AMENDMENT 3 TO RESAR-SP/90 PDA MODULE 9
INSTRUMENTATION & CONTROL AND ELECTRIC POWER

AMENDMENT 3 TO RESAR-SP/90 PDA MODULE 9

INSTRUMENTATION & CONTROL AND ELECTRIC POWER

Instruction Sheet

Replace current page 8.3-1 and 8.3.2 with revised page 8.3-1 and 8.3-2.

Replace current Figure 8.3-1 (Sheets 1 and 2) with attached revised Figure 8.3-1 (Sheets 1 and 2).

Insert Amendment 3 (Pages 430-8 and 430.9) behind Amendment 1 (Page 430-7).

430.9 An area which needs to be addressed is the basis for the absence of a fast transfer (simultaneous or sequential), and/or slow transfer scheme(s) and synchronizing scheme, between the unit auxiliary transformer and the startup (or standby) transformer. In the absence of such a scheme, with a fault on either the main or unit auxiliary transformers, the reactor coolant pumps, which provide the preferred primary coolant circulation method (as opposed to natural circulation), would be tripped potentially challenging ESF systems. With the fast transfer, the other source of power will be connected to the normal bus to supply power to the reactor coolant pumps and, thus, avoid challenging the ESF systems. In the interest of design improvements for future generation plants, we suggest consideration be given to adoption of this design feature.

Response:

The Standard Plant Design will provide for a fast transfer scheme of the 13.8 KV busses from the unit auxiliary transformer and the standby transformer. This transfer would be initiated only in the event of an electrical fault in the zone including the generator, generator bus, unit auxiliary transformer and main step up transformer. Synchronizing check relays will be provided to verify acceptable phase and voltage between the busses prior to initiating the transfer. The site specific evaluation will include a review of preferred and standby power sources to verify that they are compatible with the proposed scheme. Figure 8.3-1 has been revised to show only electrical (vice Kirk Key) interlocks between 13.8 KV breakers for the unit and standby transformers. Section 8.3.1.1.1 has been revised to incorporate this response.

430.10 Another area which needs to be addressed is the absence of a secondary winding on the ESF transformer feeding the redundant Class 1E ESF buses. There should be two instead of one secondary (4.16kV) winding of the ESF transformer which feed the redundant Class 1E buses. Two secondary windings provide a degree of independence between the redundant Class 1E systems since a transient on one ESF bus would not affect the other ESF bus as much because of the impedances of the secondary windings. This would provide a better design for future generation plants. Provide a modified design or justification for feeding the redundant Class 1E ESF buses from one secondary winding of the ESF transformer.

Response:

The ESF transformer is intended to feed only one ESF bus at a time. This protects the ESF busses from transients on a common source as well as isolating each ESF bus from a fault on the other ESF bus. Plant technical specifications will restrict operation in critical and hot standby modes when both ESF busses are being fed from the ESF transformer. Exact specification of the ESF tranformer is dependent on site specific review of diversity, voltages and available fault levels of the off-site sources.

430.11 We have discovered that the information is changing as the design continues to evolve as illustrated by inconsistency in the design submitted earlier with the single line submitted in the September 10, 1987, meeting. The main generator circuit breaker shown on Figure 8.3-1 of Standard Plant Design was omitted from the single line diagram presented to the staff in September 10, 1987, meeting. Also, the standby transformer shown on Figure 8.3-1 is called startup transformer on the single line diagram submitted to the staff. It appears that your philosophy of feeding the auxiliary power systems during startup or planned shutdown has changed completely. In our opinion, this is a significant change and should be addressed in the Standard Plant Design. Explain whether during plant startup or planned shutdown you still plan to feed the station auxiliary loads via the main step up transformer through the unit auxiliary transformer with the generator breaker open as outlined in 8.3.1.1.1 or do you plan to feed the station auxiliary loads through the start up transformer with the deletion of generator breaker as shown on the single line diagram presented in the September 10, 1987, meeting.

Response:

The diagram presented at the September 10, 1987 meeting was erroneously taken from material used at a much earlier presentation. This diagram does not reflect the current Standard Plant Design. The Standard Plant Design includes a generator breaker and a standby tranformer. During startup and planned shutdown, station auxiliary loads are fed via the main step up transformer through the unit auxiliary transformer. There has been no change in the Standard Plant Design in this area.

