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September 8, 1981

Mr. A. Schwencer, Chief
Licensing Branch 2
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: LaSalle County Station Units 1 and 2
Diesel Generator and ECCS
System - FSAR Changes
NRC Docket Nos. 50-373/374

Dear Mr. Schwencer:

Attached is a set of changes to the FSAR (pp. 6.3-40, 43, 43a, 7.3-17, 8.3-8, 8a, 9, 9a, 9.5-20,29, 29a,-32, B.1-12,12a,13, response to NRC Questions Q40.29 and Q40.30. Also, three tables and Tech Spec pages 3/4 8-1 to 3/48-7 and B3/4 8-1, which are not for inclusion in the FSAR, are attached.

The attached Table A presents some typical diesel-generator starting times measured at LaSalle. In order to accurately represent realistic diesel starting times within the LaSalle FSAR, it is first necessary to verify that these times did not compromise the Emergency Core Cooling System response times used in the Design Basis Accident Analsis. These required response times are identified in the "LaSalle Design Basis" columns of Table B and Table C. Actual test data for these response times are shown in the remaining columns of Table B (LPCS and LPCI) of Table C (For HPCS).

Tables 6.3-2, and 6.3-3 have been revised to reflect the revised diesel start times and to correct the response criteria to reflect actual design and analysis inputs.

The description of the diesel air start systems has been clarified to demonstrate diesel start capability with one air start subsystem are within the revised diesel start times. The diesel generator Technical Specification surveillances have been similarly revised to verify this start capability. The LPCI description, 7.3-17, and the description of the other diesel subsystems have been revised to reflect the revised diesel start times.

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All of the diesel generators will start a minimum of five times on stored air with normal cranking cycles as required. The Division 1 and 2 Diesel Generators also start 5 times on stored air with each subsystem, however Division 3 diesel generators will start 3 times on stored air per subsystem. Since the Division 3 diesel generators are capable of three starts and one of its air start subsystems has an engine driven compressor, which is started manually or by a DC starter motor, the reliability of the system is not compromised by not meeting the 5 start criteria in Standard Review Plan 9.5.6.

The diesel generator output breaker circuity has been revised to incorporate a one-time trip of the breaker upon receipt of a LOCA signal under any operating condition, including test. The FSAR has been revised to reflect this change. Minor corrections to the diesel control descriptions have also been made.

These proposed changes have been reviewed with the NRC Staff (Messrs. A. Bournia and J. Knox) and we believe the changes are acceptable to them. In the event you have any questions in this regard, please direct them to this office.

Very truly yours,

L. O. DelGeorge

L. O. DelGeorge
Director of Nuclear Licensing

Attachment
cc: NRC Resident Inspector

2500N

Table A

Typical LaSalle Diesel-Generator Starting Times (in seconds)

	All Starting Systems (1)		Half Starting Systems (2)	
	Speed	Voltage	Speed	Voltage
First start:				
Cold	9.0*	9.5*	10.4**	10.9**
Hot	9.5*	10.0*	11.4	11.9
Fifth start:				
Cold	9.7***	10.2	11.9**	12.4**

* By tests on diesel generators 0, 1A, 1B, 2A

** By tests on diesel generator 0

*** By tests on diesel generators 0, 1A, 1B

(1) Four air starting motors

(2) Two air starting motors

Table B

ECCS Response Times

Division 1 & 2 Diesel Generators

	LaSalle Design Basis	LaSalle Test * Data Basis (Diesel not running)	LaSalle Test * Data Basis (Diesel running)
LOCA occurs	0 sec.	0 sec	0 sec
Diesel closes onto bus	13 sec	13 sec (assumed)	3 sec (actual)
LPCS pump & RHR "C" pump start	No requirement	13 sec	3 sec
LPCS pump & RHR "C" pump running	< 27 sec	22 sec	12 sec
RHR "A" & RHR "B" pumps start	No requirement	18 sec	8 sec
RHR "A" & RHR "B" pumps running	< 32 sec	27 sec	17 sec
LPCS & RHR "C" injection valves full open **	< 40 sec	30 sec	20 sec
RHR "A" & RHR "B" injection valves full open **	< 45 sec	30 sec	20 sec

* Last six entries in each column represent actual durations from diesel-generator availability as measured during LaSalle testing.

** Valves are specified to cycle open in 20 seconds.

Table C

ECCS Response Times

Division 3 Diesel Generator

	LaSalle Design Basis	LaSalle Test Data Basis (Diesel not running)
LOCA occurs	0 sec	0 sec
Diesel closes onto bus	No requirement	13 sec (assumed)
HPCS valve starts to open	No requirement	-
HPCS pump running	No requirement	23 sec
HPCS valve full open*	< 27 sec	25.5 sec

* Valves specified to open in 12 seconds (cycle time).

TABLE 6.3-2

SIGNIFICANT INPUT VARIABLES USED IN THE LOSS-OF-COOLANT ACCIDENT ANALYSIS

Note: Values changed to correct error and to make this table consistent with remainder of FSAR.

A.	PLANT PARAMETERS		
	Core Thermal Power	MWt	~~[illegible]~~ 3489
	Vessel Steam Output	LB_m/hr	~~[illegible]~~ 14.82 x 10^6
	Corresponding Percent of Rated Steam Flow	percent	105
	Vessel Steam Dome Pressure	psia	1055
	Maximum Recirculation Line Break Area	ft^2	3.1
B.	EMERGENCY CORE COOLING SYSTEM PARAMETERS		
	Low-Pressure Coolant Injection System		
	Vessel pressure at which flow may commence	psid (vessel to drywell)	225
	Minimum rated flow at vessel pressure	gpm psid (vessel to drywell)	21,200 20
	Initiating Signals		
	Low water level or high drywell pressure	ft above top active fuel psig	>1.0 2.0
	Maximum allowable time delay from initiating signal to pumps at rated speed	sec	<27
	Pressure at which injection valve may open	psid	<750
	Injection valve fully open	sec after DBA	40.0
	Injection valves "A" & "B" fully open	sec after DBA	45.0
	Maximum allowable time delay from initiating signal to "A" & "B" pumps at rated speed	sec	< 32

TABLE 6.3-3

OPERATIONAL SEQUENCE OF EMERGENCY CORE COOLING SYSTEMS FOR DESIGN-BASIS ACCIDENT

TIME (sec)	EVENTS
0	Design-basis loss-of-coolant accident assumed to start; normal auxiliary power assumed to be lost.
~0	Drywell high pressure and reactor low water level reached. All diesel generators signaled to start; scram; HPCS, LPCS, LPCI signaled to start on high drywell pressure.
~3	Reactor low-low water level reached. Main steam isolation valves close; HPCS receives second signal to start.
~7	Reactor low-low-low water level reached. Second signal to start LPCI and LPCS; auto-depressurization sequence begins.
~~<10~~	~~All diesel generators ready to load; energize HPCS pump motor; open HPCS injection valve; begin energizing LPCI and LPCS pump motors.~~
~~<27~~	~~HPCS injection valve open and pump at design flow, which completes HPCS startup.~~
~~<40~~	~~LPCI and LPCS pumps at rated flow, LPCI and LPCS injection valves open, which completes the LPCI and LPCS startups.~~
See Figure 6.3-21	Core effectively reflooded assuming worst single failure; heatup terminated.
>10 min.	Operator shifts to containment cooling.

Delete & Add Insert A

NOTE: For the purpose of all but the next to last entry on this table, all ECCS equipment is assumed to function as designed. Performance analysis calculations consider the effects of single equipment failures. (See Subsections 6.3.2.5 and 6.3.3.3.)

Insert A

~13	HPCS diesel generators ready to load; energize HPCS pump motor; open HPCS injection valve.
<13	Division 1&2 diesel generators ready to load; start to close containment isolation valves.
<27	HPCS injection valve open & pump at design flow, which completes HFCS startup; LPCS & LPCI (RHR "C") pumps at rated speed.
<32	LPCI (RHR "A" & "B") pumps at rated speed.
<40	LPCI "C" and LPCS pumps at rated flow, LPCI "C" and LPCS injection valves open, which completes the LPCI "C" and LPCS startups.
<45	LPCI "A" & "B" pumps at rated flow, LPCI "A" & "B" injection valves open, which completes LPCI startup.

7.3.1.1.1.4.5 Redundancy and Diversity

The LPCI is actuated by either reactor vessel low water level or drywell high-pressure. Both of these conditions will result from a design-basis loss-of-coolant accident. As described in Subsection 7.3.1.1.1.3.2, if one low level switch fails, the high drywell pressure or a combination of low level and drywell pressure switches will initiate LPCI.

LPCI A initiation logic is common to the LPCS and is separated from the initiation logic for LPCI B and LPCI C. Each initiation logic uses the same one-out-of-two twice form; however, one trip system uses only Division 1 sensors (LPCI A), and the other trip system uses only Division 2 sensors (LPCI B, LPCI C). Each trip system consists of two level switches and two drywell high-pressure switches connected into a one-out-of-two twice configuration.

