus Y-2 Total = 18,394 KW	

*The loads given in this table are typical. Actual loads are site-dependent based on the equipment procured. Therefore, the site-specific SAR shall make appropriate adjustments and evaluations as necessary.

Enclosure II to
LD-92-001

QUESTIONS FOR WHICH RESPONSES WILL BE PROVIDED SEPARATELY

430.9
430.15
430.16
430.23
430.25
430.26
430.49
430.50

current and function properly during steady-state operation, power system transients, and major fault conditions. Verification testing will include, as a minimum, all tests outlined in Appendix A, Subsection B.2, to SRP Section 8.2"

The offsite power system shall be designed to minimize the probability of losing electric power from any supplies as a result of or coincident with the loss of the unit generator, the transmission network, or the onsite electric power supplies.

Compliance with General Design Criterion 18

The requirements of General Design Criterion 18 shall be implemented in the design of the offsite power system. The design shall permit periodic inspection and testing of important areas and features. The design shall include the capability to periodically test the operability and functional performance of the components of the systems as a whole and under conditions as close to design as practical.

8.2.1.5 Offsite Power System Operational Description

The nuclear generating unit shall be provided with two independent immediate access circuits of offsite power. ~~Prior to and during startup of the nuclear unit, the Unit Auxiliary Power System shall receive power from the transmission system through the main unit main transformers and the unit auxiliary transformers. During this period, the generator circuit breaker and associated disconnect switches shall be open.~~ INSERT A

After the unit generator has been brought to rated speed and its field applied, the unit generator shall be then connected to the system by closing the generator circuit breaker. Automatic and manual synchronization are provided and supervised by synchronizing relays. E

8.2.1.5.1 Offsite Power System Protective Relaying

The offsite power system protective relaying system shall be designed to remove from service with precision and accuracy any element of the offsite power system subjected to an abnormal condition that may prove detrimental to the effective operation or integrity of the unit.

8.2.1.6 Reliability Considerations

The transmission system shall be designed to conform to the reliability criteria established by the owners appropriate electric reliability council. Typically, transmission systems are designed to avoid system cascading upon the occurrence of any one of the following:

A. Loss of Generation

1. Sudden loss of entire generating capability in any one plant.

Insert A

"Prior to and during startup of the nuclear unit, the redundant Class 1E Distribution Systems shall receive power backfed from the transmission lines through two dedicated safety systems transformers. The Class 1E Distribution System shall also be capable of being fed from permanent non-safety distribution systems mentioned below as a secondary means of receiving power. Prior to and during startup of the nuclear unit, the onsite non-safety distribution systems shall receive power backfed from the grid through half-sized main generator transformers and unit auxiliary transformers. These backfeeds are initiated by opening two generator circuit breakers and associated disconnect switches to isolate the main generator from the main step-up and unit auxiliary transformers. The generator circuit breakers are located on each side of the isolated phase bus between the main generator and the connection points of the unit main and auxiliary transformers.

The two generator circuit breakers used to provide immediate access of the onsite power systems to offsite power systems will meet the guidelines of Appendix A to SRP Section 8.2. They will have the capability to interrupt the systems maximum fault current and function properly during steady-state operation, power system transients, and major fault conditions. Verification testing will include, as a minimum, all tests outlined in Appendix A, Subsection B.2, to SRP Section 8.2"

Question 430.8 (8.2)

Based on information presented in Table 8.2-1, Sh. 1 of 2, of the SSAR, it appears that if the switchyard power circuit breakers connecting the main generator unit to the transmission network trip, the emergency diesel generators (EDGs) and AAC source start even if the main generator is available. Please clarify what signal starts the EDG and AAC source under this event.

Also, (Sh. 1 of 7) in case of a unit auxiliary transformer fault, the unit generator automatically trips and its output breaker opens. The permanent non-safety auxiliary system switchgear supplied from the faulty circuit is connected in an automatic bus transfer to the standby auxiliary transformer, and EDG and AAC source automatically start. Please clarify the signal that would start the EDG and AAC source under this event.

Response 430.8

Tables 8.2-1 and 8.3.1-1 have been revised in response to Question 430.9. The operating sequences described in this question are no longer valid. See Question 430.9 for further information.