8.3 ONSITE POWER SYSTEMS

8.3.1 AC Power Systems

8.3.1.1 Description

The onsite AC power system includes a Class 1E system and a non-Class 1E system.

8.3.1.1.1 Non-Class 1E AC System

The non-Class 1E AC system is that part of the power system which is outside the broken line enclosure as indicated in Figure 8.3-1. The non-Class 1E AC system distributes power at 13.8 kV, 4.16 kV, 480 V and 120 V.

The unit auxiliary transformer is connected to the main generator via a generator circuit breaker. The supply for the primary winding of the auxiliary transformer is tapped between the generator circuit breaker and the low voltage bushings of the main step up transformer. During normal operation, the non-Class 1E AC auxiliary loads are energized by the main generator and the auxiliary transformer. The auxiliary transformer is a three winding transformer with two secondary windings rated at 13.8 kV each.

During plant startup or planned shutdown, the non-Class 1E AC loads are fed from the alternate offsite source via the main step up transformer, unit auxiliary transformer with the generator circuit breaker open.

During all modes of operation, the supply from the standby transformer serves as a backup. In the event of unit trip (except for faults in the generator-transformer zone), the circuit breaker isolates the generator from the systems. The 13.8 kV system remains energized by backfeeding through the main and auxiliary transformer from the alternate offsite source.

The auxiliary transformer and the standby transformer have the capacity to supply both non-Class 1E and both Class 1E load groups simultaneously.

The ESF transformer is intended to supply one of the redundant 4.16 KV Class 1E loads during plant operation. This configuration isolates the redundant busses from faults in a common supply as well as isolating each bus from a fault on the redundant bus.

The 13.8 KV busses are provded with a fast transfer scheme. In the event of a fault in the zone including the generator, generator bus, main step up 3

8.3 ONSITE POWER SYSTEMS

8.3.1 AC Power Systems

8.3.1.1 Description

The onsite AC power system includes a Class 1E system and a non-Class 1E system.

8.3.1.1.1 Non-Class 1E AC System

The non-Class 1E AC system is that part of the power system which is outside the broken line enclosure as indicated in Figure 8.3-1. The non-Class 1E AC system distributes power at 13.8 kV, 4.16 kV, 480 V and 120 V.

The unit auxiliary transformer is connected to the main generator via a generator circuit breaker. The supply for the primary winding of the auxiliary transformer is tapped between the generator circuit breaker and the low voltage bushings of the main step up transformer. During normal operation, the non-Class 1E AC auxiliary loads are energized by the main generator and the auxiliary transformer. The auxiliary transformer is a three winding transformer with two secondary windings rated at 13.8 kV each.

During plant startup or planned shutdown, the non-Class 1E AC loads are fed from the alternate offsite source via the main step up transformer, unit auxiliary transformer with the generator circuit breaker open.

During all modes of operation, the supply from the standby transformer serves as a backup. In the event of unit trip (except for faults in the generator-transformer zone), the circuit breaker isolates the generator from the systems. The 13.8 kV system remains energized by backfeeding through the main and auxiliary transformer from the alternate offsite source.

The auxiliary transformer and the standby transformer have the capacity to supply both non-Class 1E and both Class 1E load groups simultaneously.

The ESF transformer is intended to supply one of the redundant 4.16 KV Class 1E loads during plant operation. This configuration isolates the redundant busses from faults in a common supply as well as isolating each bus from a fault on the redundant bus. 3

The 13.8 KV busses are provded with a fast transfer scheme. In the event of a fault in the zone including the generator, generator bus, main step up transformer and unit transformer; the 13.8 KV busses are transferred from the unit auxiliary transformer to the standby transformer. The fast transfer is 3 supervised by synchronizing check relaying to ensure that voltage and phasing are acceptable prior to initiating the switch over.

The switchgears for the 13.8 kV busses are standard 1000 MVA. All circuit breakers are air break type. Each 13.8 kV bus supplies power to reactor coolant pumps, other nonsafety related motors and transformers for distribution at 4.16 kV and 480 V level.

8.3.1.1.2 Class 1E AC System

The Class 1E AC system is that portion of the onsite power system inside the broken-line enclosures shown in Figure 8.3-1, sheet 2.