7.3.1.1.1.4.6 Actuated Devices

The functional control arrangement for the LPCI system pumps is shown in Figure 7.3-12. LPCI system pumps start immediately if normal auxiliary power is available or are delayed as described in Subsection 7.3.1.1.1.4.3. The time delays are provided by timers (see Table 7.3-1). The delay times for the pumps to start when normal a-c power is not available include ~~approximately 3~~ time ~~seconds~~ for the start signal to develop after the actual reactor vessel low water level or drywell high-pressure occurs, ~~10~~ time ~~seconds~~ for the standby power to become available, and a sequencing delay to prevent overloading the source of standby power. The total delay times from the time of the accident to the start of the main system pumps are: Pump A, 18 seconds; Pump B, 18 seconds; and Pump C, 13 seconds. If normal power is available, the delay time for all three pumps is 13 seconds.

The operator can also control the pumps manually from the main control room.

The main system pump motors are provided with overload protection. The overload relays maintain power on the motor as long as possible without harming the motor or jeopardizing the emergency power system.

All automatic valves used in the LPCI function are equipped with remote/manual test capability. The entire system can be operated from the control room. Motor-operated valves have limit switches to turn off the motor when the full open or full closed positions are reached. Torque switches are also provided to control valve motor forces when valves are closing. Thermal overload devices are used to trip motor-operated valves and to provide alarms. Valves that also have primary containment and reactor vessel isolation requirements are described in Subsection 7.3.1.1.2. LPCI valves are required to travel full stroke within 40 seconds after the start of the maximum recirculation line break accident.

The diesel-generator sets have ample capacity to supply all power required for the safe shutdown of both units in the event of a total loss of offsite power. Ample capacity is provided for the condition in which one unit may be involved in a loss-of-coolant accident while the remaining unit is being shut down without loss of coolant, as well as for the condition in which both units are concurrently being shut down without loss-of-coolant accidents.

The diesel generators are rated as indicated in Table 8.3-3. The continuous ratings of the diesel generators are based on the maximum coincidental LOCA or shutdown load expected. The starting systems are described in Subsection 9.5.6.

Control power for each diesel generator is supplied from the 125-Vdc battery within its associated division. ~~The d-c controls for diesel generator "0" are supplied from the Unit 1 Division 1 d-c bus.~~ *Add Insert A and run in.*

In the event of loss of all normal sources of power (onsite and offsite) to the Class 1E power system, each diesel generator set is automatically started and loaded. Controls and circuitry used to start and load the redundant units are independent of each other. The starting circuitry and control power is provided by a 125-Vdc battery for each division load group. The diesel generator automatic starting and loading proceeds as follows:

a. Each diesel generator is automatically started by one of the following events (Figure 8.3-2):

   1. Undervoltage develops on the associated 4-kV bus.

   2. Low water level develops in the reactor vessel.

   3. High pressure develops in the primary containment.

b. Should automatic fast source transfer fail to occur upon loss of voltage ~~in~~ the 4160-volt ~~division~~ buses, [divisional] [on] all 4-kV motor loads on the Division 1 and Division 2 buses are shed. Division 3 loads are not shed following a loss of bus voltage, *since the total connected bus load is within the capability of the diesel-generator set.*

c. After each diesel-generator set has attained a normal frequency and voltage, its breaker closes if no. 1 a-c power has been lost in the manner described above. *This constitutes* ~~in~~ the automatic slow transfer scheme.

d. If normal a-c power is still present and the diesel generator was started by signals a.2 or a.3 preceding, the diesel-generator breaker does not close, and the set remains at full frequency and voltage until manually shut down.

Insert A

The 125-Vdc control power for diesel-generator "0" is supplied from either Unit 1 Division 1 or Unit 2 Division 1 as determined by the position of an automatic transfer switch located in the diesel generator "0" control panel. The automatic transfer switch seeks Unit 1 Division 1.

e. If normal a-c power is lost and signals a.2 and a.3 are not present, only the loads needed for safe shutdown are connected automatically or manually by the operator's action as station conditions require.

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Electrical interlocks, consisting of mechanically actuated auxiliary breaker position switches, are provided to prevent an operator from paralleling, through the unit ties, two standby diesel generators without an offsite source connected to one of the associated ESF buses.

Additional interlocks prevent automatic closure of a standby diesel-generator breaker ~~(after an automatic start)~~ to its associated 4160-volt bus (supplying ESF loads), unless the normal (#1 offsite) source, the unit tie (#2 offsite) source, ~~and~~ the bus tie (#1 onsite) source breakers are all open, *and an undervoltage condition exists on the bus.*

All control circuits and their components including the bus transfer system are provided with means for manual testing during normal station operation and meet IEEE 279-1971 criteria. Means are provided to permit connecting selected non-1E loads in the station to the diesel-generator set within its capability. However, this is a strictly manual operation under the operator's full control.

Each diesel generator can be started manually either by a control switch located on the main control board or by a control switch located on the separate local control panel of the diesel generator (NOTE: diesel generator "0" has a control switch on both U-1 MCB and U-2 MCB). Diesel generators 1B and 2B are each furnished with a two-position selector switch ("remote" and "local") located at the remote control station in the control room.

The fuel oil system, air starting system, and generator output and excitation systems of each diesel engine are equipped with instrumentation to monitor all important parameters and to annunciate abnormal conditions.

Table 8.3-4 shows the protective and supervisory functions for each diesel generator. Instrumentation is shown on Figure 8.3-6.

The fuel oil storage and transfer systems are described in Subsection 9.5.4, lubrication systems in Subsection 9.5.7, and cooling systems in Subsection 9.5.5.

Insert A

f. If, while operating as per item e, signal a.2 or a.3 appears, the Division 1 and Divison 2 diesel generator breakers are tripped causing all 4kV motor loads to be shed from these buses. The Division 1 and Division 2 diesel generator breakers then reclose and the required Class 1E loads are started automatically. Division 3 does not require load shedding and, therefore, upon appearance of signal a.2 or a.3 the diesel generator breaker remains closed and the required Class 1E loads are started automatically.

g. If, while the diesel generator is connected to the bus during routine periodic load testing, signal a.2 or a.3 appears, the Division 1 and Division 2 diesel generator breakers are tripped. If normal a-c power is still present the diesel generator breakers do not reclose and the sets remain at full frequency and voltage until manually shut down. If normal a-c power is coincidentally or subsequently lost, all 4kV motor loads are shed, the diesel generator breakers are reclosed and the required Class 1E loads are started automatically. Division 3 does not require load shedding and, therefore, upon appearance of signal a.2 or a.3 the diesel generator breaker remains closed and the required Class 1E loads are started automatically.

As a supplement to the station battery supplied emergency lighting system, additional self-contained, battery operated emergency lighting units of a portable or semiportable type are provided where required. These are equipped with 4-hour battery supplies.

9.5.4 Diesel-Generator Fuel Oil Storage and Transfer System

The design objective of the diesel fuel oil storage and transfer system is to supply fuel to the diesel generator during a loss-of-coolant accident (LOCA) as well as for all conditions of shutdown without a LOCA.

9.5.4.1 Design Bases

9.5.4.1.1 Safety Design Bases

Specific safety design bases for the five fuel oil storage and transfer systems are as follows:

a. The system is designed consistent with automatic startup of each diesel-generator set such that required loads can be accepted ~~in 10 seconds.~~ within the required time.

b. All system piping and components required to assure a 7-day supply of fuel to the diesel generators are designed to Seismic Category I and ASME Section III, Class 3 requirements and are protected from tornadoes, missiles, pipe whip, and floods.

c. The entire diesel-generator system consisting of five diesel generators including the associated fuel storage and transfer system is designed to meet single failure criteria. Each fuel system or diesel generator in itself does not need to meet the single failure criteria.

d. The minimum required fuel storage capacity for each Division 1 and 2 diesel generator is 31,250 gallons which is based on continuous diesel-generator operation at rated capacity for 7 days. Fuel consumption at rated capacity is 186 gph. The minimum required storage capacity for each Division 3 diesel generator is 29,750 gallons which is based on the following criteria:

1. High-pressure core spray (HPCS) pump operation at maximum power demand conditions for 25 hours, after which time the pump operates at runout flow for the balance of the 7-day period. All other Division 3 loads operate at maximum power for the full 7-day period.

Temperature switches installed at the engine outlet actuate local and control room alarms at 200° F and automatically trip the engine at a temperature of 208° F. This automatic trip is bypassed, however, when the engine is started automatically during an emergency.

A temperature switch installed in the lube oil cooler controls the electric immersion heater used to keep the engine in a warm standby condition. Low-temperature switches on the Divisions 1, 2, and 3 diesel generators actuate local and control room alarms if engine temperature drops below 85° F to detect failure of the diesel cooling water heaters.

9.5.6 Diesel-Generator Starting Air System

The purpose of the diesel-generator starting air system is to provide a quick, reliable, and automatic start of the generators.

9.5.6.1 Design Bases

9.5.6.1.1 Safety Design Bases

The design objective of each diesel starting air system is to automatically start the associated diesel-generator unit such that rated frequency and voltage is achieved and the unit is ready to accept required loads within ~~10 seconds~~ the required time.

