GULF STATES UTILITIES COMPANY

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August 21, 1984
RBG- 18,698
File No. G9.5, G9.8.6.2

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Denton:

River Bend Station - Unit 1
Docket No. 50-458

Enclosed for your review are Gulf States Utilities Company (GSU) responses to Request for Additional Information identified by the Nuclear Regulatory Commission's Power Systems Branch (PSB). This letter will A) provide close out to Item (16) and provide a partial close out to Item (10) of Table 1.3 of the Safety Evaluation Report and B) provide partial close out to Item (51) of Table 1.4 of the Safety Evaluation Report. Attachment 1 of this letter summarizes GSU's responses. The enclosures contain changes to the Final Safety Analysis Report (FSAR) text that will be incorporated in a future amendment.

Sincerely,

J. E. Booker

J. E. Booker
Manager-Engineering
Nuclear Fuels & Licensing
River Bend Nuclear Group

JEB/ERG/JEP/je

B001 1/40

Attachment 1

RESPONSE TO SER OPEN ITEMS (10) AND (16) AND CONFIRMATORY ITEM (51):

I TRAINING

The River Bend Station training program includes training for operations and maintenance personnel for the operations, preventative maintenance and corrective maintenance of the diesel generators. A discussion of the River Bend Station training program is provided in revised FSAR Section 13.2 (Enclosure 1).

River Bend Station has implemented the Staff's recommendation of providing vendor training, or that equivalent to vendor training, for the operations and maintenance department personnel (including supervisors). In addition, training for operation of the diesels is provided for control room personnel at the plant simulator and for all operations personnel by on-the-job training using a qualification card system. FSAR Sections 13.2.1.1.1 Item 6 and Section 13.2.1.1.3 describe the training for operations personnel for the theory of operation, construction, controls and support systems.

To date, three maintenance personnel including one supervisor has received comprehensive vendor training for the diesels consisting of theory of operation, support systems, testing, controls, preventative maintenance and corrective maintenance through complete overhaul. In addition, twenty-two mechanical and electrical maintenance technicians have received training on the diesels consisting of theory of operation, support systems, controls and preventative maintenance.

Vendor retraining, or that equivalent to vendor retraining, for operations and maintenance personnel is provided on a continuing basis and provides for [illegible]ntenance of proficiency.

II DESIGN PARAMETERS

Additional information on the diesel generator design parameters for the most severe ambient conditions that might be experienced at River Bend Station is provided in revised FSAR Section 8.3.1.1.3.6.1.1 and 8.3.1.1.3.6.1.2 (Enclosure 2).

III HPCS DG AUXILIARY SYSTEMS DRAWINGS

Additional information for the HPCS diesel generator auxiliary systems controls, alarms and instrumentation is provided in Enclosure 3. These drawings will be incorporated into the FSAR in a future amendment.

IV HPCS DGCWS LEAKAGE

Additional information is provided in revised FSAR Section 9.5.5.2 (Enclosure 4) describing how makeup water may be added to the HPCS diesel generator during long periods of continuous operation.

V ASME VS. B31.1

The interface requirements were provided in a March 5, 1984 letter from Booker to Denton and is supplemented with additional clarifications as provided in Enclosure 5.

VI HPCS DGCWS INHIBITOR

Additional information on the type of inhibitor used for the HPCS DGCWS is provided in revised FSAR Section 9.5.5.2 (Enclosure 6).

VII TEST AND CALIBRATION PROGRAM

The frequency of instrumentation and control test and calibration program for the diesel generator auxiliary systems is provided in revised response to FSAR Question 430.69 (Enclosure 7).

VIII DGSS I&C DRAWINGS

The standby diesel generator air start system instrumentation and controls diagram is provided in Enclosure 8. These drawings will be incorporated into the FSAR in a future amendment.

IX HPCS DGSS FIVE START CAPABILITY

Additional information on the five start capability of the HPCS DGSS is provided in revised FSAR Section 9.5.6.1 (Enclosure 9). A graph is provided in Enclosure 10 to show the HPCS DGSS five start capability based on a Perry factory test report. The extrapolated data points were based on a constant pressure drop determined by the mean of the actual test points. The constant pressure drop was used to determine the extrapolated points because the actual pressure drop would tend to decrease. Thus, the straight line curve would be conservative. In addition, as stated on FSAR Figure 9.5-4b the minimum recommended cranking pressure at the air starters is 100 psig.

X DUST CONTROL

In order to protect electrical contact surfaces, both the standby and HPCS diesel generator control panels are designed in accordance with NEMA Type 1 and will have dust-tight gasketed doors. The static excitor cabinets (NEMA Type 3) will have dust-tight gasketed doors and filter equipped louvers for proper cooling and protection of the field flasher contacts. All starting circuitry relays and contacts not contained in dust-tight cabinets or panels as described above, will have individual dust-tight covers. The ventilation air intake for the diesel generator building and control room is at el. 118'-0" (see FSAR Figure 1.2-28). This is about 23'-6" above the average plant grade of 94'-6". Ventilation air to each diesel generator control room (200 cfm) is filtered (see FSAR Figure 9.4-5). Normal ventilation air (diesel engine not running) for each diesel generator room consist of 2000 cfm filtered air that enters from the diesel generator control room and 1650 cfm unfiltered air that enters from outside the building. During normal plant operation, equipment and personnel access doors are normally kept closed to minimize the entrance of dust. In addition, the diesel generator room floors will be painted as recommended by NUREG/CR-0660.

Combustion air for the diesel generators is piped directly from outside the building. The intake is at el. 129'-6" (centerline), which is 35 feet above the average plant grade of 94'-6". The combustion air is filtered, as described in FSAR Section 9.5.8.

Dust control during construction is minimized by water sprinkling or by paving or applying asphalt binders to construction roads. After construction exposed tracts of land will be re-seeded to promote vegetation where practical. (see Environmental Report Section 4.6.3).

XI EMERGENCY LIGHTING

Additional information is provided in revised FSAR Section 9.5.3 and Figure 9.5-9 (Enclosure 10).

XII FUEL OIL STORAGE TANK SEDIMENT

Additional information is provided in revised FSAR Section 9.5.4.3 (Enclosure 11).

XII COMBUSTION AIR INTAKE SENSOR

Additional information is provided in revised FSAR Section 9.5.8.5 (Enclosure 12).

XIV FUEL OIL STORAGE TANK FILL/VENT LINT ENCLOSURES

The following references are provided:

(1) Location/Layout: FSAR Fig. 1.2-2P

(2) Structural Design of DG Building: FSAR Section 3.8.4.1.5.

(3) Design of tornado missile barriers: FSAR Section 3.5.3

XV DIESEL DRIVEN AIR COMPRESSOR

Additional information is provided in revised FSAR Section 9.5.6.2.2 (Enclosure 13).

XVI PRE-LUBE MODIFICATION FSAR FIGURE UPDATE

The response to FSAR Question 430.101 is revised to include that the FSAR Figure 9.5-5b will be updated to incorporate the modification described. (Enclosure 14)

ENCLOSURE 1

p. Emergency procedures
q. Radiation monitor malfunctions
r. Load rejection transients
s. Malfunctions involving core damage
t. Feedwater and pressure regulation malfunctions
u. Multiple malfunctions with various size LOCA
v. Post-LOCA conditions
w. Plant hydrostatic test procedure
x. Reactor scrams
y. EMERGENCY DIESEL GENERATOR OPERATIONS

Personnel attending this course include:

1. Shift Supervisor

2. Control Operating Foreman

3. Nuclear Control Operator

4. Other - Individuals pursuing NRC licenses will receive this course or its equivalent prior to taking the examination(s).

13.2.1.1.5 Observation Training (A6) - 4 Weeks

The observation course is designed to give the cold license candidate access to an operating nuclear plant facility in which to gain experience prior to the NRC license examination. The experience is gained by both academic classroom and actual in-plant observation. Current plans are to use Georgia Power Company's Hatch Plant as the principle observation site; however, other plants will be used if the need arises.

Supervision for this portion of the cold license training program will be the responsibility of GSU. The training consists of the following:

1. Routine processing/indoctrination

2. In-plant tours (following classroom reviews)

3. Site tour

4. Systems reviews

5. Equipment arrangements

6. Containment design

7. Control room review

81. Specific operating characteristics of the reactor and auxiliary system

82. Effects and causes of system changes

83. Fuel handling and core parameters

84. Fuel handling and loading

85. Core loading procedures and limitations

86. Fuel transfer and storage

87. Fuel characteristics

88. Fuel handling personnel requirements

89. Administrative procedures and controls

90. Administrative, procedural, and regulatory items affecting facility operations

91. Design and operating considerations

92. Facility license considerations

93. EMERGENCY DIESEL GENERATOR OPERATIONS

Personnel attending this phase consists of those listed in Section 13.2.1.1.4.

13.2.1.1.10 Prelicense Examination (B3)

This service consists of actual written and oral examinations closely adhering to NRC methods and practices. These examinations will be completed prior to certification of competency of an individual to the NRC. Examinations are critiqued and reviewed with GSU management as part of this service.

These examinations will be administered by a qualified outside agent experienced in this area.

Personnel participating in this phase of the training will consist of any license candidate who has not been previously licensed on a commercial reactor.

13.2.1.1.11 Fire Protection Training

Fire protection training consists of training in three specific areas:

13.2.1.3 Training Programs for Nonlicensed Personnel

Professional, supervisory, and technical personnel receive training necessary to satisfy requirements for their positions. This training will consist of formal classroom presentations coupled with on-the-job training. Vendor training will be utilized to provide additional knowledge on specific tasks.

INSERT ⟶

13.2.1.3.1 BWR Technology Training (B7) - Length 4 Weeks

This course provides BWR plant technical and maintenance personnel with the design and operating details of the balance of plant systems at the River Bend Station.