The Class 1E AC system distributes power at 4.16 kV, 480 V, 208/120 V, and 120 V AC to all safety related loads. Also, the Class 1E AC system supplies certain selected loads which are not safety related but are important to the plant operation. Table 8.3-2 lists the major safety related and isolated nonsafety related loads supplied from the Class 1E AC system.

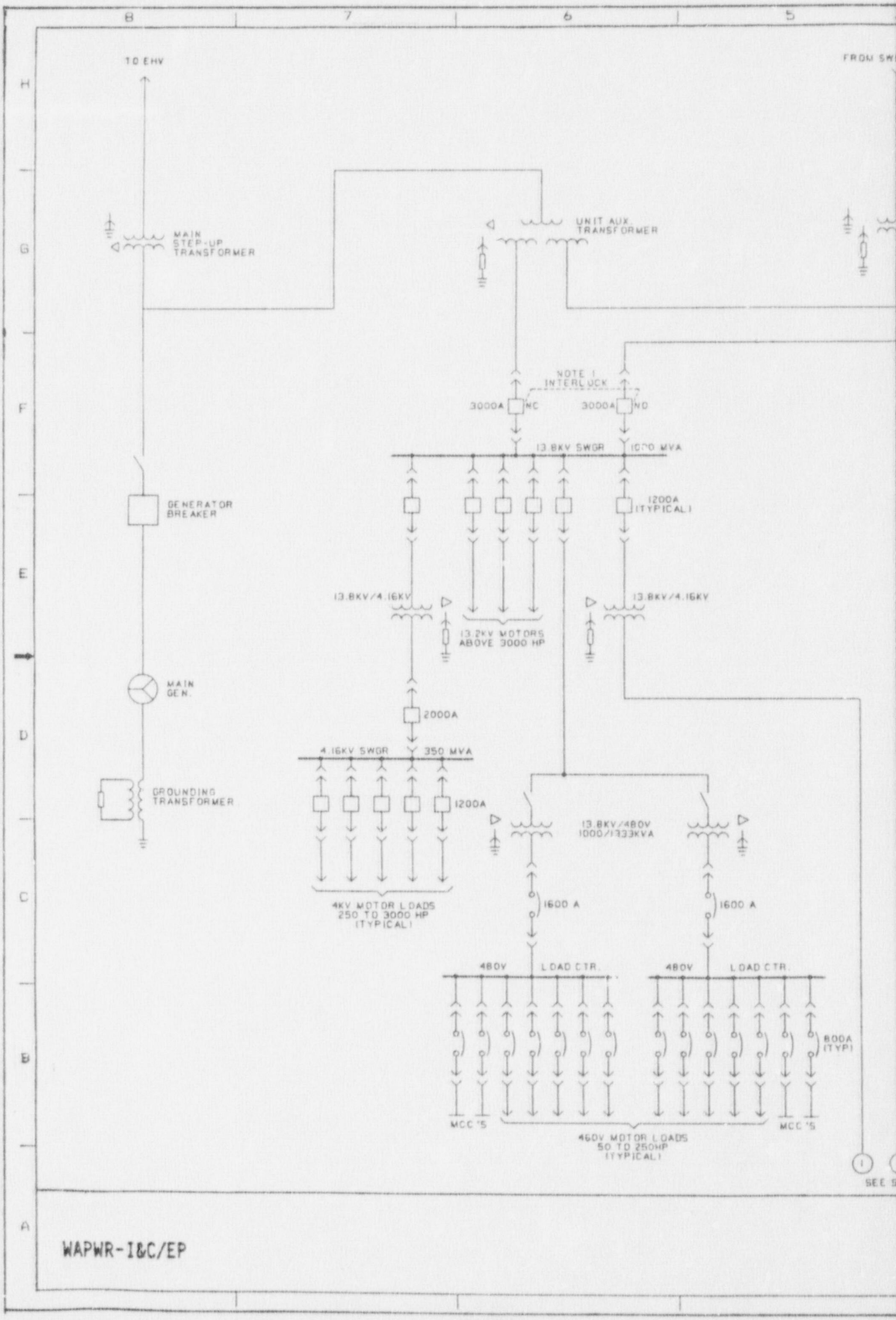
In addition to the above power distribution, the Class 1E AC system contains standby power sources which provide the power required for safe shutdown in the event of a loss of the preferred power sources.