Question 430.10 (8.3.1)

Figure 8.3.1-1 of the SSAR shows the safety loads normally powered from the unit auxiliary transformers through the permanent non-safety load buses. The unit auxiliary transformer winding that feeds these loads also feed a portion of the non-safety loads. The standby auxiliary transformer also feed the safety buses through the permanent non-safety load buses. In addition, there is a provision (through two circuit breakers in series) to directly feed the safety buses from the standby auxiliary transformer.

Feeding the safety buses from the offsite power sources through non-safety buses or from a common winding with non-safety loads is not the most reliable configuration. It subjects the safety loads to transients caused by the non-safety loads and adds additional failure points between the offsite power sources and safety loads. In order to overcome these shortcomings we recommend that a second standby auxiliary transformer directly supplied from the transmission system be added, with the combination of the two standby auxiliary transformers normally directly powering the safety buses. The existing supply from the unit auxiliary transformer through the permanent non-safety buses to the safety buses should be retained as a manually switched alternate power supply.

Response 430.10

The electrical one line, Figure 8.3.1-1, has been revised to show that the safety buses can be fed directly from an offsite power source. That figure also shows that the safety buses could be fed from the non-safety buses. As discussed at the November 20, 1991 meeting with the NRC staff, the normal supply of power to the safety buses is a site-specific consideration which would include the voltage and reliability of the switchyard source. See the response to RAI 430.9 for CESSAR changes.

Question 430.12 (8.3.1)

Section 8.3.1.1.3.2 describes the periodic test program for electrical equipment. Supplement this section by including the following additional information:

1. The frequency of inspection, maintenance, and testing of all Class 1E and non-Class 1E transformers, circuit breakers, Class 1E protective relays and current and potential transformers. Also provide the basis for establishment of test frequency for the above.

2. Types of tests performed on inverters and battery chargers.

3. State whether the 480 V circuit breakers are tested by primary current injection or by secondary current injection method. Are these circuit breakers also individually checked for each component, such as charging motor, shunt trip coil, etc., including the wiring and connectors to demonstrate that the circuit breaker functions properly. Are additional tests such as contact resistance, insulation resistance, etc., also performed during this maintenance?

4. Identification and justification for each circuit or component part of the offsite system which will not be tested during normal plant operation.

Response 430.12

1. The frequency of inspection maintenance and test of equipment is dependent upon the type of equipment actually procured and cannot be determined at the design certification stage. The test frequencies shall be based on manufacturers' recommendations and current practice as determined by actual nuclear plant experience considering such factors as cleanliness, average operating temperatures, and the quality of operating personnel. Non-Class 1E and Class 1E systems should be tested alike. Some example testing frequencies are presented as follows:

• Transformers	Every 6 months
• Circuit breakers	Every 36 months
• Protective relays	Every 18 months
• Instrument transformers	Every 36 months

2. Test procedures will be dependent upon as-procured equipment characteristics that will address the testing for the inverters and battery chargers. The test procedures will be based on manufacturers' recommendations and current practice as determined by actual nuclear plant experience. Typically these would include cleaning the inverters and battery chargers, checking inverter voltages and frequencies, replacing the capacitors in both the inverters and battery chargers, and performing a capacity test on the battery chargers.

3. Test procedures will be dependent upon as-procured equipment characteristics. The test procedures will be based on manufacturers' recommendations and current practice as determined by actual nuclear plant experience. Typically, these would include primary current injection testing; individually checking each component, such as charging motors, shunt trip coils, drawout devices, heaters, air filters, wiring and connectors; and contact resistance testing. Insulation resistance and high-potential tests are not required and not easily performed on installed equipment. They may be done if there is reason to believe that dielectric integrity may be impaired, perhaps because of contamination, smoke, water damage, or other environmental intrusion.

4. All parts of the offsite power system are capable of being tested during normal plant operation.

Question 430.13 (8.3.1)

Sufficient system single-line diagrams and schematic diagrams for on-site systems have not been provided in SSAR to permit an independent evaluation of compliance with the safety criteria as required by RG 1.70. Please provide this information including the schematic diagram for Reactor Trip Breaker.