The course will be taught by NUS Corporation (or other training contractor firm). Subject matter includes but is not limited to:

1. Turbine
2. Turbine auxiliary systems
3. Generator
4. Generator auxiliary systems
5. Condensate system
6. Feedwater system
7. Condensate demineralizer system
8. Auxiliary steam system
9. Leak detection system
10. Circulating water system
11. Condenser air removal system
12. Service water systems
13. Feedwater heaters
14. Extraction steam system
15. Floor and equipment drain system
16. AC electrical distribution

Insert for Page 13.2-32

. Maintenance and Technical Training Programs

The training programs for Mechanical, Electrical, I&C, Chemistry, and Radiation Protection personnel are developed from a job performance task analysis and updated from post training performance feedback. The exact course content and course length for each discipline will change as a result of that feedback. The approximate general course outlines are as indicated.

Mechanical Maintenance Training

1. Hand Tools
2. Measurement Tools
3. Valves
4. Pumps
5. Air Compressors
6. Bearings
7. Lubrication
8. Boiler Maintenance
9. Resurfacing Techniques
10. Cutting Tools
11. Heat Exchangers
12. Print Reading
13. Piping and Pipe Fittings
14. Shock and Expansion Devices
15. Steam Traps
16. Insulation
17. Centrifugal Pumps
18. Positive Displacement Pumps
19. Coupling and Alignment
20. DIESEL THEORY, CONTROLS, SUPPORT SYSTEMS AND PREVENTATIVE MAINTENANCE

Electrical Maintenance

1. Fundamentals of Electricity
2. Batteries, Generators and Motors (INCLUDING EMERGENCY DIESEL GENERATORS)
3. Transformers and Control Mechanisms
4. A.C. Motor Control Maintenance
5. Breakers
6. Electrical Safety
7. Cables and Conductors
8. Electrical Test Equipment
9. Electromagnetism
10. Switchgear
11. Special Termination and Penetrations
12. Safety in Electrical Maintenance

I&C Technician Training

1. Mathematics
2. Mechanics
3. Heat Transfer
4. Chemistry
5. Reactor Technology
6. Instrument and Control Technology
7. Electrical Theory

8. Electronic Theory
9. Digital Electronics
10. Troubleshooting
11. Maintenance and Repair
12. Test Equipment
13. Print Reading
14. Analog process control
15. Hand tools
16. Radiation detection
17. Plant Specific Training
18. Instrument and Control Devices
19. Procedures

<u>Chemistry Technician Training</u>

1. General Chemistry Theory
2. Routine Sampling Requirements
3. Post-Accident Sampling Requirements
4. Photometric Analysis Methods
5. Gravimetric Analysis Methods
6. Volumetric Analysis Methods
7. Specific Ion Probe Analysis Methods
8. Chromatographic Analysis Methods
9. Radioanalysis Analysis Methods
10. Chemical Process Theory

<u>Radiation Protection Technician Training</u>

1. Atomic Theory
2. Exposure Control
3. Biological Effects of Radiation
4. Survey Requirements
5. Contamination Control
6. Instrument Calibration
7. Post-Accident Exposure
8. Waste Management

ENCLOSURE 2

8.3.1.1.3.6.1 Standby Diesel Generators

8.3.1.1.3.6.1.1 Description

Each standby diesel generator is physically independent, located in a building structure designed to withstand earthquakes and to protect the standby diesel generators against tornadoes, floods, hurricanes, and tornado-generated missiles (Section 3.8). Within the protected structure, each standby diesel generator, including its associated starting equipment and other auxiliaries, is installed in a separate room of a Seismic Category I building so that an incident at one generator will not physically or electrically involve the others. Each standby diesel generator is provided with a separate missile-protected combustion air intake, room air intake and discharge, and diesel engine exhaust opening.

Seismic qualification of the standby diesel generators and associated equipment is discussed in Sections 3.9.2.2A and 3.10A. ~~Environmental qualification is discussed in Section 3.11 and in the separate Environmental Qualification Document (EQD)~~. In addition, the standby diesel generators can provide full rated load when subjected to extreme atmospheric conditions, e.g., due to a hurricane or tornado. The probability of a tornado striking a point on the site is low, about once in 3,415 yrs (Section 2.3.1.2.4). 13

Each standby diesel generator is provided with an independent fuel oil system consisting of a day tank with fuel capacity for 1-hr minimum operation at required load, and one 100 percent capacity Class 1E fuel oil transfer pump for automatically filling the day tank from its respective storage tank. One fuel oil storage tank for each standby diesel generator supplies fuel for continuous operation at its rated capacity for 7 days (Section 9.5.4).

Each standby diesel generator unit is provided with two independent and redundant air starting systems with separately powered air compressors to furnish air for automatic and manual starting. The starting systems for each standby diesel generator includes electrically driven compressors, primary air tanks, reserve air tanks, and necessary gears and valves for cranking the engine. The two starting systems (the HPCS diesel's air compressors are described in Section 8.3.1.1.3.6.2) are arranged so that failure of one will not jeopardize proper operation of the other. Each train of the starting system is capable of at least eight cranking cycles without the assistance of outside power. The time required by each air compressor to system associated with that generator. Safety-related piping and valves subject to freezing are electrically heat traced and thermally insulated.

The standby diesels for 1EGS*EG1A and 1EGS*EG1B are Transamerica Delaval Inc. type DSR 48 and provide 4889 bhp in continuous duty. The synchronous generators were manufactured by Parsons Peebles Electric Products ~~Division Porter~~ Inc.

The rating of each standby diesel generator is determined from plant design and power requirements and has the capability to ensure proper starting and operation of all required motor loads without excessive frequency or voltage drop. The rating of each of the standby diesel generators is based on the maximum required coincident loads during the unit design basis accident (DBA) in accordance with Regulatory Guide 1.9, except for the HPCS diesel. The philosophy applicable to the sizing of the HPCS diesel is defined in Section 8.3.1.1.3.6.2.

The rating of the standby diesel generator sets are as follows:

Standby Diesel Generator 1EGS*EG1A	Standby Diesel Generator 1EGS*EG1B	Time (hr)
3,500 kW	3,500 kW	8,760
3,850 kW	3,850 kW	2

The 8,760-hr rating is on continuous duty under normal maintenance. The diesel generators are capable of supplying 10 percent in excess of their 8,760 hr rating, at rated voltage and frequency for any 2 hours out of any 24 consecutive hours of operation.

13 ~~No derating is required for operation of the standby diesel generators for ambient temperatures up to 125°F or for ambient atmospheric pressures down to 20.58 in. Hg absolute (10.1 psia).~~ REPLACE WITH INSERT A

The standby generator and the 4.16-kV preferred station service system are manually synchronized during periodic testing or upon restoration of preferred power. If any safety-related switching equipment fails to operate automatically, manual operation is possible, remotely in the main control room or at the standby diesel generator control room. Except for sensors and other equipment that must be directly mounted on the engine or associated piping, the controls and monitoring instrumentation are installed on free-standing floor-mounted panels located in a vibration-free floor area.

INSERT A

The standby diesel generators are specified to provide their rated output for combustion air temperatures ranging from 2 F to 110 F.

No derating is required for ambient atmospheric pressures down to 20.58 inches Hg - absolute (10.1 psia). Humidity extremes are not expected to affect the operation of the standby diesel generators since the intake air is compressed and heated in the turbochargers prior to entering the engines.

The standby diesel generators are capable of running unloaded for 7 days without degrading the performance or reliability of the engine. The manufacturer has demonstrated this capability with a special no load endurance test.

8.3.1.1.3.6.2 High Pressure Core Spray Power Supply System

8.3.1.1.3.6.2.1 Description

Fig. 8.3-3 shows the HPCS power system (Division III) simplified one-line diagram electrical arrangement, power distribution, protective relaying, and instrumentation for the HPCS power system.

The HPCS power supply system is self-contained except for the initiation signal source and access to the preferred source of offsite power through the plant ac power distribution system. It has a dedicated diesel generator, 1E22*S001G1C and is operable as an isolated system independent of electrical connection to any other system.

The HPCS diesel IE21*S001G1C is a Stewart and Stevenson EMD 20645-E4, 20-cylinder vee type. It provides 3600 bhp in continuous duty. The synchronous generator was manufactured by Ideal. This SM-100 model has an 8,760-hr rating of 2600 kW, and a 2,000-hr rating of 2850 kW.

Seismic qualification of the HPCS diesel generator and associated equipment is discussed in Section 3.9.2.2B and INSERT A 3.10B. ~~Environmental qualification is discussed in Section 3.11 and in the separate Environmental Qualification Document (EQD)~~. 13

The standby auxiliary equipment such as heaters, air compressor, and battery charger are supplied from the same power source as the HPCS motor.