The starting air system design is based on meeting single failure criteria. Each diesel generator is provided with two ~~complete full capacity~~ starting air subsystems, and each diesel-generator starting air system is independent of the other diesel generators. ~~four starting air systems~~. which has its own

The system design is based on Seismic Category I requirements and incorporates protection from tornadoes, external missiles, floods, and other natural phenomena.

Delete & add Insert A

~~Each diesel-generator starting air system consists of two starting subsystems and has sufficient total air storage capacity for a minimum of six normal cranking cycles (six normal starts). With all four air motors simultaneously, each diesel will achieve 900 rpm ± 3% in less than 10 seconds for five normal starts on stored air.~~

~~Air storage capacity for each subsystem is based on a minimum of five normal cranking cycles in rapid succession without use of the air compressor, assuming the redundant subsystem fails to operate. The minimum receiver pressure required to assure a fast start is approximately 220 psig when starting on two air motors. When utilizing all four air motors simultaneously, the minimum cranking pressure is reduced to approximately 140 to 155 psig. The minimum receiver pressure at initiation of the starting sequence is assumed to be at the air compressor control switch "start" setpoint.~~

Insert A

Each diesel generator starting air system consists of two starting subsystems. The air storage capacity of each subsystem is based on a minimum of five normal cranking cycles in rapid succession without the use of the air compressor for the Division 1 and Division 2 Diesel Generators and three normal cranking cycles in rapid succession without the use of the air compressor for the Division 3 Diesel Generators, assuming the redundant subsystem fails to operate. A normal cranking cycle is assumed to mean the Diesel Generator will start and accelerate to 900 rpm +5%,-3% within 13 seconds. The minimum receiver pressure at initiation of the starting sequence is less than or equal to the air compressor auto start setpoint of approximately 210 psig.

The minimum air receiver pressure required to assure a single normal cranking cycle is approximately 165 psig when starting with one subsystem and approximately 140 to 155 psig when starting with both subsystems. Therefore, a low air pressure alarm is set at about 200 psig to ensure prompt notification to the Control Room of an abnormal pressure condition below approximately 210 psig normal minimum header pressure.

for the Division 3 systems actuate local (Division 3 only) and control room alarms on low air pressure.

Each air compressor is controlled by a pressure switch connected to the corresponding air receiver. The compressor is started at approximately 210 ~~220~~ psig and is stopped at approximately 240 psig.

For the refrigerated air dryers provided, indicators are installed to identify a malfunction of the air dryer unit, when the air compressors are running.

9.5.7 Diesel-Generator Lubrication System

The function of the diesel-generator lube oil system is to supply lube oil to the engine bearing surfaces at controlled pressure, temperature, and cleanliness conditions.

9.5.7.1 Design Bases

9.5.7.1.1 Safety Design Bases

a. The system is based on reliable fast starting such that the diesel generator can accept loads within ~~10~~ the required time ~~seconds~~. To accomplish this the lube oil is heated above 100° F when the engine is not operating by an immersion heater in the engine cooling water system (Subsection 9.5.5). The warm lube oil is circulated to the turbocharger bearing and oil filter during shutdown by an electric circulating pump.

b. To meet the single failure criterion, each diesel-generator lube oil system is independent and located entirely on the diesel-generator skid.

c. System piping and components are designed to meet Seismic Category I requirements. Tornado, missile, and flood protection is provided by locating the diesel-generator skid within the Seismic Category I reinforced concrete diesel-generator building. Protection against pipe whip is not necessary as the only high energy piping located within the diesel-generator building is the diesel-generator starting air system piping. The diesel generators and their associated auxiliary systems are separated from each other by reinforced concrete walls.

9.5.7.1.2 Power Generation Design Bases

Since the diesel generators' sole function is to provide an onsite source of standby power to safely shut down the plant and mitigate the consequences of an accident, the diesel generators are not required to operate during plant power generation except

During the preoperational testing, it is verified that the diesel generators are capable of starting and accelerating to rated speed, in the required sequence, all the needed ESF and emergency shutdown loads, while maintaining the voltage and frequency within the limits specified in Position 4 Conformance. During these tests, the overspeed limits are also verified.

Add Insert 4

The suitability of each standby diesel generator is confirmed by prototype qualification test data and by preoperational tests.

The HPCS diesel-generator unit is considered as a unique application, justifiable departure from the strict conformance to Regulatory Guide 1.9 - 1971 regarding voltage and frequency limits during the initial loading transient. The HPCS system consists of one large pump and motor combination which represents more than 90% of the total load; consequently, limiting the momentary voltage drop to 25% and the momentary frequency drop to 5% would not significantly enhance the reliability of HPCS operation. To meet the specific Regulatory Guide requirements, a diesel-generator unit approximately two to three times as large as that required to carry the continuous rated load, would be necessary. The specific diesel engine-electric generator-pump assembly was designed specifically for this integral operation. The frequency and voltage overshoot requirements of Regulatory Guide 1.9 - 1971 are met. A factory testing program on a prototype unit has verified the following functions:

a. system fast-start capabilities,

b. load-carrying capability,

c. load shedding capability,

d. ability of the system to accept and carry the required loads, and

e. the mechanical integrity of the diesel-engine generator unit and all of the major system auxiliaries.

GE Licensing Topical Report, "HPCS Power Supply," NEDO-~~1095~~ 10005, describes the theoretical analytical aspects of the unique application including prototype and reliability test considerations.

The design of the HPCS diesel-generator conforms with the applicable sections of IEEE Criteria for Class IE "Electrical Systems for Nuclear Power Generation Stations," IEEE Standard 308-1971.

The generator has the capability of providing power for starting the required loads with operationally acceptable voltage and frequency recovery characteristics. A partial or complete load rejection will not cause the diesel-engine to trip on overspeed.

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Position C.2.a.(8) of Regulatory Guide 1.108 allows the Division 1 and Division 2 Diesel Generators to be running in standby at 50% speed droop. Under this rare condition the Division 1 and 2 Diesel Generators do not meet the voltage requirements of Regulatory Guide 1.9 during the ECCS pump starts. A test of the Division 1 Diesel Generator (worst case) was done for two conditions. One test was a simultaneous ECCS initiation with bus undervoltage, while the diesel was in a test mode at 50% speed droop. The other test was an ECCS initiation signal with the diesel in a test mode at 50% speed droop, followed later by bus undervoltage. The test verified the capability of the diesels to pick up the pump loads with no indication of any possible failures due to the voltage transient and recovery time.

A special prototype test ~~will be~~ was conducted at the LSCS facility to field (site) verify the hardware real load aspects of the HPCS power supply concept. This test ~~will be~~ was conducted in ~~1978.~~ February, 1979. This prototype test verified the acceptability of the HPCS power supply concept.
The HPCS diesel generators utilized in LSCS Units 1 and 2 are in compliance with the intent of this guide through the alternate approach cited above. The other standby-power diesel-generators and their loading schemes are in compliance with the guidance set forth in this guide.

QUESTION 040.29

"Describe the sensors and alarms provided in your design of the diesel generator air starting system to warn the operator when design parameters are exceeded. Discuss the operator actions during alarm conditions. (SRP 9.5.6, Part III, Item 1.)"

RESPONSE

All sensors and alarms for the diesel-generator starting air system are described in Subsection 9.5.6.5 and indicated on revised Figure 9.5-8. Upon low-pressure alarm actuation, the operator must take appropriate steps to prevent further loss of air pressure; make the necessary repairs or adjustments; and restore the system to standby with air pressure in the normal range of ~~220~~ approximately 210 to ~~250~~ approximately 240 psig.

QUESTION 040.30

"Section 9.5.6.2 states that each subsystem except those associated with the Division 3 diesel-generator is provided with a moisture separator and refrigerated air dryer between the air compressor and air receiver tank. Explain why Divisions 1 and 2 have this feature while Division 3 does not. Also, what is the affect on reliability for Division 3 without these components."

RESPONSE

The ~~Division 1 and 2~~ diesel-generator starting air systems have moisture separators and refrigerated air dryers to provide added assurance against moisture accumulations in the receiver tanks. ~~The lack of this equipment in the Division 3 starting air system has no effect on reliability since periodic inspections are used to detect and drain any moisture accumulation in the air receivers~~.

QUESTION 040.42

"Describe any sensors and alarms provided in your design of the diesel engine combustion air intake and exhaust system to warn the operator when design parameters are exceeded. Discuss the operator actions during an alarm condition. (SRP 9.5.8, Part III, Item 1 & 4.)"

RESPONSE

The diesel-generator air intake and exhaust systems do not require monitoring or alarming of any parameters. ~~The air filter supplied with the engine is provided with a restriction indicator discussed in Subsection 9.5.8.4.~~ Intake filters supplied with the engine are changed periodically.

Do not set

Explanatory note: This correction should have been made in Amendment 54 when Section 9.5.8.4 was corrected. There is no flow restriction indicator.

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3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

A.C. SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and

b. Three separate and independent diesel generators with:

1. For diesel generator 0 and 1A:

a) A separate day fuel tank containing a minimum of 250 gallons of fuel.

b) A separate fuel storage system containing a minimum of 31,000 gallons of fuel.