The following describes various features of the Class 1E systems:

POWER SUPPLY FEEDERS - Each 4.16 kV load group is supplied by two preferred power supply feeders and one diesel generator (standby) supply feeder. Each 4.16 kV bus supplies motor loads and 4.16 kV/480 V load center transformers with their associated 480 V busses.

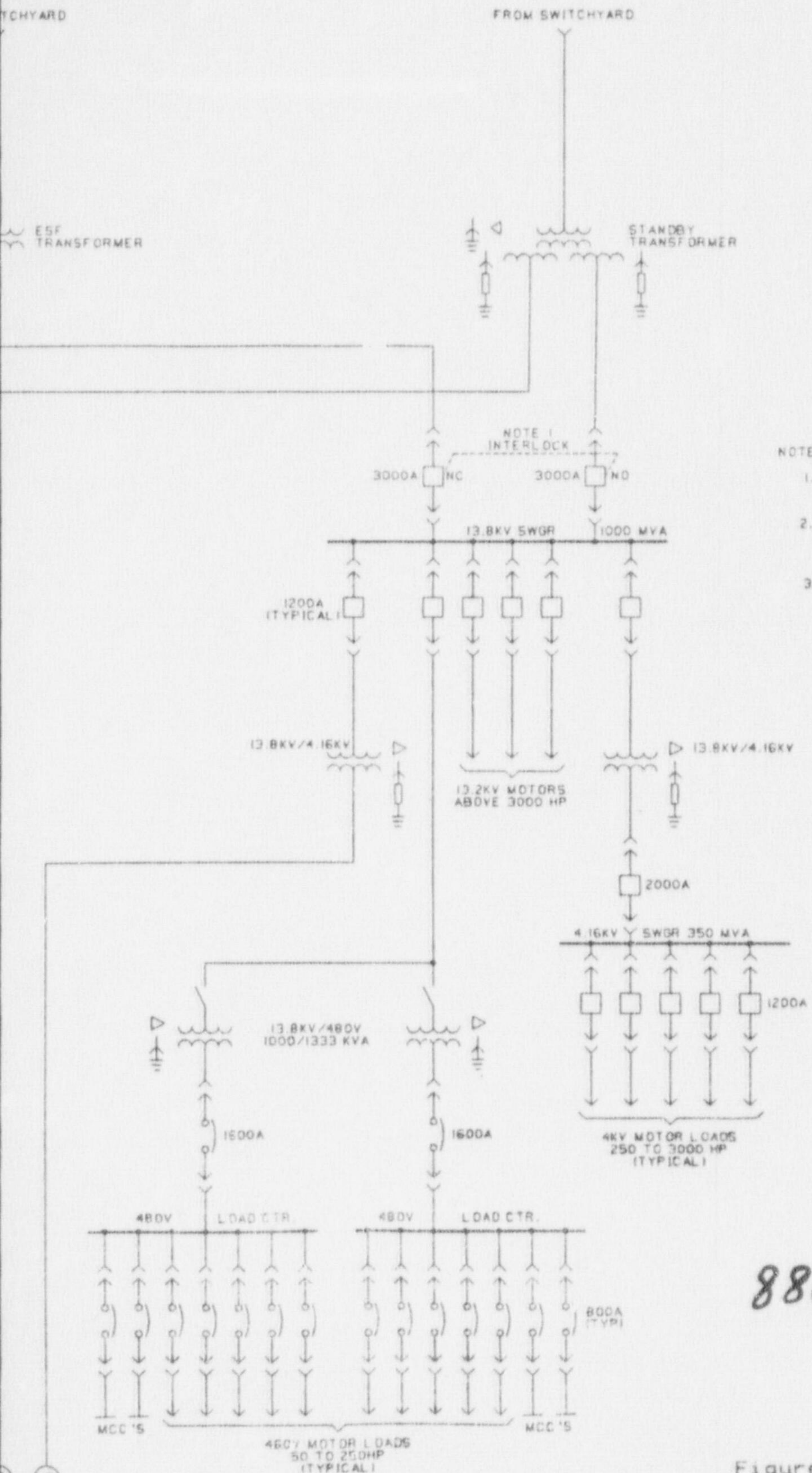
BUS ARRANGEMENTS - The Class 1E AC system is divided into two redundant load groups per unit (load groups 1 and 2). Either one of the load groups is capable of providing power to safely shutdown a unit following DBA. Each AC load group consists of a 4.16 kV bus, 480 V load centers, 480 V motor control centers, and lower voltage AC supplies.