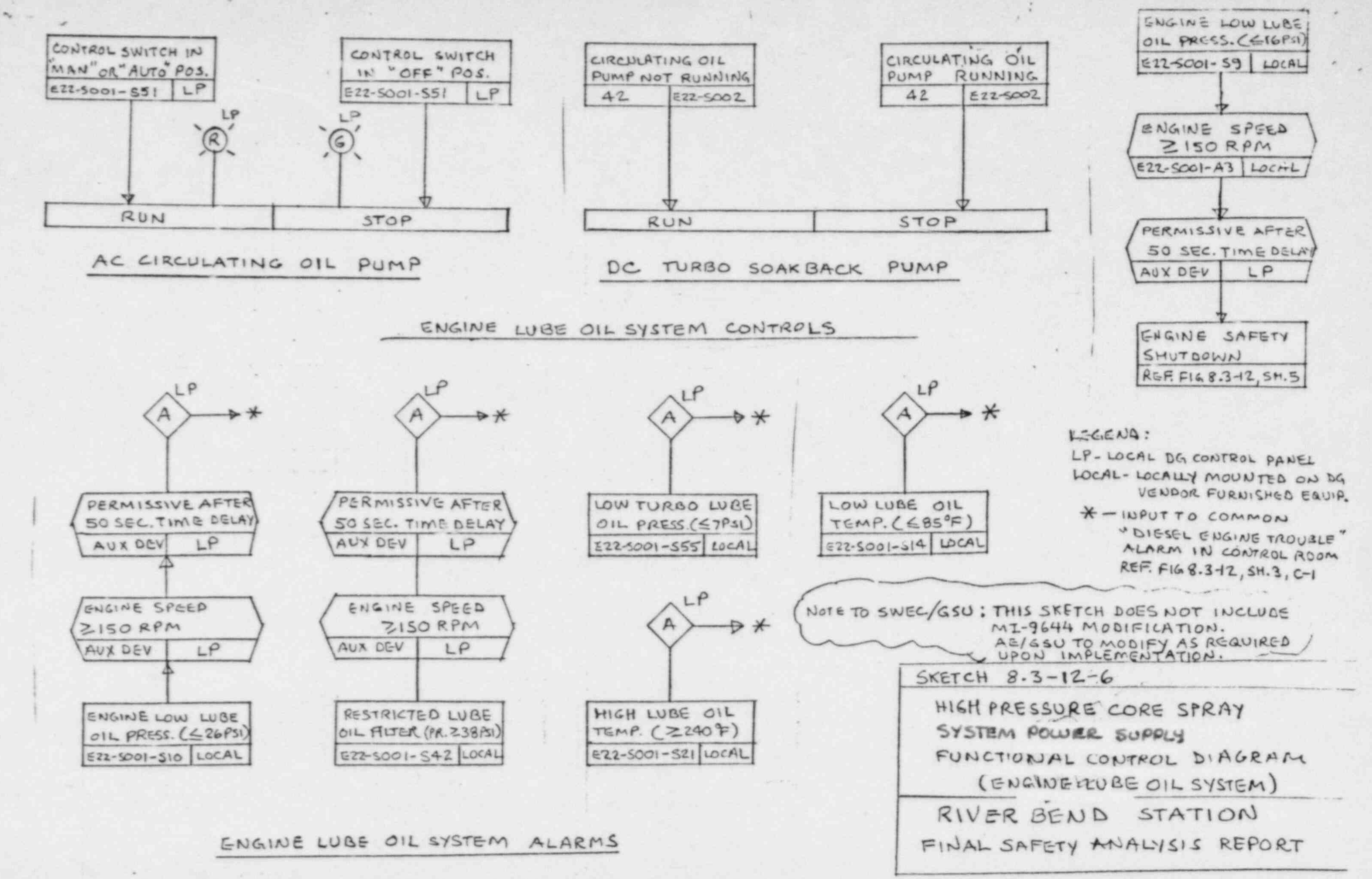
Voltage and frequency of the HPCS diesel generator is compatible with that available from the plant ac power system.

The HPCS diesel generator has the capability to restore power quickly to the HPCS bus in the event offsite power is unavailable and to provide all required power for the startup and operation of the HPCS system. The HPCS diesel generator starts automatically on a LOCA signal from the plant protection system or the HPCS supply bus undervoltage, and will be automatically connected to the HPCS bus when the plant preferred ac power supply is not available. The

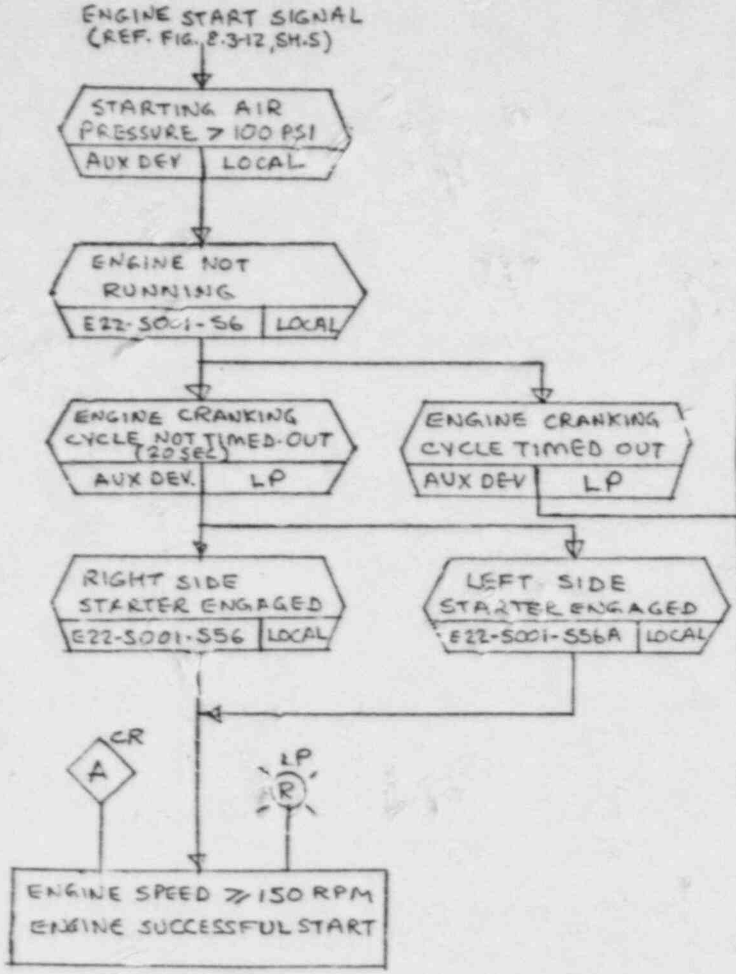
INSERT A

In addition, the HPCS diesel generator can provide full rated load when subjected to extreme atmospheric conditions. No de-rating is required for operation in ambient temperatures up to 120 F, a relative humidity of 90% and an atmospheric pressure down to 28.25 inches Hg. Low combustion air temperatures do not affect the operability of the HPCS diesel generator since the intake air is compressed and heated in the turbo-charger prior to entering the engine .

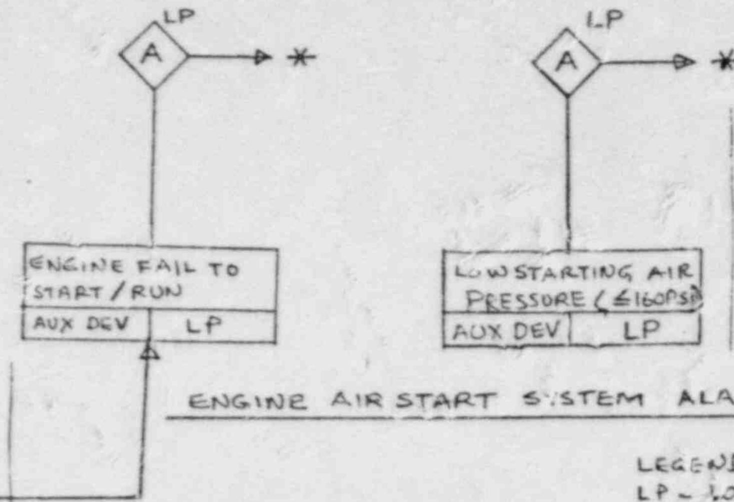
ENCLOSURE 3



CONTROL SWITCH IN "MAN" OR "AUTO" POS.
E22-S001-S51
LP
R
G
CONTROL SWITCH IN "OFF" POS.
E22-S001-S51
LP
RUN
STOP
AC CIRCULATING OIL PUMP
CIRCULATING OIL PUMP NOT RUNNING
42
E22-S002
CIRCULATING OIL PUMP RUNNING
42
E22-S002
RUN
STOP
DC TURBO SOAKBACK PUMP
ENGINE LOW LUBE OIL PRESS. (≤16PSI)
E22-S001-S9
LOCAL
ENGINE SPEED ≥150 RPM
E22-S001-A3
LOCAL
PERMISSIVE AFTER 50 SEC. TIME DELAY
AUX DEV
LP
ENGINE SAFETY SHUTDOWN
REF. FIG 8.3-12, SH.5
ENGINE LUBE OIL SYSTEM CONTROLS
A
*
PERMISSIVE AFTER 50 SEC. TIME DELAY
AUX DEV
LP
ENGINE SPEED ≥150 RPM
AUX DEV
LP
ENGINE LOW LUBE OIL PRESS. (≤26PSI)
E22-S001-S10
LOCAL
PERMISSIVE AFTER 50 SEC. TIME DELAY
AUX DEV
LP
ENGINE SPEED ≥150 RPM
AUX DEV
LP
RESTRICTED LUBE OIL FILTER (PR. ≥38PSI)
E22-S001-S42
LOCAL
LOW TURBO LUBE OIL PRESS. (≤7PSI)
E22-S001-S55
LOCAL
HIGH LUBE OIL TEMP. (≥240°F)
E22-S001-S21
LOCAL
LOW LUBE OIL TEMP. (≤85°F)
E22-S001-S14
LOCAL
LEGEND:
LP - LOCAL DG CONTROL PANEL
LOCAL - LOCALLY MOUNTED ON DG VENDOR FURNISHED EQUIP.
* - INPUT TO COMMON "DIESEL ENGINE TROUBLE" ALARM IN CONTROL ROOM REF. FIG 8.3-12, SH.3, C-1
NOTE TO SWEC/GSU: THIS SKETCH DOES NOT INCLUDE MI-9644 MODIFICATION. AE/GSU TO MODIFY AS REQUIRED UPON IMPLEMENTATION.
ENGINE LUBE OIL SYSTEM ALARMS
SKETCH 8.3-12-6
HIGH PRESSURE CORE SPRAY SYSTEM POWER SUPPLY FUNCTIONAL CONTROL DIAGRAM (ENGINE LUBE OIL SYSTEM)
RIVER BEND STATION
FINAL SAFETY ANALYSIS REPORT