2. For diesel generator 1B, a separate fuel storage tank/day tank containing a minimum of 29,750 gallons of fuel.

3. A separate fuel transfer pump.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, and 3.

ACTION:

Basis for change

Reg Guide 1.108 describes method acceptable to NRC to meet operability requirements. Refer to Reg Guide 1.108, B page 2. Table 4.8.1.1.2-1 makes allowance to increase surveillances when D/G failures occur.

a. With either one offsite circuit or diesel generator 0 or 1A of the above required A.C. electrical power sources inoperable, ~~demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a and 4.8.1.1.2.a.4, within one hour and at least once per 8 hours thereafter;~~ restore at least two offsite circuits and diesel generators 0 and 1A to OPERABLE status within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

Same basis as action a. above.

b. With one offsite circuit and diesel generator 0 or 1A of the above required A.C. electrical power sources inoperable, ~~demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a and 4.8.1.1.2.a.4 within one hour and at least once per eight hours thereafter;~~ restore at least one of the inoperable A.C. sources to OPERABLE status within 12 hours or be in at least HOT SHUTDOWN within the next [illegible] hours and in COLD SHUTDOWN within the following 24 hours. Restor[illegible] at least two offsite circuits and diesel generators 0 and 1A to OPERABLE status within 72 hours from the time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

LIMITING CONDITION FOR OPERATION (Continued)

c. With two of the above required offsite circuits inoperable, ~~demonstrate the OPERABILITY of three diesel generators by performing Surveillance Requirement 4.8.1.1.2.a.4 within one hour and at least once per 8 hours thereafter, unless the diesel generators are already operating;~~ restore at least one of the inoperable offsite circuits to OPERABLE status within 24 hours or be in at least HOT SHUTDOWN within the next 12 hours. With only one offsite circuit restored to OPERABLE status, restore at least two offsite circuits to OPERABLE status within 72 hours from time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

Same basis as Action a. above.

d. With diesel generators 0 and 1A of the above required A.C. electrical power sources inoperable, ~~demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a and 4.8.1.1.2.a.4 within one hour and at least once per 8 hours thereafter;~~ restore at least one of the inoperable diesel generators 0 and 1A to OPERABLE status within 2 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. Restore both diesel generators 0 and 1A to OPERABLE status within 72 hours from time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

Same basis as Action a. above.

e. With diesel generator 1B of the above required A.C. electrical power sources inoperable, ~~demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a and 4.8.1.1.2.a.4 within one hour and at least once per 8 hours thereafter;~~ restore the inoperable diesel generator 1B to OPERABLE status within 72 hours or declare the HPCS system inoperable and take the ACTION required by Specification 3.5.1.

Same basis as Action a. above.

SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Each of the above required independent circuits between the offsite transmission network and the onsite Class 1E distribution system shall be:

a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignments and indicated power availability, and

b. Demonstrated OPERABLE at least once per 18 months during shutdown by manually transferring unit power supply from the normal circuit to the alternate circuit.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.2 Each diesel generator shall be demonstrated OPERABLE:

a. In accordance with the frequency specified in Table 4.8.1.1.2-1 on a STAGGERED TEST BASIS by:

1. Verifying the fuel level in the day fuel tank.

2. Verifying the fuel level in the fuel storage tank.

3. Verifying the fuel transfer pump starts and transfers fuel from the storage system to the day fuel tank.

Basis for changes

1. 900 rpm is equivalent to 60 Hz, thus 60+3, -1.2 Hz is 900 +5%, -3% rpm.
2. GE design analysis requires D/G's to close onto bus in 13 seconds.

Basis for deletions

1. Requires use of jumpers, which add risk of decreased reliability.
2. Beyond requirements of Reg. Guide 1.108.

4. Verifying the diesel starts from ambient condition and accelerates to 900 rpm +~~10%~~, -3% in less than or equal to ~~10~~ 13 seconds. The generator voltage and frequency shall be 4160 ± 150 volts and 60 + 3.0, -1.2 Hz within ~~10~~ 13 seconds after the start signal. ~~The diesel generator shall be started for this test by using one of the following signals with startup on each signal verified at least once per 124 days:~~

~~a) Manual.~~

~~b) Simulated loss of offsite power by itself.~~

~~c) Simulated loss of offsite power in conjunction with an ESF actuation test signal.~~

~~d) An ESF actuation test signal by itself.~~

5. Verifying the diesel generator is synchronized, loaded to greater than or equal to 2600 kw and operates for greater than or equal to 60 minutes.

6. Verifying the diesel generator is aligned to provide standby power to the associated emergency busses.

7. Verifying the pressure in ~~all~~ diesel generator air start receivers for at least one subsystem to be greater than or equal to ~~150~~ 165 psig.

b. At least once per 31 days and after each operation of the diesel where the period of operation was greater than or equal to 1 hour by checking for and removing accumulated water from the day and engine-mounted fuel tanks.

c. At least once per 92 days and from new fuel oil prior to addition to the storage tanks by verifying that a sample obtained in accordance with ASTM-D270-1975 has a water and sediment content of less than or equal to 0.05 volume percent and a kinematic viscosity @ 40°C of greater than or equal to 1.3 but less than or equal to 2.4 when tested in accordance with ASTM-D975-77, and an impurity level of less than 2 mg. of insolubles per 100 ml. when tested in accordance with ASTM-D2274-70.

SURVEILLANCE REQUIREMENTS (Continued)

d. At least once per 18 months during shutdown by:

1. Subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service.

2. Verifying the diesel generator capability to reject a load of greater than or equal to 1190 kw for diesel generator 0, greater than or equal to 638 kw for diesel generator 1A, and greater than or equal to 2381 kw for diesel generator 1B while maintaining engine speed less than or equal to 75% of the difference between nominal speed and the overspeed trip setpoint or 15% above nominal, whichever is less.

3. Verifying the diesel generator capability to reject a load of 2600 kw without tripping. The generator voltage shall not exceed 5000 volts during and following the load rejection.

4. Simulating a loss of offsite power by itself, and:

a) For Divisions 1 and 2:

1) Verifying de-energization of the emergency busses and load shedding from the emergency busses.

2) Verifying the diesel generator starts on the auto-start signal, energizes the emergency busses with permanently connected loads within ~~(10)~~ 13 seconds, energizes the auto-connected loads and operates for greater than or equal to 5 minutes while its generator is so loaded. After ~~(3)~~ 3 seconds following energization, the steady state voltage and frequency of the emergency busses shall be maintained at 4160 ± 150 volts and 60 ± 1.2 Hz during this test.

b) For Division 3:

1) Verifying de-energization of the emergency bus.

2) Verifying the diesel generator starts on the auto-start signal, energizes the emergency bus with its loads within ~~10~~ 13 seconds and operates for greater than or equal to 5 minutes while its generator is so loaded. After ~~( )~~ 3 seconds following energization, the steady state voltage and frequency of the emergency bus shall be maintained at 4160 ± 150 volts and 60 ± 1.2 Hz during this test.

Basis for deletion

1. Requires use of jumpers, adding risk.

2. Beyond requirements of Reg. Guide 1.108.

~~5. Verifying that on an ECCS actuation test signal, without loss of offsite power, the diesel generator starts on the auto-start signal and operates on standby for greater than or equal to 5 minutes. The generator voltage and frequency shall be 4160 + 420, -150 volts and 60 + 3.0, -1.2 Hz within 13 seconds after the auto-start signal; the steady state generator voltage and frequency shall be maintained within these limits during this test.~~

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SURVEILLANCE REQUIREMENTS (Continued)

Basis for deletion

Beyond requirements of Reg. Guide 1.108.

~~6. Verifying that on a simulated loss of the diesel generator, with offsite power not available, the loads are shed from the emergency busses and that subsequent loading of the diesel generator is in accordance with design requirements.~~

7. Simulating a loss of offsite power in conjunction with an ECCS actuation test signal, and:

a) For Divisions 1 and 2:

1) Verifying de-energization of the emergency busses and load shedding from the emergency busses.

2) Verifying the diesel generator starts on the auto-start signal, energizes the emergency busses with permanently connected loads within ~~10~~ 13 seconds, energizes the auto-connected emergency loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. After ~~( )~~ seconds following energization, the steady state voltage and frequency of the emergency busses shall be maintained at 4160 ± ~~150~~ 10% volts and 60 ± 1.2 Hz during this test, *except for 4 seconds following start and stop of loads.*

Basis for change

Reg. Guide 1.9 and G.E. Design Basis.

Basis for deletion

Beyond requirements of Reg. Guide 1.108.

~~3) Verifying that all automatic diesel generator trips, except engine overspeed, generator differential current, and emergency manual stop, are automatically bypassed upon loss of voltage on the emergency bus concurrent with an ECCS actuation signal.~~

b) For Division 3:

1) Verifying de-energization of the emergency bus.

2) Verifying the diesel generator starts on the auto-start signal, energizes the emergency bus with its loads within ~~10~~ 13 seconds and operates for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. After ~~( )~~ seconds following energization, the steady state voltage and frequency of the emergency bus shall be maintained at 4160 ± 10% ~~150~~ volts and 60 ± 1.2 Hz during this test, *except for 5 seconds following the start and stop of loads.*

Basis for change

Reg. Guide 1.9 and G.E. Design Basis.