Response 430.13

Electrical one-line diagrams of the on-site power system have been generated for the facility. The drawings include the following:

Non-class 1E Auxiliary Power System Main One Line

Class 1E DC and Vital AC Instrumentation and Control Power Supply System

Non-class 1E 125 VDC and 208/120 VAC Instrumentation and Control, 125 VDC Onsite Alternate AC Source and 250 VDC Power Supply System

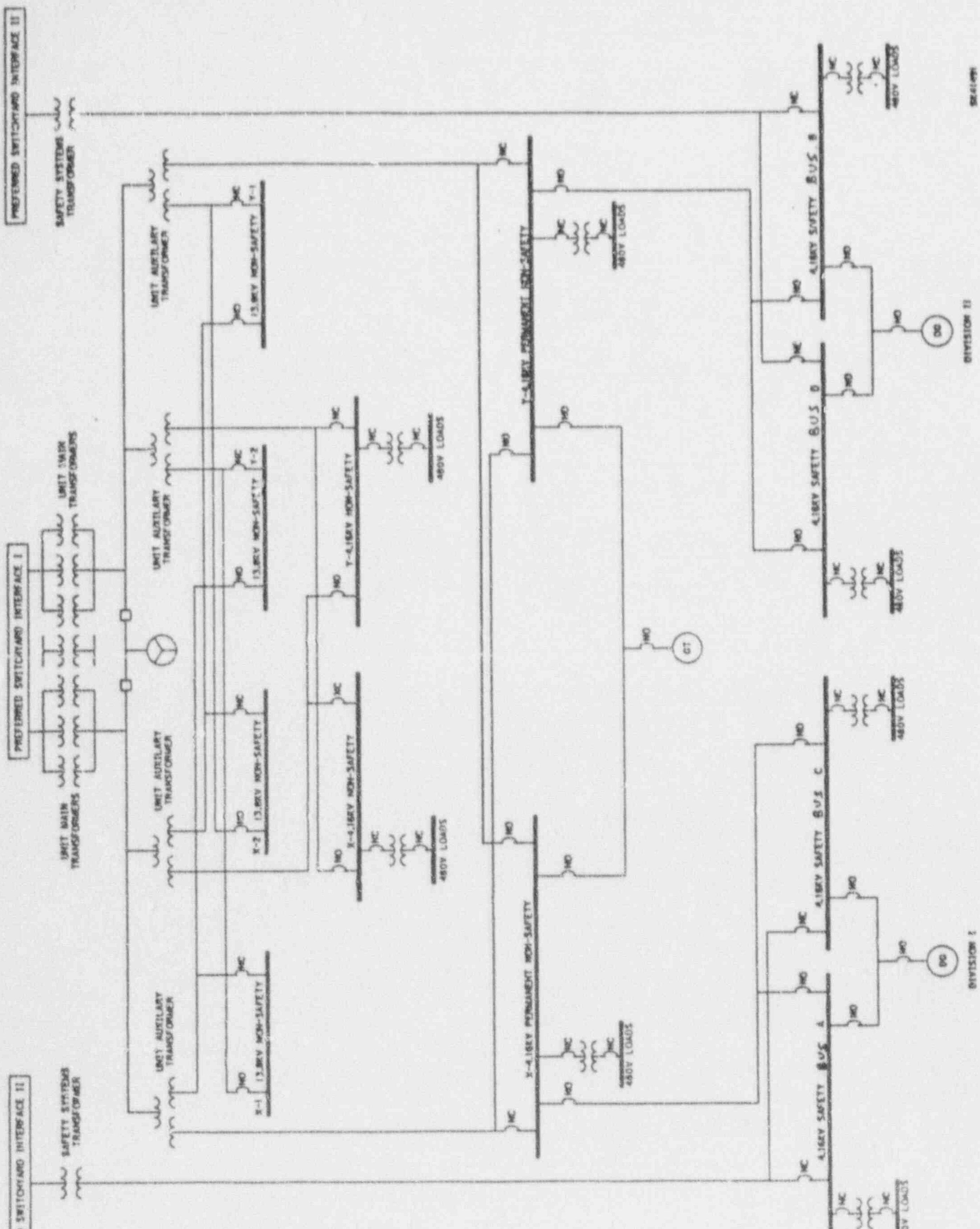
Class 1E Auxiliary Power System Main One Line Diagram.

These drawings will be included as part of Chapter 8 and shall replace existing figures as follows:

Figure 8.1-1	Attached revision
Figure 8.3.1-1	Replace with Drawing E-713-00-01 and Drawing E-713-00-03
Figure 8.3.2-1	Drawing E-713-00-02
Figure 8.3.2-2	Drawing E-713-00-04

See Attached Drawings.

The operation of the Plant Protection System is shown on logic diagrams 7.2-12 and -19. Actual schematic diagrams of the reactor trip breaker are dependent upon as-procured information and cannot be provided for design certification.



Revised Figure 8.1-1