ENGINE AIR STARTING SYSTEM



ENGINE AIR START SYSTEM ALARMS

LEGEND:
LP – LOCAL DG CONTROL PANEL
LOCAL – LOCALLY MOUNTED ON DG VENDOR FURNISHED EQUIPMENT
* – INPUT TO COMMON "DIESEL ENGINE TROUBLE" ALARM IN CONTROL ROOM REF. FIG. 8.3-12, SH.3, C-1

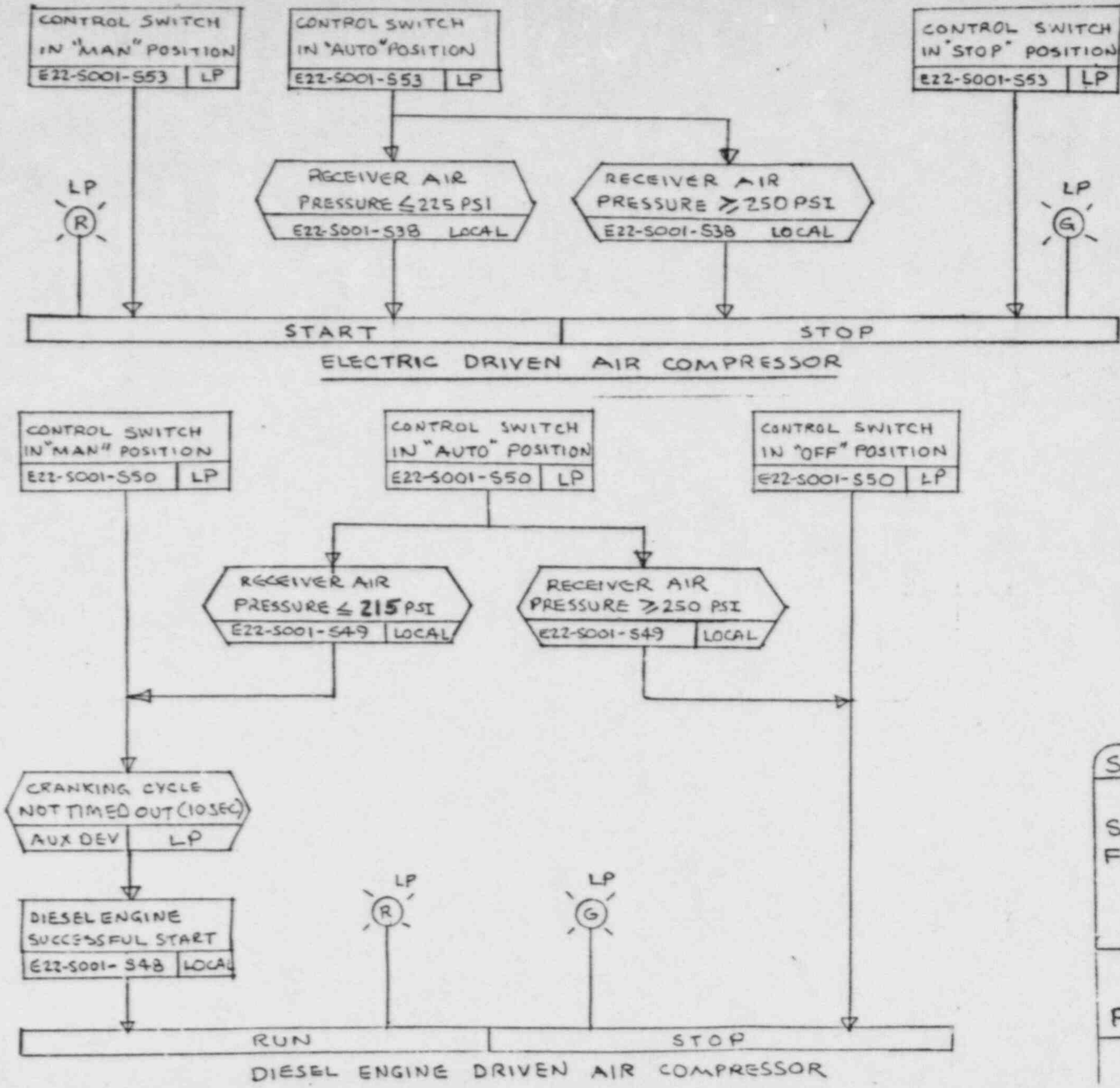
SKETCH 8.3-12-7

HIGH PRESSURE CORE SPRAY SYSTEM POWER SUPPLY FUNCTIONAL CONTROL DIAGRAM

(ENGINE AIR START SYSTEM)
PART 1 OF 2

RIVER BEND STATION

FINAL SAFETY ANALYSIS REPORT



LEGEND:

LP - LOCAL DG CONTROL PANEL

LOCAL - LOCALLY MOUNTED ON DG VENDOR FURNISHED EQUIPMENT.

SKETCH 8.3-12-8

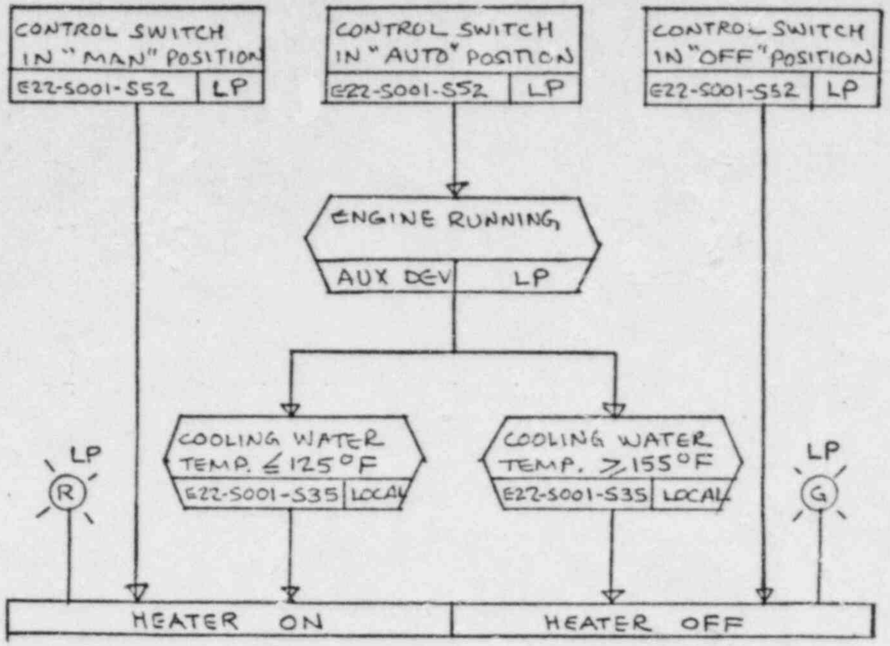
HIGH PRESSURE CORE SPRAY SYSTEM POWER SUPPLY FUNCTIONAL CONTROL DIAGRAM

(ENGINE AIR START SYSTEM)

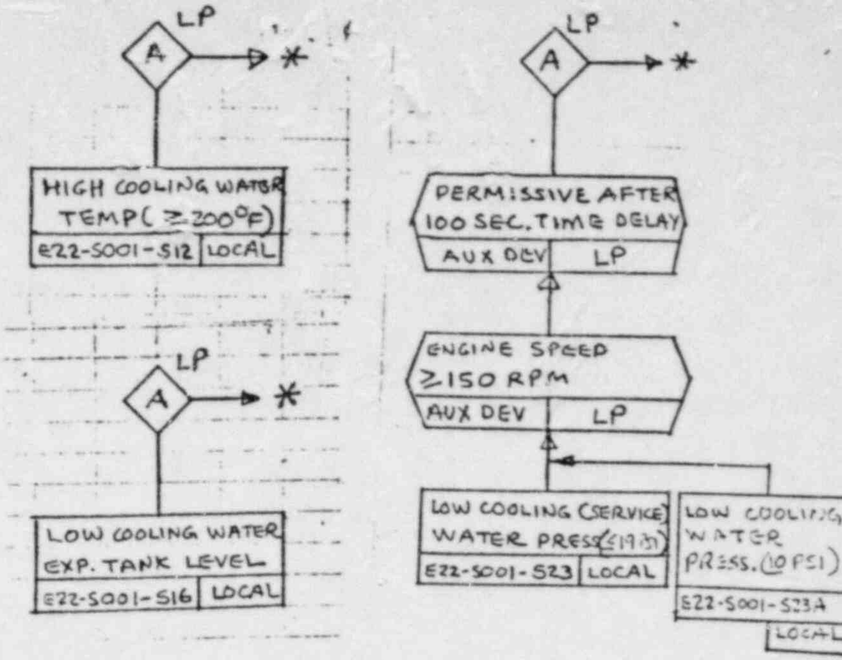
PART 2 OF 2

RIVER BEND STATION

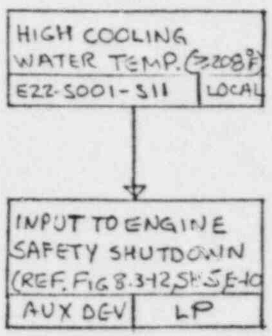
FINAL SAFETY ANALYSIS REPORT



COOLING WATER IMMERSION HEATER



COOLING WATER SYSTEM ALARMS



LEGEND:

LP - LOCAL DG CONTROL PANEL

LOCAL - LOCALLY MOUNTED ON DG VENDOR FURNISHED EQUIPMENT

* - INPUT TO COMMON "DIESEL ENGINE TROUBLE" ALARM IN CONTROL ROOM REF. FIG. 8.3-12, SH.3, C-1

SKETCH 8.3-12-9

HIGH PRESSURE CORE SPRAY SYSTEM POWER SUPPLY FUNCTIONAL CONTROL DIAGRAM (ENGINE COOLING WATER SYSTEM)

RIVER BEND STATION

FINAL SAFETY ANALYSIS REPORT

ENCLOSURE 4

continuous operation at full rated load. Any loss of water is noticed through routine checks of the standpipe sight glass. Jacket water low level is alarmed in the standby diesel generator control room, and activates a common 13
trouble alarm in the main control room to alert the operator of abnormal conditions. Makeup water, if needed, is provided from the makeup water system (Section 9.2.3 and Figure 9.2-3b).