Basis for deletion

Beyond requirements of Reg. Guide 1.108

~~3) Verifying that all automatic diesel generator trips, except engine overspeed, generator differential or overcurrent, and emergency manual stop, are automatically bypassed upon loss of voltage on the emergency bus concurrent with an ECCS actuation signal.~~

SURVEILLANCE REQUIREMENTS (Continued)

Basis for change

1. Load D/G consistently.
2. Run D/G 1 hour.
3. Reduce number of ECCS pump starts.
4. Provide stations relief from test scheduling during outage, which would add to critical path.

8. Verifying the diesel generator operates for at least 24 hours. During the first 2 hours of this test, the diesel generator shall be loaded to greater than or equal to 2860 kw and during the remaining 22 hours of this test, the diesel generator shall be loaded to 2600 kw. The generator voltage and frequency shall be 4160 + 420, -150 volts and 60 + 3.0, -1.2 Hz within 13 seconds after the start signal; the steady state generator voltage and frequency shall be maintained within these limits during this test. Within 5 minutes after completing this 24 hour test, perform Surveillance Requirement ~~4.8.1.1.2.d.7.a).2) and b).2).~~ 4.8.1.1.2.d.4 and 4.8.1.1.2.a.5.

Basis for deletion.

Beyond requirements of Reg. Guide 1.108.

~~9. Verifying that the auto-connected loads to each diesel generator do not exceed the 2000 hour rating of 2860 kw.~~

10. Verifying the diesel generator's capability to:

a) Synchronize with the offsite power source while the generator is loaded with its emergency loads upon a simulated restoration of offsite power,

b) Transfer its loads to the offsite power source, and

c) Be restored to its standby status.

~~11. Verifying that with the diesel generator operating in a test mode and connected to its bus, a simulated safety injection signal overrides the test mode by (1) returning the diesel generator to standby operation, and (2) automatically energizes the emergency loads with offsite power.~~

12. Verifying that with all diesel generator air start receivers pressurized to less than the compressors auto-start setpoint or equal to and the compressors secured, the diesel generator starts at least 5 times from ambient conditions and accelerates to 900 rpm ± 5%, -2%, in less than or equal to ~~10~~ 13 seconds.

for the Div. 1&2 diesels and 3 times for the Div 3 diesel

13. Verifying that the automatic load sequence timer is OPERABLE with the interval between each load block within ± 10% of its design interval for diesel generators 0 and 1A.

~~14. Verifying that the following diesel generator lockout features prevent diesel generator starting only when required:~~

Basis for deletion

Beyond requirements of Reg. Guide 1.108.

~~a) Generator underfrequency.~~

~~b) Low lube oil pressure.~~

~~c) High jacket cooling temperature.~~

~~d) Generator reverse power.~~

~~e) Generator overcurrent.~~

~~f) Generator loss of field.~~

~~g) Engine cranking lockout.~~

SURVEILLANCE REQUIREMENTS (Continued)

e. At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting all three diesel generators simultaneously, during shutdown, and verifying that all three diesel generators accelerate to 900 rpm + 5, -2% in less than or equal to ~~10~~ 13 seconds.

f. At least once per 10 years by:

1. Draining each fuel oil storage tank, removing the accumulated sediment and cleaning the tank using a sodium hypochlorite or equivalent solution, and

2. Performing a pressure test of those portions of the diesel fuel oil system designed to Section III, subsection ND, of the ASME Code at a test pressure equal to ~~110 percent of the system design pressure~~ *that specified in ASME Section XI subsection IWD 5000.*

4.8.1.1.3 Reports - All diesel generator failures, valid or non-valid, shall be reported to the Commission pursuant to Specification 6.6.B. Reports of diesel generator failures shall include the information recommended in Regulatory Postion C.3.b of Regulatory Guide 1.108, Revision 1, August 1977. If the number of failures in the last 100 valid tests, on a per nuclear unit basis, is greater than or equal to 7, the report shall be supplemented to include the additional information recommended in Regulatory Position c.3.b of Regulatory Guide 1.108, Revision 1, August 1977.

TABLE 4.8.1.1.2-1

DIESEL GENERATOR TEST SCHEDULE

Number of Failures in Last 100 Valid Tests*	Test Frequency
≤ 1	At least once per 31 days
2	At least once per 14 days
3	At least once per 7 days
≥ 4	At least once per 3 days

*Criteria for determining number of failures and number of valid tests shall be in accordance with Regulatory Position C.2.e of Regulatory Guide 1.108, Revision 1, August 1977, where the last 100 tests are determined on a per nuclear unit basis. For the purposes of this test schedule, only valid tests conducted after the OL issuance date shall be included in the computation of the "last 100 valid tests." Entry into this test schedule shall be made at the 31 day test frequency.

BASES

3/4.8.1 and 3/4.8.2 A.C. SOURCES and ONSITE POWER DISTRIBUTION SYSTEMS

The OPERABILITY of the A.C. and D.C. power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety related equipment required for (1) the safe shutdown of the facility and (2) the mitigation and control of accident conditions within the facility. The minimum specified independent and redundant A.C. and D.C. power sources and distribution systems satisfy the requirements of General Design Criteria 17 of Appendix "A" to 10 CFR 50.

The ACTION requirements specified for the levels of degradation of the power sources provide restriction upon continued facility operation commensurate with the level of degradation. The OPERABILITY of the power sources are consistent with the initial condition assumptions of the accident analyses and are based upon maintaining at least Division I or II of the onsite A.C. and D.C. power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss of offsite power and single failure of one of the two onsite A.C. sources. Division III supplies the high pressure core spray (HPCS) system only.

The OPERABILITY of the minimum specified A.C. and D.C. power sources and associated distribution systems during shutdown and refueling ensures that (1) the facility can be maintained in the shutdown or refueling condition for extended time periods and (2) sufficient instrumentation and control capability is available for monitoring and maintaining the unit status.

with the exceptions noted in Appendix B to the FSAR,

The surveillance requirements for demonstrating the OPERABILITY of the diesel generators are in accordance with the recommendations of Regulatory Guide 1.9, "Selection of Diesel Generator Set Capacity for Standby Power Supplies," March 10, 1971, Regulatory Guide 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977 (, and Regulatory Guide 1.137, "Fuel-Oil Systems for Standby Diesel Generators," Revision 1, October 1979).

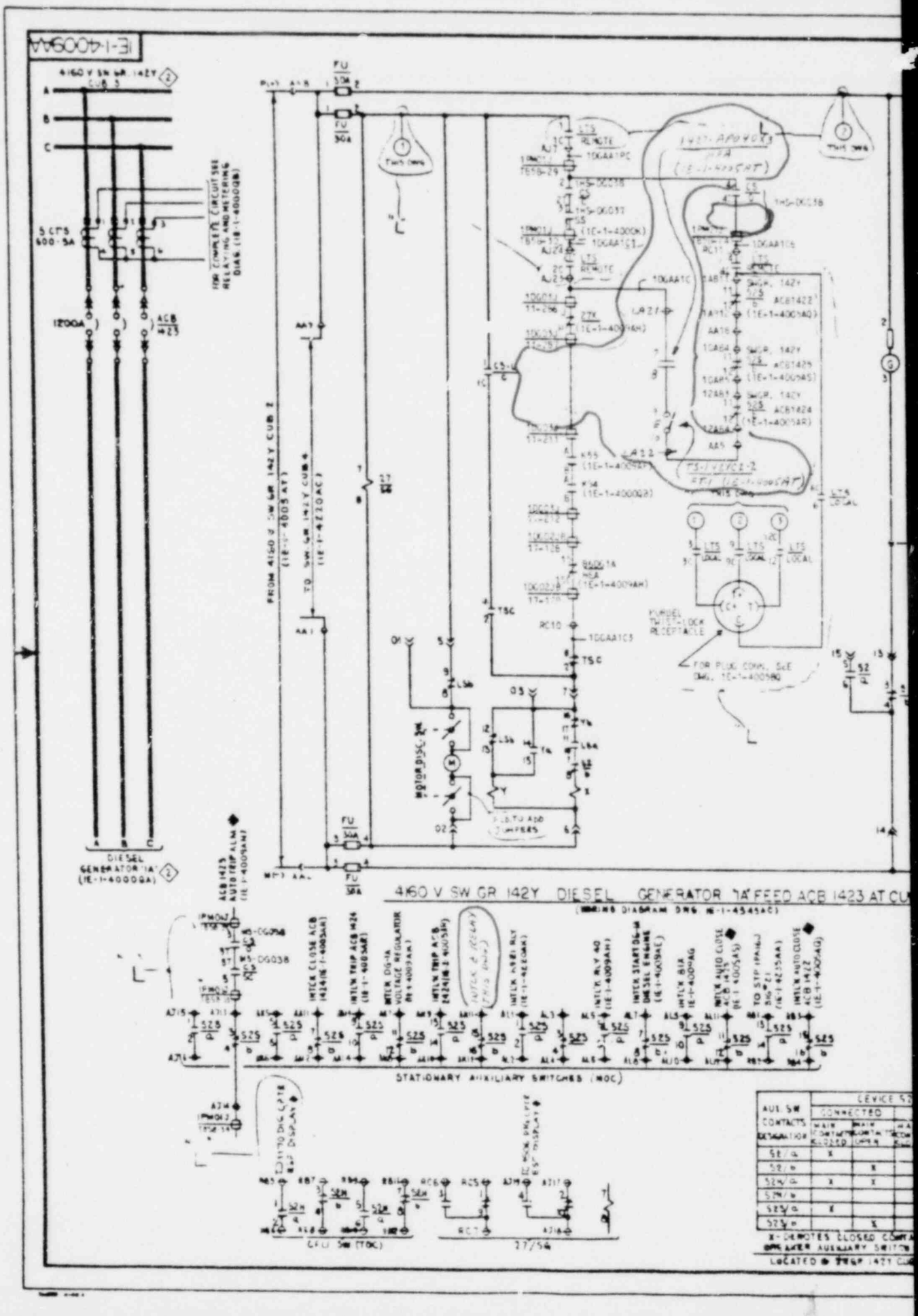
Add Insert A →

The surveillance requirements for demonstrating the OPERABILITY of the unit batteries are in accordance with the recommendations of Regulatory Guide 1.129, "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants," February 1978, and IEEE Std 450-1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Station and Substations."