LOADS SUPPLIED FROM EACH BUS - Refer to Table 8.3-2. for a listing of Class 1E system loads.



TO EHV
MAIN STEP-UP TRANSFORMER
UNIT AUX. TRANSFORMER
FROM SW
NOTE 1 INTERLOCK
3000A NC
3000A NO
13.8KV SWGR
1000 MVA
1200A (TYPICAL)
GENERATOR BREAKER
13.8KV/4.16KV
13.2KV MOTORS ABOVE 3000 HP
13.8KV/4.16KV
MAIN GEN.
2000A
4.16KV SWGR
350 MVA
GROUNDING TRANSFORMER
1200A
13.8KV/480V 1000/1333KVA
4KV MOTOR LOADS 250 TO 3000 HP (TYPICAL)
1600 A
1600 A
480V
LOAD CTR.
480V
LOAD CTR.
800A (TYP)
MCC'S
MCC'S
460V MOTOR LOADS 50 TO 250HP (TYPICAL)
SEE S

WAPWR-I&C/EP



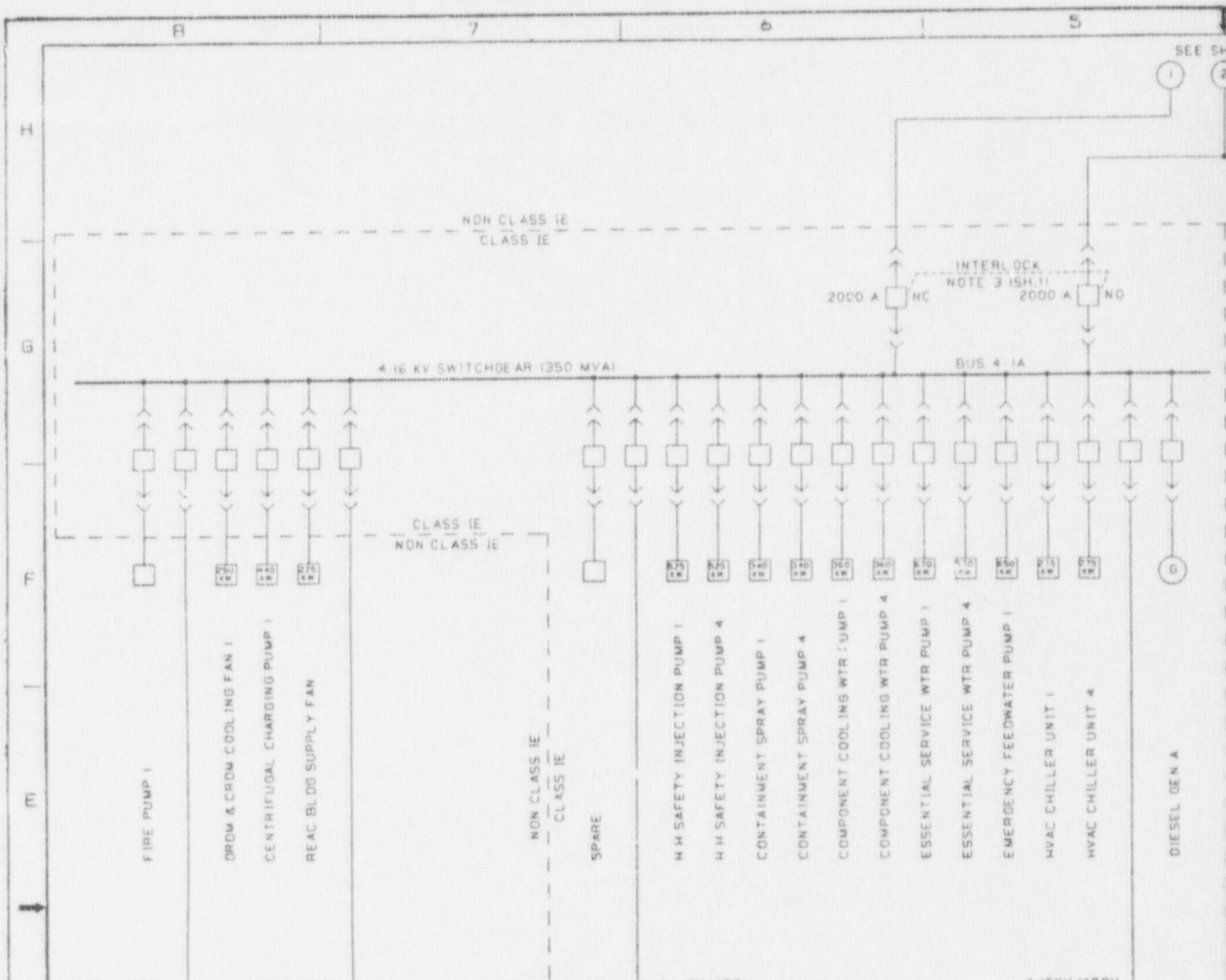
NOTES:

1. ELECTRICAL INTERLOCK PREVENTS OPERATION WITH BOTH BREAKERS CLOSED. | 3
2. ALL CLASS IE BREAKERS FEEDING NON CLASS IE LOADS WILL BE TREATED AS ISOLATION DEVICES IN ACCORDANCE WITH REG. GUIDE 1.75.
3. A KIRK KEY INTERLOCK SCHEME WILL BE PROVIDED TO ALLOW A BREAKER TO BE INSERTED INTO ONLY ONE OF THE TWO POSITIONS. | 3

8801060245-01

Figure 8.3-1
WAPWR AC Main Single Line Diagram
(Sheet 1 of 2)

NOVEMBER, 1987
AMENDMENT 3



SEE SH
NON CLASS 1E
CLASS 1E
INTERLOCK
NOTE 3 (SH.1)
2000 A
NC
NO
4.16 KV SWITCHGEAR (350 MVA)
BUS 4-1A
CLASS 1E
NON CLASS 1E
FIRE PUMP 1
DRDM & CRDM COOLING FAN 1
CENTRIFUGAL CHARGING PUMP 1
REAC BLDG SUPPLY FAN
NON CLASS 1E
CLASS 1E
SPARE
H H SAFETY INJECTION PUMP 1
H H SAFETY INJECTION PUMP 4
CONTAINMENT SPRAY PUMP 1
CONTAINMENT SPRAY PUMP 4
COMPONENT COOLING WTR PUMP 1
COMPONENT COOLING WTR PUMP 4
ESSENTIAL SERVICE WTR PUMP 1
ESSENTIAL SERVICE WTR PUMP 4
EMERGENCY FEEDWATER PUMP 1
HVAC CHILLER UNIT 1
HVAC CHILLER UNIT 4
DIESEL GEN A
4.16KV/480V
500 KVA
800A
4.16KV/480V
1000/1333KVA
1600A
4.16KV/480V
1000/1333KVA
1600 A
4.16KV/480V
1000/1333KVA
1600 A
480 V LOAD CENTER
480 V LOAD CENTER
480 V LOAD CENTER BUS 3-1A1
480 V LOAD CENTER BUS 3-1A2
PRESSURIZER HEATERS
REAC. COMP. COOLING FAN
REAC. BLDG EXHAUST FAN 1
CONT. PURGE SUPPLY FAN 1
CONT. PURGE EXHAUST FAN 1
INSTRUMENT AIR COMPRESSOR 1
TURNING OIL PUMP
TURBINE CONTROL CENTER
SPARE
REACTOR CONTROL CENTER
REACTOR CONT. FAN COOLER 1
CHILLED WTR PUMP 1
DIESEL GEN. ROOM FAN A1
BATTERY CHARGER 1
INVERTER FOR INSTRUMENT
C/V H2 RECOMBINER 1
SAMPLING RM EXHAUST FAN 1
SPENT FUEL PIT COOLING PUMP
SPARE
REACTOR CONTROL CENTER
REACTOR CONT. FAN COOLER 4
CHILLED WTR PUMP 4
DIESEL GEN. ROOM FAN A2
BATTERY CHARGER 4
INVERTER FOR INSTRUMENT 4
D/G CONTROL CENTER 1
SPARE
LOAD GROUP 1