The HPCS DGCWS is a completely self-contained closed loop, 13
with an expansion tank. The DGCWS can be vented to ensure that the entire system is filled with water. Surfaces of 3
vent lines in contact with water will resist corrosion because the water used is demineralized and treated. Each time the engine is run all parts of the cooling system are 13
wetted with a borate-nitrite inhibitor that provides a protective coating inside the pipes. Running the engine once a month will provide adequate corrosion protection, and no decrease in cooling system life is anticipated. This design precludes piping exposure to air and its associated corrosion.

The HPCS cooling water system provides a total cooling water capacity of approximately 318 gallons which is adequate to maintain the required pump NPSH. The system does not require makeup water unless it is lost through seepage, leakage, or the pressure relief cap. Any loss of water is 11
noticed through routine checks of the expansion tank sight glass during shutdown of the diesel generator and is manually replaced when necessary through the filler opening at the top of the expansion tank. ~~However~~, No makeup needs are anticipated for seven days continuous operation of the HPCS diesel engine at full rated load. INSERT A

The HPCS diesel generator cooling water system has a built-in provision to assure all components and piping are completely filled with water by having two system high point vents, one coming off the manifold, and the other coming off the water side of the lube oil cooler. These high point vents are attached directly to the cooling water expansion 7
tank to maintain the closed system. In addition, there is a low positive pressure in the system from the engine driven water circulating pump, which helps drive out any entrapped air in the system. Thus, the air is purged from the system piping once the engine is running and attains rated speed.

The venting of air from the cooling water system does not delay the starting of the diesel generator.

Upon a cold start, if any air is pushed out of the manifold, 11
before it can be vented to the expansion tank, it travels to the top of the lube oil cooler where a second line vents to

INSERT A

In the event that continous operation exceeds seven days and cooling water is needed, the makeup water may be added by a pressurized source connecting to the cooling water drain connection (Fig. 9.5-3b). Makeup cooling water is added slowly to the cooling water system to avoid thermal shock.

ENCLOSURE 5

ASME SECTION III, CLASS 3 vs. ANSI B31.1

The HPCS Diesel Generator auxiliary systems have been designed as described in FSAR text Section 9.5 and Table 3.2-1. Specifically, the components and piping systems are designated Seismic Category I and are designed either to ASME Section III Class 3 or ANSI B31.1 requirements. Utilization of the codes described above meets Regualtory Guide 1.26 which requires the design and associated quality requirements be based on the importance to safety of the plant. There are few technical differences between ANSI B31.1 and ASME Section III, Class 3 as reflected in the following table. Specifying all safety class auxiliaries as Seismic Category I and requiring qualification and pre-operational testing further reduces these differences. Conservative design pressures were utilized in the auxiliary systems piping design. Verification that correct piping and component materials were used (material certification) during the manufacturing process should eliminate the need for actual mill test reports for piping. The discussion following the table specifically delineates the differences between the two codes and River Bend Station's specific design for each of the diesel engine auxiliary systems.

RBS considers that an acceptable alternative, which provides an equivalent level of design and quality as ASME Section III Class 3 requirements, has been provided in its HPCS diesel generator auxiliary systems design.

ASME Section III, Class 3	ANSI B31.1
1) Requires ASME materials and mill test reports for piping.	1) Requires only material certifications.
2) Requires seismic design in addition to the B31.1 requirements.	2) Requires design for pressure, temperature, and normal operating loads.
3) Requires liquid penetrant examination for welds over 4" IPS.	3) Requires only visual inspection of welds for design pressure and temperatures of the auxiliaries.
4) Requires hydrostatic test to 1.25 x design pressure.	4) Requires initial service leak test.

The diesel generator auxiliaries are separated into three different segments for design and manufacture, as described in FSAR Section 9.5.

a) The auxiliaries that are supplied as a part of the diesel engine skid and diesel starting air skid.

b) The fuel oil storage tanks and day tanks (provided by a tank fabricator).

c) The piping that connects the DSA skid with the engine skid, fuel oil storage tanks and day tank to the engine skid, the cooling service water to the cooling water heat exchanger and the diesel engine air intake and exhaust.

A discussion of each segment follows:

a) Diesel Engine and Diesel Starting Air (DSA) Skid

The engine-mounted piping and components of the fuel oil, engine cooling water (except heat exchangers - ASME Section III, Class 3), starting air and lubricating oil systems are seismically qualified to Seismic Category I requirements as part of the diesel engine skid. These systems, furnished with the engine, are the standard systems developed by the engine manufacturer in accordance with DEMA standards, and have a long history of service and reliability. These systems, piping, and components, are designed, fabricated, inspected, installed, examined, and tested in accordance with the guidelines and requirements of ASNI B31.1.

It should be also noted that it is not possible to obtain all auxiliary components to ASME Section III, Class 3 requirements. For example, the diesel oil pump, lubricating oil pump, filters and flex hoses could not be purchased to ASME Section III, Class 3, since they are unique to engine component manufacturers, which do not manufacture to ASME Section III, Class 3 requirements.

For the engine skid and DSA-skid, the technical differences between ANSI B31.1 and ASME Section III, Class 3 are reduced by the specification of Seismic Category I and RBS's intent to perform a system pressure test in accordance with the hydrostatic test parameters specified in ASME Section III, Class 3. The technical differences are delineated in the following paragraph, formatted consistent with the above table. (Technical differences are distinguised from the Section III, Class 3 administrative requirements in that a technical difference will result in a difference in construction, whereas an administrative requirement provides additional paper evidence the work was done in accordance with the Code.)

1) By invoking ANSI B31.1, RBS has received material certification (certificates of compliance) for the skid-mounted piping components and piping. Mill test reports for piping as required by ASME Section III cannot be obtained.

2) By specifying the skids to be Seismic Category I, the skids and auxiliaries on them will withstand a seismic event.

3) The only piping on the diesel engine skids that is over 4" are the 6" lines between the cooling water heat exchanger, expansion tank, and engine block. These have not been liquid penetrant examined, but will be prior to preoperational testing.

4) The engine auxiliary systems will be at operating pressure for a considerable period of time throughout plant startup testing and thus, will provide a good test of their leak tightness before the

systems are put into operation. Because of the overspecified design pressure of the components and piping, the chance for leakage at other than mechanical joints is low. The expansion tank will be hydrostatically tested at 1.5 times its design pressure.

b) Diesel Oil Storage Tank, Day Tank Supplied by Fabricator

These components are ASME Section III, Class 3.

c) Piping and Components Connecting Skids

The fuel oil piping up to the diesel engine skid, and the cooling water system's piping and components up to the diesel engine heat exchanger, are designed, fabricated, inspected, installed, examined, and tested in accordance with ASME Section III, Class 3 requirements.

The piping connecting the diesel fuel oil storage tank and day tank, is ASME Section III, Class 3. The piping connecting the DSA skid to the engine skid are designed, fabricated, inspected, installed, examined, and tested in accordance with ANSI B31.1 and is designated Seismic Category I. Performance of hydrostatic testing to 1.5 times design pressure will also be accomplished during onsite testing of the auxiliary systems.

Essential components of the starting air system are designed in accordance with the requirements of Section III of the ASME Code. The system is classified Safety Class 3 and Seismic Category I from the check valve upstream of the reciever tanks.

The air intake and exhaust system, including ~~except for~~ the crankcase vent lines and exhaust silencers is also classified Seismic Category I Safety Class 3. Piping and components up to the diesel engine interface, are designed in accordance with ASME Section III Class 3 requirements. For both systems, the ~~time at operating pressure during~~ preoperational testing will be ~~as likely to expose a leak as would occur during operation at the higher, but shorter duration test time of 10 minutes required by~~ equivalent to ASME Section III, Class 3. Therefore, the technical differences between ANSI B31.1 and ASME Section III, Class 3 are largely closed.

ENCLOSURE 6

continuous operation at full rated load. Any loss of water is noticed through routine checks of the standpipe sight glass. Jacket water low level is alarmed in the standby
diesel generator control room, and activates a common 13
trouble alarm in the main control room to alert the operator of abnormal conditions. Makeup water, if needed, is provided from the makeup water system (Section 9.2.3 and Figure 9.2-3b).

The HPCS DGCWS is a completely self-contained closed loop, 13
with an expansion tank. The DGCWS can be vented to ensure
that the entire system is filled with water. Surfaces of 13
vent lines in contact with water will resist corrosion because the water used is demineralized and treated. Each
time the engine is run all parts of the cooling system are 13
wetted with [a borate-nitrite] inhibitor that provides a protective coating inside the pipes. Running the engine once a month will provide adequate corrosion protection, and no decrease in cooling system life is anticipated. This design precludes piping exposure to air and its associated corrosion.

The HPCS cooling water system provides a total cooling water capacity of approximately 318 gallons which is adequate to maintain the required pump NPSH. The system does not require makeup water unless it is lost through seepage,
leakage, or the pressure relief cap. Any loss of water is 11
noticed through routine checks of the expansion tank sight glass and [during shutdown of the diesel generator] is manually replaced when necessary through the filler opening at the top of the expansion tank. ~~However,~~ No makeup needs are anticipated for seven days continuous operation of the HPCS diesel engine at full rated load. ← INSERT A

The HPCS diesel generator cooling water system has a built-in provision to assure all components and piping are completely filled with water by having two system high point vents, one coming off the manifold, and the other coming off the water side of the lube oil cooler. These high point
vents are attached directly to the cooling water expansion 7
tank to maintain the closed system. In addition, there is a low positive pressure in the system from the engine driven water circulating pump, which helps drive out any entrapped air in the system. Thus, the air is purged from the system piping once the engine is running and attains rated speed.