Verifying average electrolyte temperature above the minimum for which the battery was sized, total battery terminal voltage onfloat charge, connection resistance values and the performance of battery service and discharge tests ensures the effectiveness of the charging system, the ability to handle high discharge rates and compares the battery capacity at that time with the rated capacity.

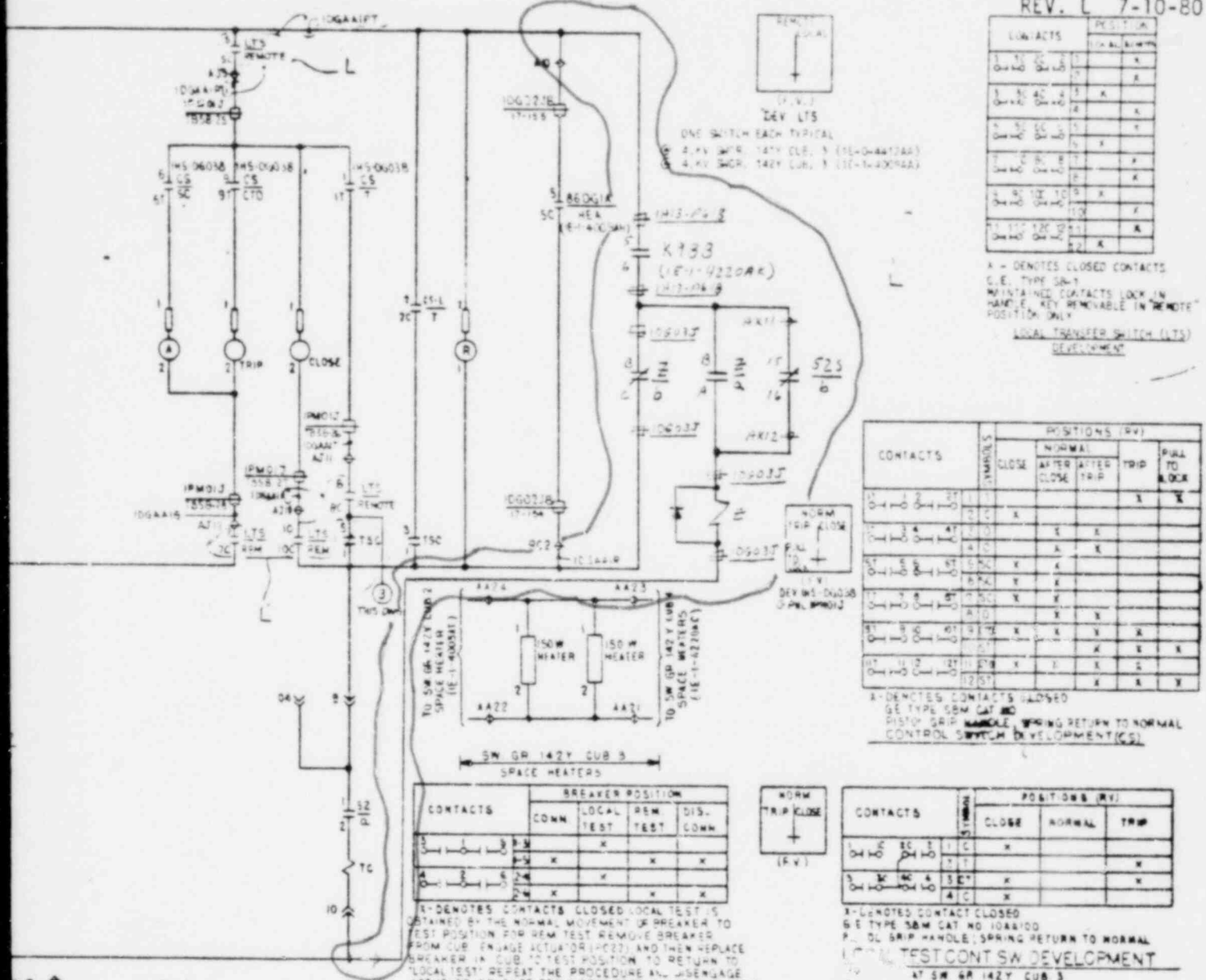
Insert A

Surveillance requirement 4.8.1.1.2.a.4 acceleration time to 900 rpm +5%, -3% is 11 seconds instead of 13 seconds in order to verify the diesel starting ability is not being degraded.


4160 V SW GR 142Y DIESEL GENERATOR "A" FEED ACB 1423 AT CU
STATIONARY AUXILIARY SWITCHES (NOC)
AUX. SW CONTACTS DESIGNATION
CONNECTED
52/a
52/b
52Y/a
52Y/b
52/a
52Y/b

LOCA TRIP ADDITION

AMENDMENT 50
OCTOBER 1980
REV. L 7-10-80



CONTACTS	POSITION	
	LOCAL	REMOTE
1 2C 1C 2	1	X
	2	X
3 4C 4C 4	3	X
	4	X
5 6C 6C 6	5	X
	6	X
7 8C 8C 8	7	X
	8	X
9 10C 10C 10	9	X
	10	X
11 12C 12C 12	11	X
	12	X

A = DENOTES CLOSED CONTACTS
G.E. TYPE SBM
MAINTAINED CONTACTS LOCK IN HANDLE, KEY REMOVABLE IN "REMOTE" POSITION ONLY
LOCAL TRANSFER SWITCH (LTS) DEVELOPMENT

CONTACTS	SYMBOLS	POSITIONS (RV)				
		CLOSE	NORMAL AFTER CLOSE	NORMAL AFTER TRIP	TRIP	PULL TO LOCK
1 2 2T	1				X	X
	2	X				
3 4 4T	3		X	X		
	4		A	X		
5T 5 6 6T	5	X	A			
	6	X	X			
7 8 8T	7	X				
	8		X	X		
9T 9 10 10T	9	X	X	X	X	
	10			X	X	X
11T 11 12 12T	11	X	X	X	X	
	12			X	X	X

A-DENOTES CONTACTS CLOSED
G E TYPE SBM CAT NO
PISTOL GRIP HANDLE; SPRING RETURN TO NORMAL
CONTROL SWITCH DEVELOPMENT (CS)

CONTACTS	BREAKER POSITION			
	CONN	LOCAL TEST	REM TEST	DIS-CONN
1 2 3 4		X		
	X		X	X
5 6 7 8		X		
	X		X	X

X-DENOTES CONTACTS CLOSED LOCAL TEST IS OBTAINED BY THE NORMAL MOVEMENT OF BREAKER TO TEST POSITION FOR REM TEST REMOVE BREAKER FROM CUB ENGAGE ACTUATOR (1-C27) AND THEN REPLACE BREAKER IN CUB TO TEST POSITION TO RETURN TO "LOCAL TEST" REPEAT THE PROCEDURE ALL DISENGAGE ACTUATOR RELEASE FROM REM TEST IS NOT AUTOMATIC WHEN BREAKER IS MOVED OUT FROM TEST POSITION
LIMIT SWITCH DEVELOPMENT
DEV TSC AT SWGR 142Y CUB 5

NORM TRIP CLOSE
(F.V.)