WAPWR-I&C/EP

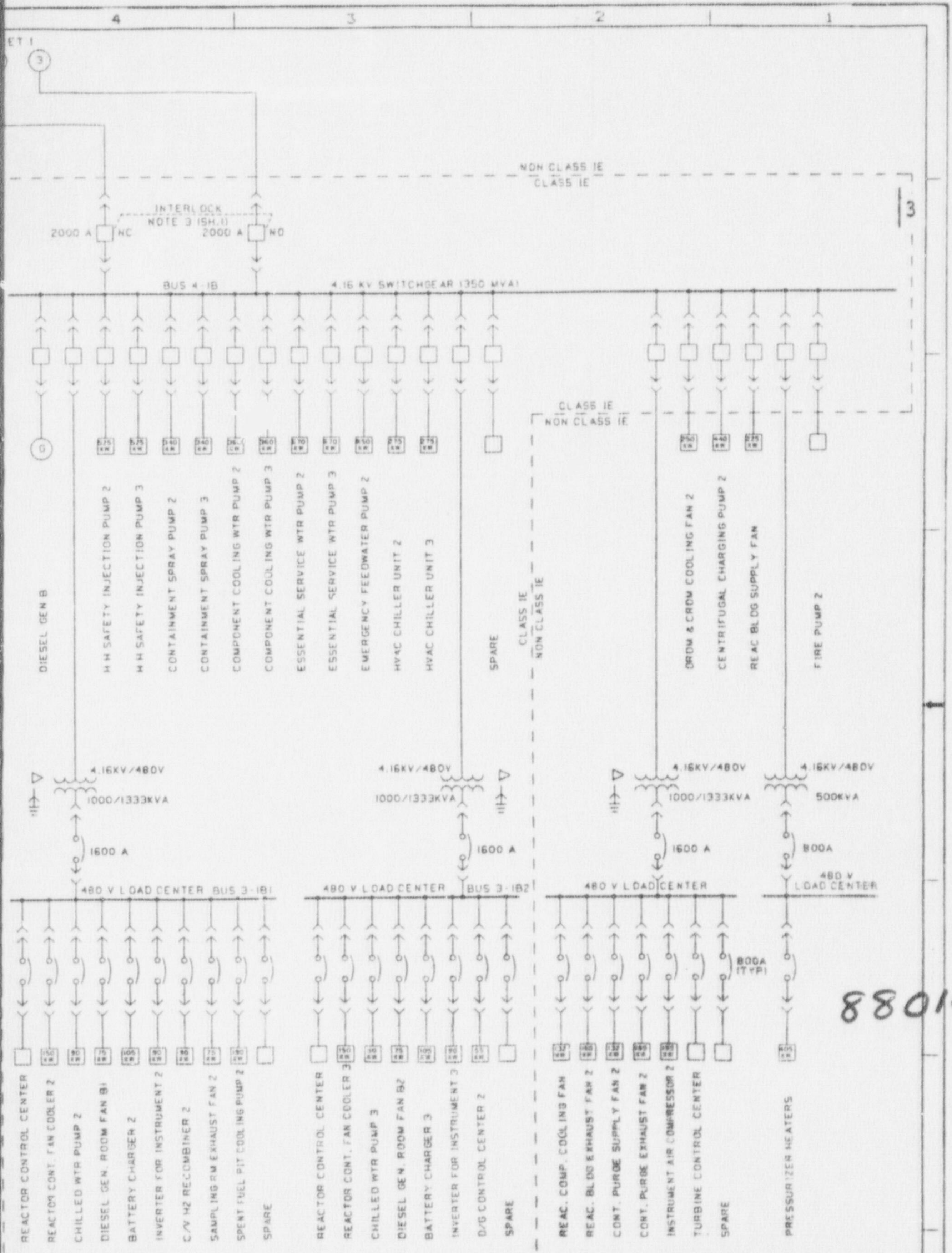


Figure 8.3-1
WAPWR AC Main Single Line Diagram
(Sheet 2 of 2)

NOVEMBER, 1987
AMENDMENT 3