The venting of air from the cooling water system does not delay the starting of the diesel generator.

Upon a cold start, if any air is pushed out of the manifold, 11
before it can be vented to the expansion tank, it travels to the top of the lube oil cooler where a second line vents to

INSERT A

In the event that continous operation exceeds seven days and cooling water is needed, the makeup water may be added by a pressurized source connecting to the cooling water drain connection (Fig. 9.5-3b). Makeup cooling water is added slowly to the cooling water system to avoid thermal shock.

ENCLOSURE 7

QUESTION 430.69 (9.5.4)

Provide a discussion of the testing of the diesel generator fuel oil storage and transfer system controls and instrumentation necessary to maintain and assure a highly reliable system. Define what is meant by "periodically" as it relates to testing of controls and instrumentation.

RESPONSE

The response to this request is provided in revised s
Section 9.5.4.4.

Additionally, control logic for the diesel generator standby power support systems (fuel oil storage and transfer, cooling water, starting, lubrication, and combustion air intake and exhaust systems) is discussed in Section 7.3.1.1.11. The standby and HPCS diesel generator protection systems are described in Sections 8.3.1.1.4.1 and 8.3.1.1.4.2, respectively. These sections identify those instruments and controls located in the diesel generator control room and in the main control room. 11

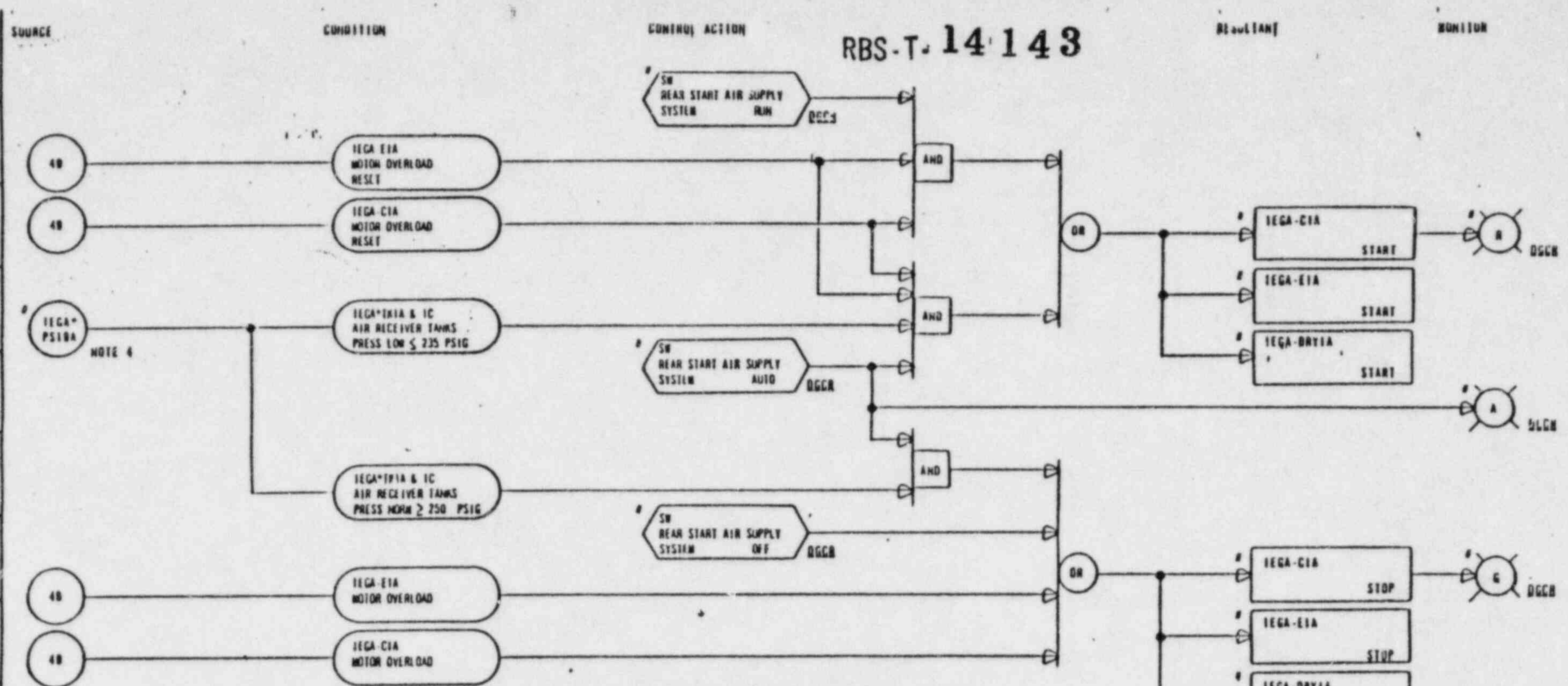
Design criteria and regulatory requirements for calibration,
1.22, setpoint selection, and minimum testing (e.g., Regulatory
Guides 1.108 and 1.118) of Class 1E portions of the standby 1.8,
power support systems are identified in Sections 7.1.2, 7.3.2, 8.1, and 8.3.1. ~~A Periodic~~ Calibration and surveillance of the control and protection systems for standby power support systems will be included in the plant operating procedures. The logic testing will include simulation of abnormal conditions for which the system is required to generate signals, i.e low water temperature, high pressure setpoints, etc. These signals are shown on Figures 7.3-15, 7.3-16, 7.3-17, 7.3-23 sheets 17 through 28 and 8.3-12. (1)

(1) THE CALIBRATION TEST AND SURVEILLANCES WILL BE CONDUCTED AT A MINIMUM EVERY EIGHTEEN (18) MONTHS. MORE FREQUENT TEST AND SURVEILLANCES MAY BE CONDUCTED AS DEEMED NECESSARY FOR THE SPECIFIC INSTRUMENTATION AND CONTROLS

ENCLOSURE 8

ATTACHED TO:

RBS-T-14143



STANDBY DIESEL GENERATOR 1EGS*EG1A, REAR START AIR SUPPLY SYSTEM

NOTES:

1. CONTROL OF STANDBY DIESEL GENERATOR 1EGS*EG1A REAR START AIR SYSTEM IS SHOWN. CONTROL OF 1EGS*EG1A FORWARD START AIR AND 1EGS*EG1B, REAR AND FORWARD START AIR SUPPLY SYSTEMS IS SIMILAR.
2. ASSOCIATED EQUIPMENT IDENTIFICATION NUMBERS:

1EGS*EG1A REAR	1EGS*EG1A FORWARD	1EGS*EG1B REAR	1EGS*EG1B FORWARD
1EGA-C1A	1EGA-C2A	1EGA-C1B	1EGA-C2B
1EGA*PS18A	1EGA*PS20A	1EGA*PS19B	1EGA*PS20B
1EGA*TK1A	1EGA*TK2A	1EGA*TK1B	1EGA*TK2B
1EGA*TK1C	1EGA*TK2C	1EGA*TK1D	1EGA*TK2D
1EGA-E1A	1EGA-E2A	1EGA-E1B	1EGA-E2B
1EGA-DRY1A	1EGA-DRY2A	1EGA-DRY1B	1EGA-DRY2B

3. # DENOTES EQUIPMENT BY DIESEL GENERATOR VENDOR.
4. EQUIPMENT IS STRUCTURALLY QA CAT I ONLY.

DOCUMENT USER
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LISTING FOR CHANGES

NUCLEAR SAFETY RELATED
QA CAT I & II

LOGIC DIAGRAM
AIR START-UP STANDBY DIESEL GENERATOR
RIVER BEND STATION - UNIT 1
GULF STATES UTILITIES COMPANY
STONE & WEBSTER ENGINEERING CORPORATION