CONTACTS	SYMBOLS	POSITIONS (RV)		
		CLOSE	NORMAL	TRIP
1 2C 2	1 C	X		
	2 T			X
3 4C 4	3 C*	X		X
	4 C	X		

X-DENOTES CONTACT CLOSED
G E TYPE SBM CAT NO 10A8100
P. G. GRIP HANDLE; SPRING RETURN TO NORMAL
CONTROL TEST CONT SW DEVELOPMENT
AT SW GR 142Y CUB 5

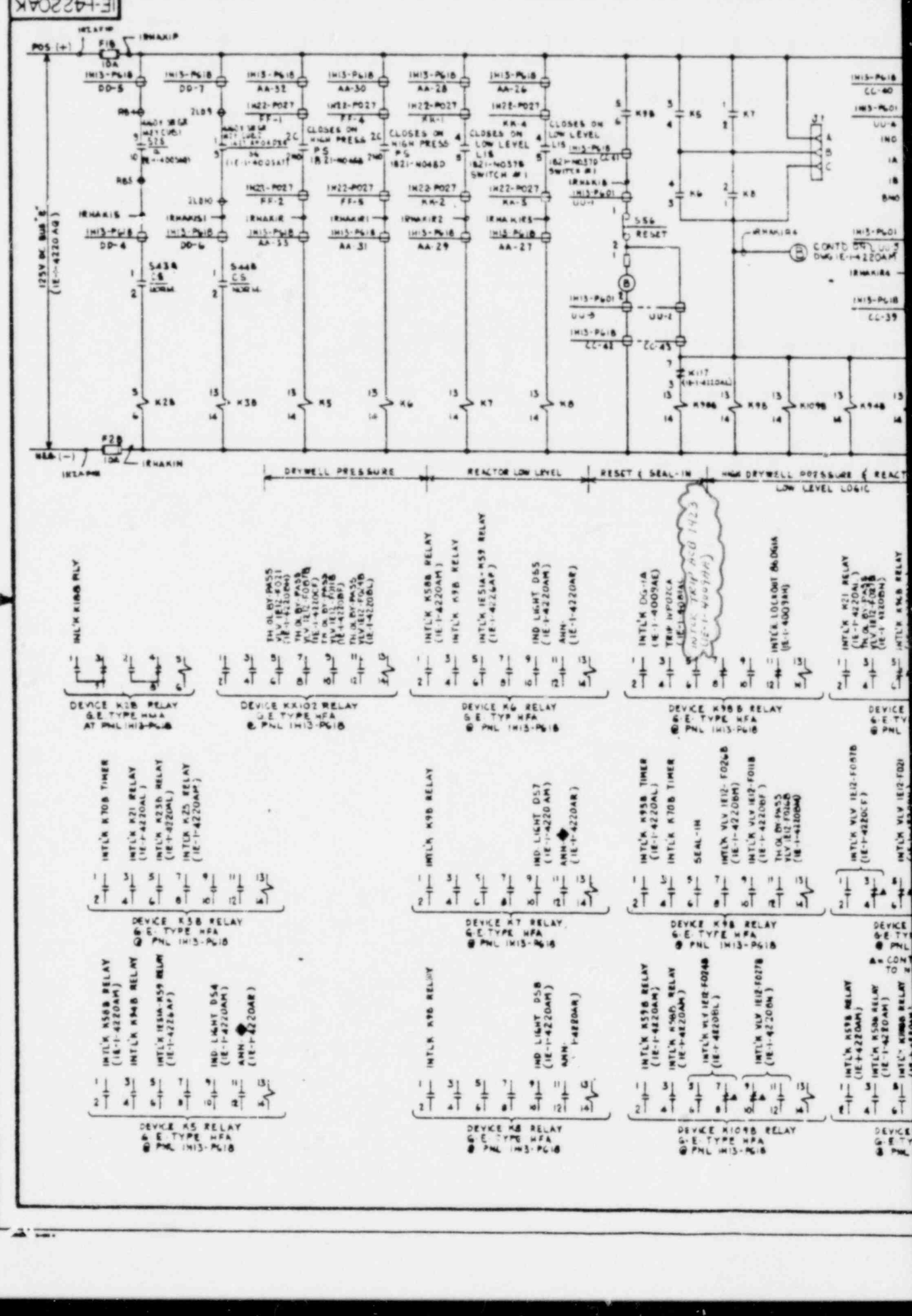
NOTES
1 FOR SYMBOLS & DEVICE NUMBERS SEE S&L STANDARDS EC-110, EC-111 & EC-115.
2 SYMBOLS
⏚ - INDICATES CONNECTION TO GROUND BUS
⊟ - INDICATES TERMINAL AT PANEL
⊕ - INDICATES TERMINAL AT MCC OR SW GR
( ) - INDICATES REFERENCE DWG NUMBER

SEGREGATION CODE
◈ - ESS DIV 2
◆ - NON ESS

LA SALLE COUNTY STATION
FINAL SAFETY ANALYSIS REPORT

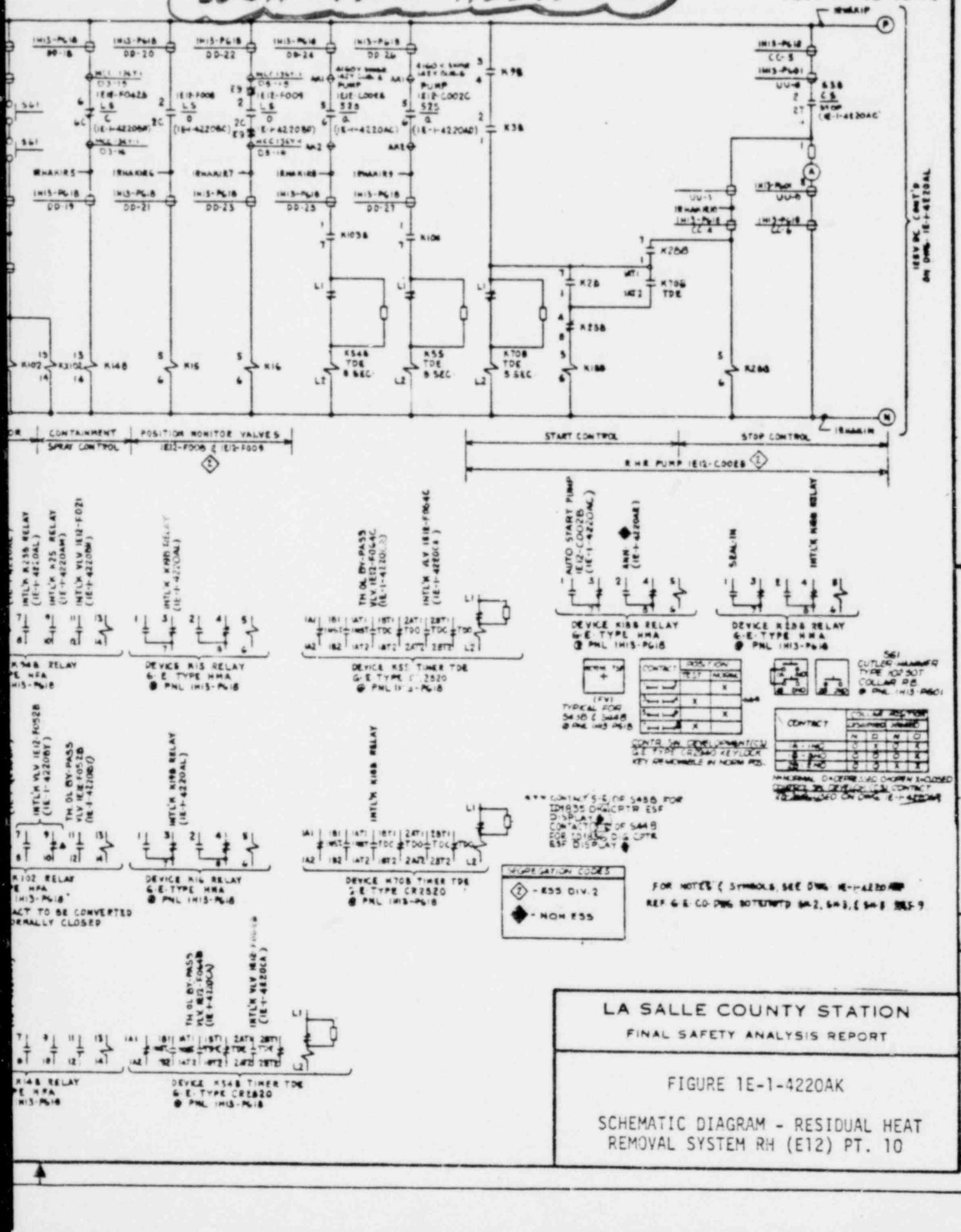
FIGURE 1E-1-4009AA

SCHEMATIC DIAGRAM - 4160-V SWITCHGEAR
142Y DG 1A FEED ACB 1423 SYSTEM
(DG) PT. 1


1E-4220AK
DRYWELL PRESSURE
REACTOR LOW LEVEL
RESET (SEAL-IN
LOW LEVEL LOGIC
DEVICE K28 RELAY
G.E. TYPE HMA
AT PNL IH13-P618
DEVICE KK102 RELAY
G.E. TYPE HFA
@ PNL IH13-P618
DEVICE K6 RELAY
G.E. TYP HFA
@ PNL IH13-P618
DEVICE K98B RELAY
@ G.E. TYPE HFA
@ PNL IH13-P618
DEVICE K38 RELAY
@ G. TYPE HFA
@ PNL IH13-P618
DEVICE K7 RELAY
G.E. TYPE HFA
@ PNL IH13-P618
DEVICE K98 RELAY
G.E. TYPE HFA
@ PNL IH13-P618
DEVICE K5 RELAY
G.E. TYPE HFA
@ PNL IH13-P618
DEVICE K8 RELAY
G.E. TYPE HFA
@ PNL IH13-P618
DEVICE K109B RELAY
G.E. TYPE HFA
@ PNL IH13-P618

LOCA TRIP ADDITION

AMENDMENT 50
OCTOBER 1980
REV. M 12-13-79

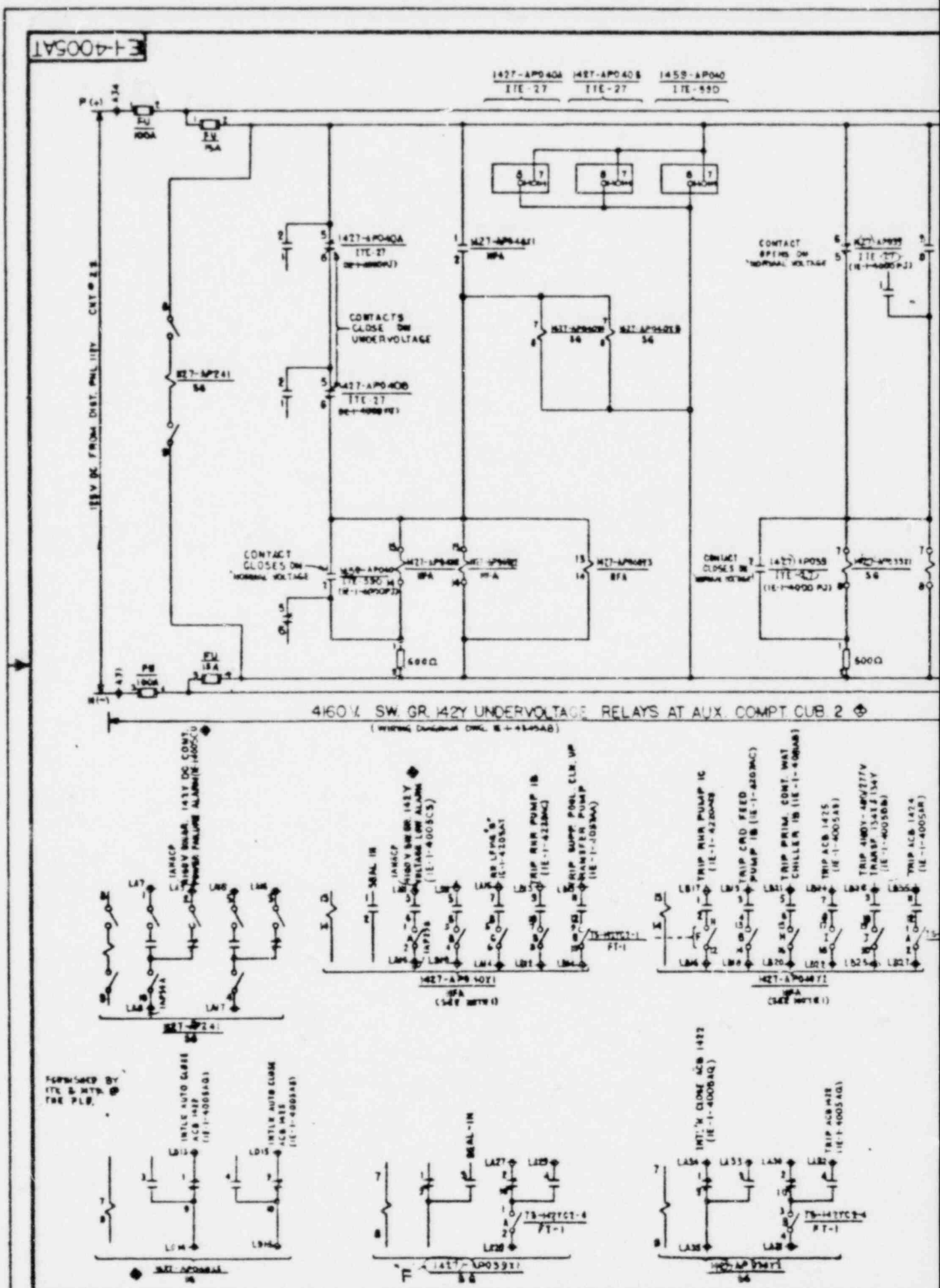


LA SALLE COUNTY STATION
FINAL SAFETY ANALYSIS REPORT

FIGURE 1E-1-4220AK

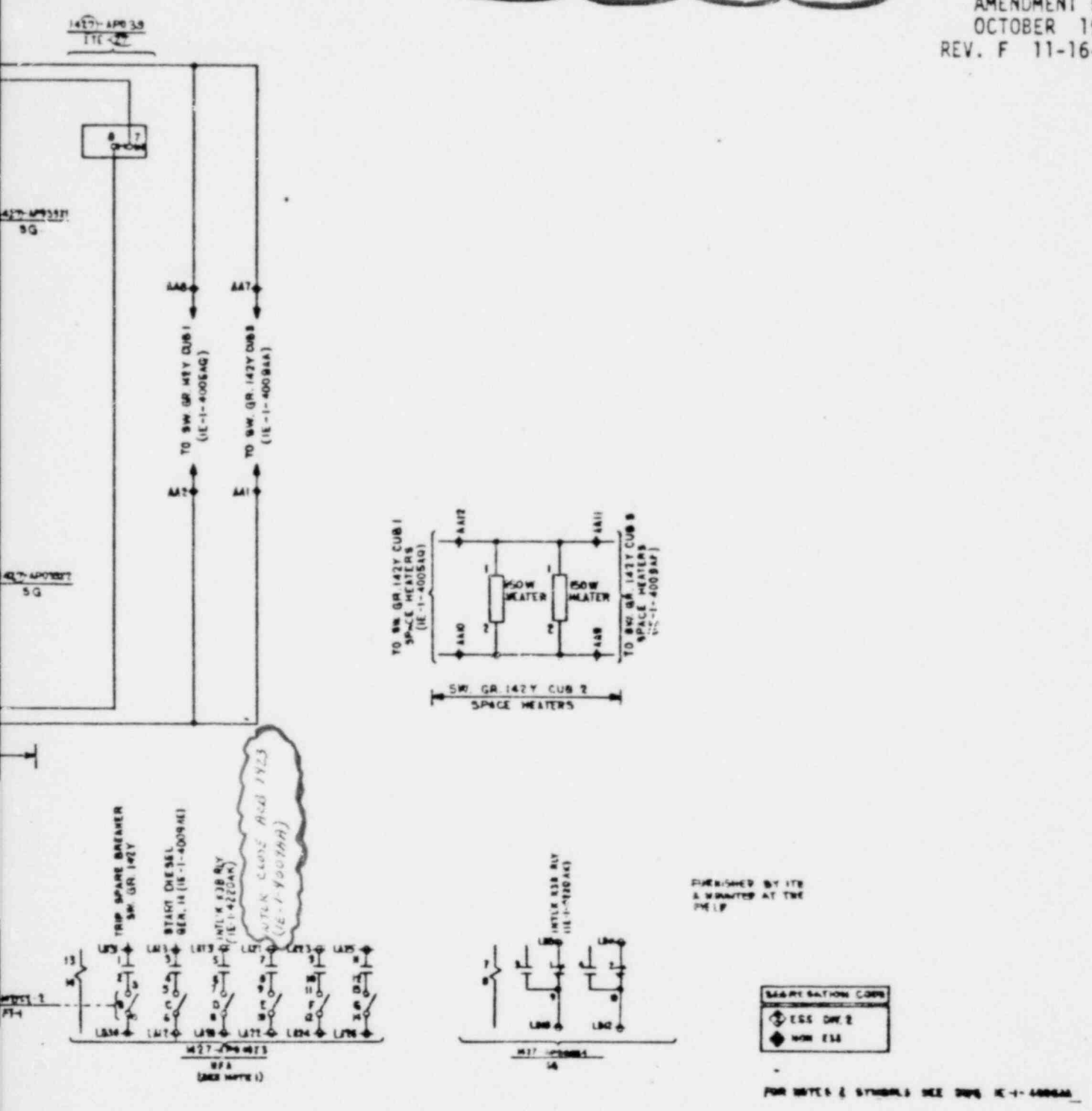
SCHEMATIC DIAGRAM - RESIDUAL HEAT REMOVAL SYSTEM RH (E12) PT. 10

E-1-4005AT


1427-AP040A ITE-27
1427-AP040B ITE-27
1459-AP040 ITE-59D
CONTACTS CLOSE ON UNDERVOLTAGE
CONTACT CLOSES ON NORMAL VOLTAGE
CONTACT OPENS ON NORMAL VOLTAGE
600Ω
600Ω
4160 V. SW. GR. 142Y UNDERVOLTAGE RELAYS AT AUX. COMPT. CUB. 2

LOCA TRIP ADDITION

AMENDMENT 50
OCTOBER 1980
REV. F 11-16-79



NOTE
1. "B" CONTACTS OF HFA RELAYS ARE NOT MECHANICALLY CERTIFIED. THEREFORE, THEY ARE NOT TO BE USED IN NUCLEAR SAFETY RELATED CIRCUITS.

LA SALLE COUNTY STATION
FINAL SAFETY ANALYSIS REPORT

FIGURE 1E-1-4005AT

SCHEMATIC DIAGRAM - 4160-V
SWITCHGEAR 142Y AUXILIARY COMPARTMENT
SYSTEM AP PT. 18