12210-LSK-12-4A

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P					OSD	OSD	OSD
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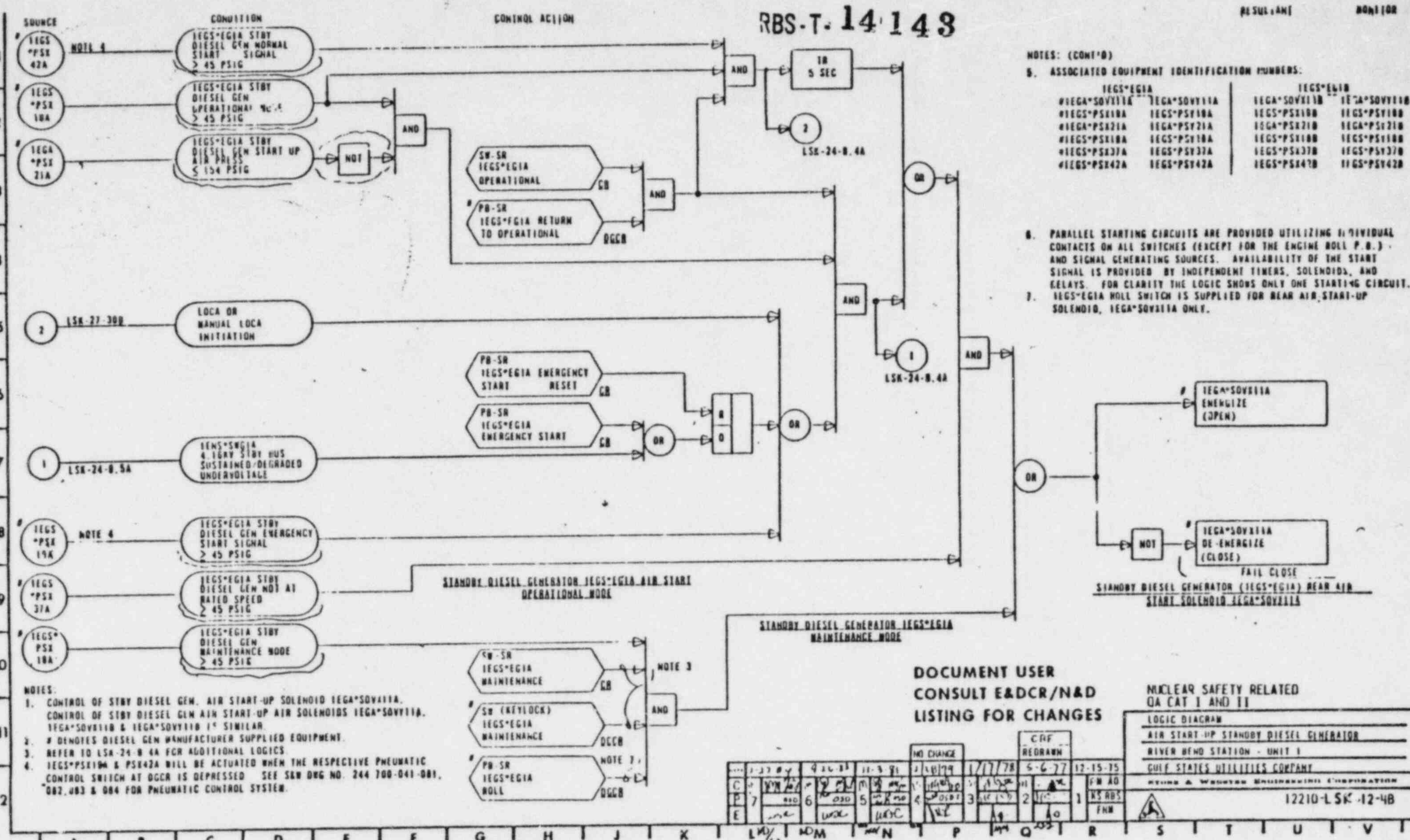

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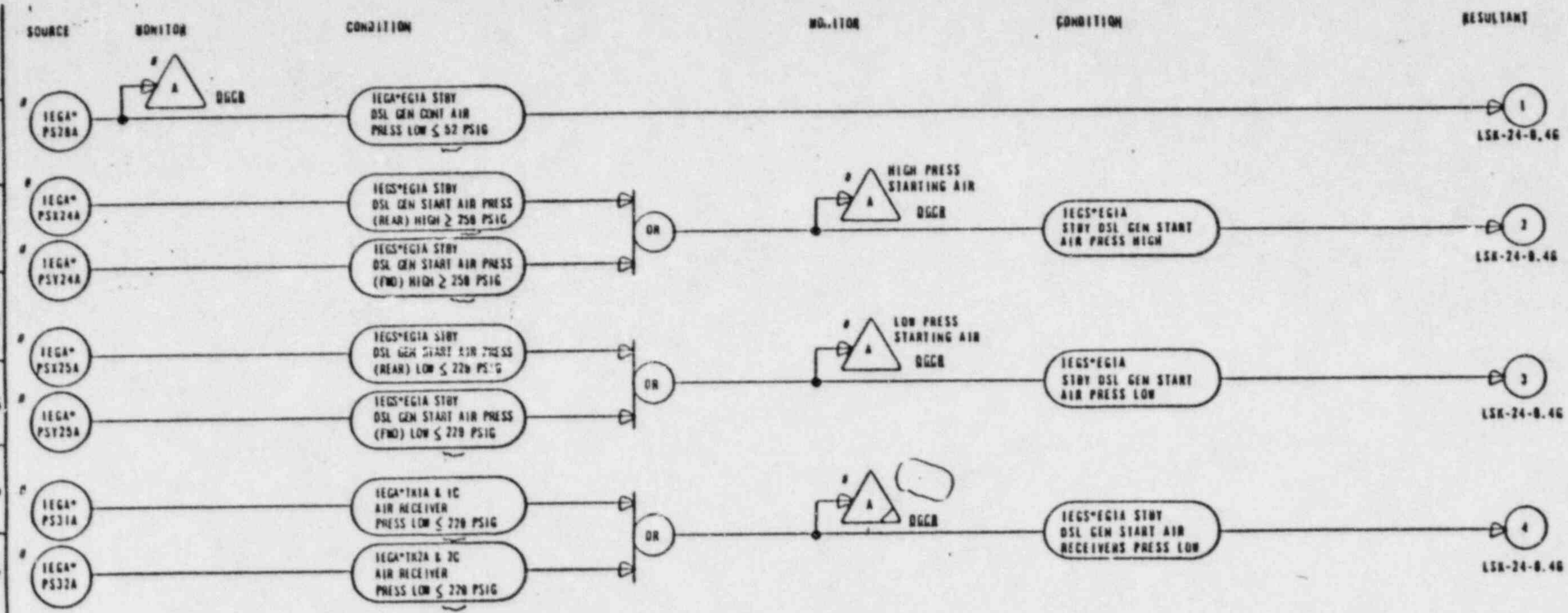

NOTES:

1. STANDBY DIESEL GENERATOR 1EGS*EG1A ALARMS ARE SHOWN. STANDBY DIESEL GENERATOR 1EGS*EG1B ALARMS ARE SIMILAR.
2. # DENOTES DIESEL GEN MANUFACTURER SUPPLIED EQUIPMENT.
3. ASSOCIATED EQUIPMENT IDENTIFICATION:

1EGS*EG1A REAR	1EGS*EG1A FORWARD	1EGS*EG1B REAR	1EGS*EG1B FORWARD
1EGA*PSX24A	1EGA*PSY24A	1EGA*PSX24B	1EGA*PSY24B
1EGA*PSX25A	1EGA*PSY25A	1EGA*PSX25B	1EGA*PSY25B
1EGA*PS31A	1EGA*PS32A	1EGA*PS31B	1EGA*PS32B
1EGA*PS28A		1EGA*PS28B	

DOCUMENT USER
CONSULT E&DCR/N&D
LISTING FOR CHANGES

NUCLEAR SAFETY RELATED
QA CAT I & II

LOGIC DIAGRAM
AIR START-UP STANDBY DIESEL GENERATOR
RIVER BEND STATION-UNIT 1
GULF STATES UTILITIES COMPANY
STONE & WEBSTER ENGINEERING CORPORATION

12210-LSK-12-4C

NO CHG

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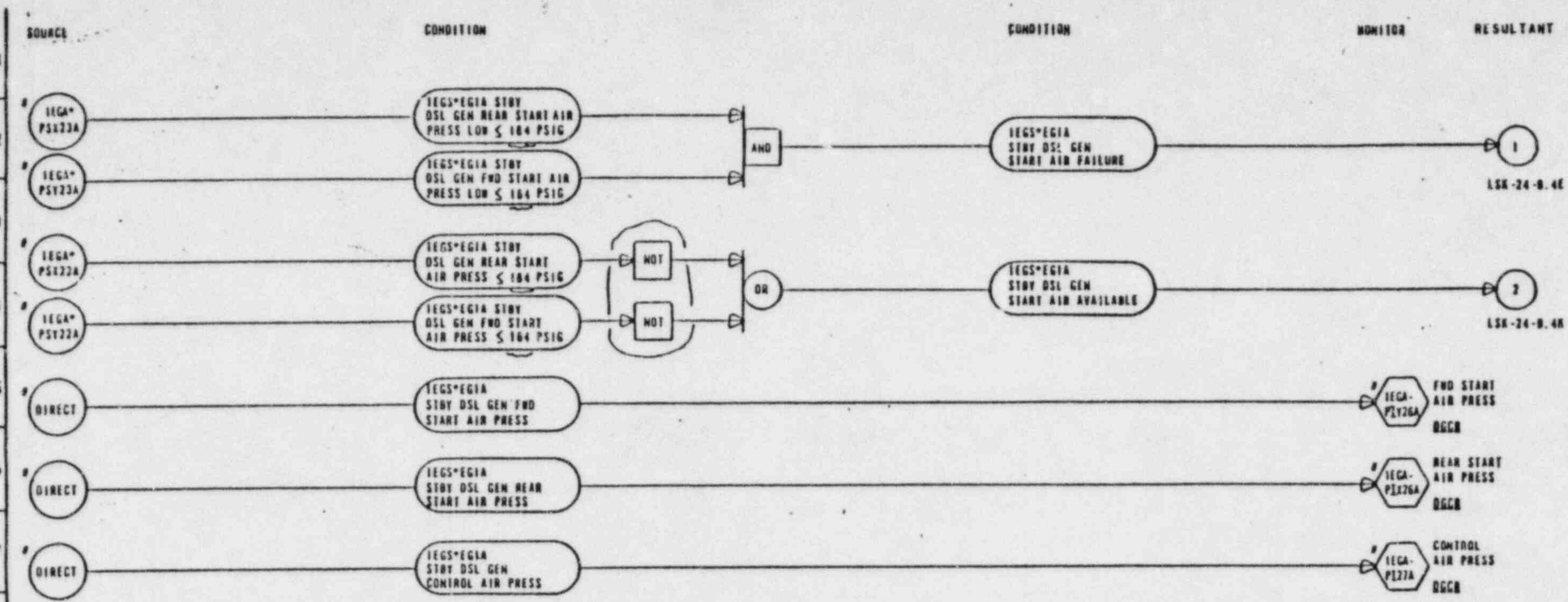

NOTES:

1. STANDBY DIESEL GENERATOR 1EGS*EG1A ALARMS & INDICATORS ARE SHOWN. STANDBY DIESEL GENERATOR 1EGS*EG1B ALARMS & INDICATORS ARE SIMILAR.
2. # DENOTES DIESEL GENERATOR MANUFACTURER SUPPLIED EQUIPMENT.
3. ASSOCIATED EQUIPMENT IDENTIFICATION:

1EGS*EG1A REAR	1EGS*EG1A FORWARD	1EGS*EG1B REAR	1EGS*EG1B FORWARD
1EGA*PSX23A	1EGA*PSY23A	1EGA*PSX23B	1EGA*PSY23B
1EGA*PSX22A	1EGA*PSY22A	1EGA*PSX22B	1EGA*PSY22B
1EGA-PIX26A	1EGA-PIY26A	1EGA-PIX26B	1EGA-PIY26B
1EGA-PI27A		1EGA-PI27B	

DOCUMENT USER
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NUCLEAR SAFETY RELATED
QA CAT I & II

LOGIC DIAGRAM
AIR START-UP STANDBY DIESEL GENERATOR
RIVER BEND STATION UNIT - 1
GULF STATES UTILITIES COMPANY
STONE & WEBSTER ENGINEERING CORPORATION

12210-LSK-12-4D

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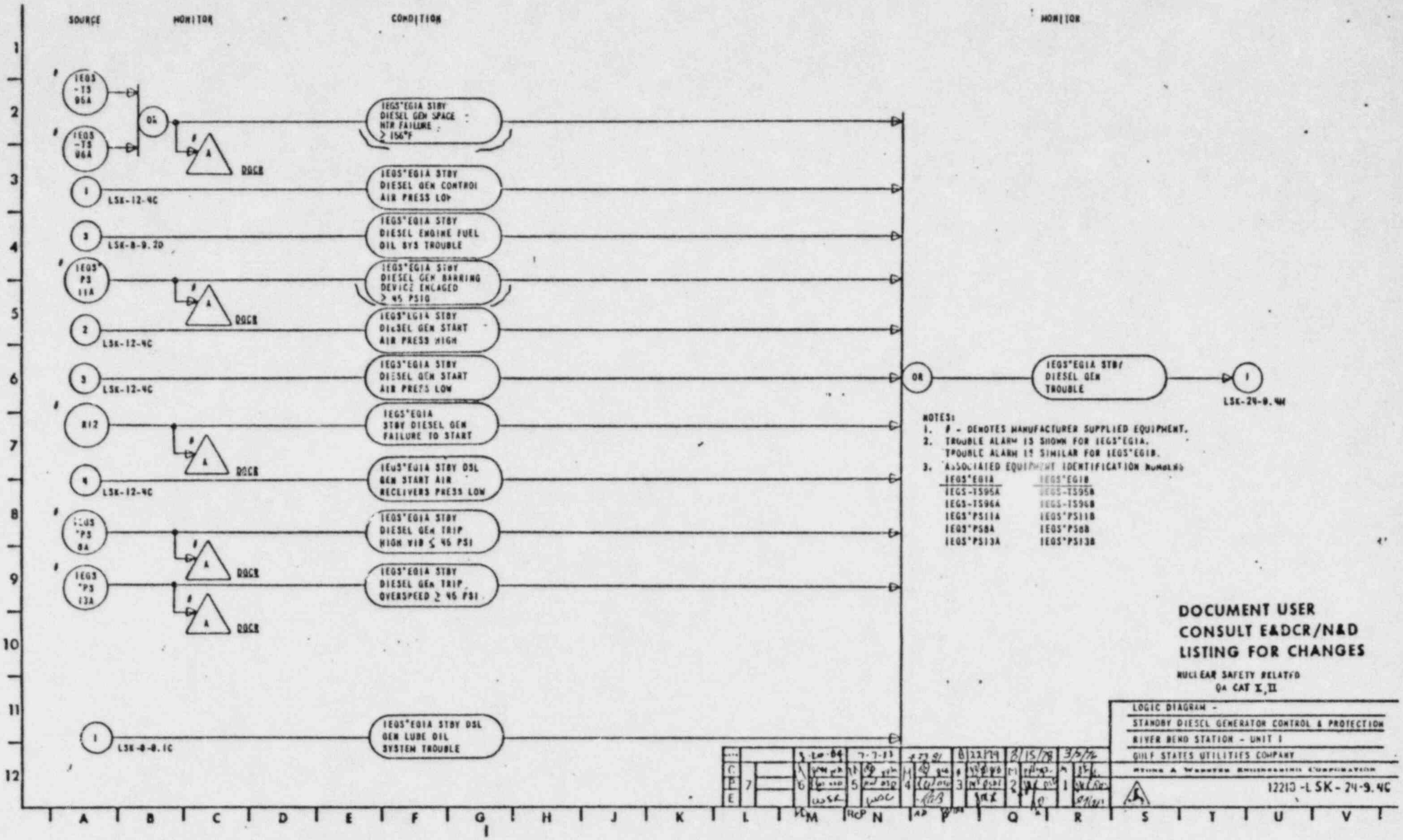

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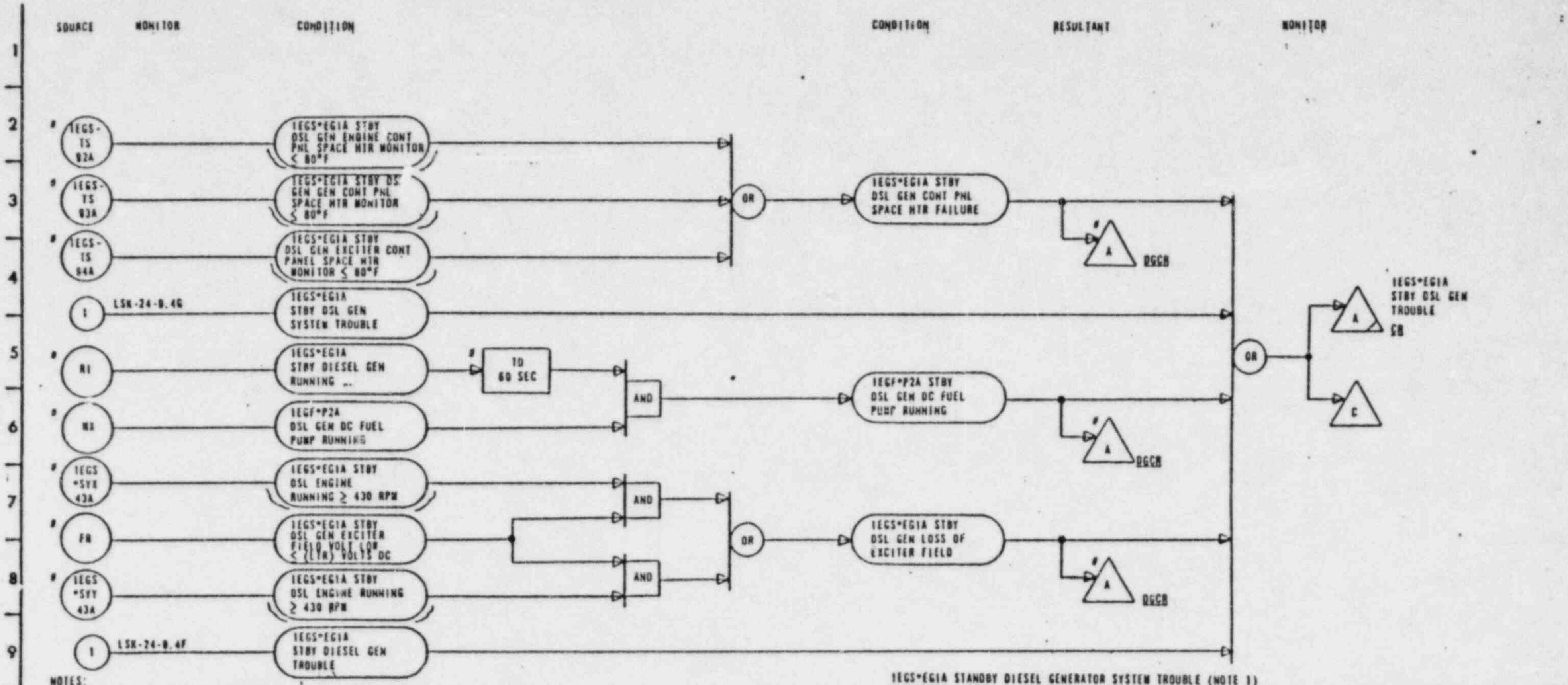


NOTES:

1. TROUBLE ALARM FOR 1EGS*EG1A IS SHOWN. 1EGS*EG1B TROUBLE ALARM IS SIMILAR.
2. # - DENOTES MANUFACTURER SUPPLIED EQUIPMENT.

DOCUMENT USER CONSULT E&DCR/N&D LISTING FOR CHANGES

NUCLEAR SAFETY RELATED
QA CAT I & II

LOGIC DIAGRAM -
STANDBY DIESEL GENERATOR CONTROL AND PROTECTION
RIVER BEND STATION - UNIT 1
GULF STATES UTILITIES COMPANY
STONE & WEBSTER ENGINEERING CORPORATION

12210-LSK-24-9.4M

Nuclear Document Control
MAR 29 1984

ENCLOSURE 9

3. The DGSS is designed so that a single failure of any active or passive component, assuming a loss of offsite power, cannot result in the loss of more than one diesel generator starting system train. 5

4. Piping which forms integral part of the diesel engine is designed in accordance with ANSI Piping Code B31.1. The remainder of the piping is designed in accordance with ASME III, Class 3. The air receivers associated with the DGSS are designed and constructed in accordance with the requirements of ASME Code, Section III, Class 3.

5. Each redundant DGSS train is capable of providing the standby diesel generator with eight starts (five of them are 10 sec starts) from two air receivers without recharging the associated air receivers.

6. The HPCS diesel generator air start subsystem has sufficient capacity to start the diesel generator within 10 seconds five times without recharging, when operated in its normal configuration using both redundant trains through all air start motors, and when initially charged to 215 ~~250~~ psig. ~~The air start system has sufficient air supply to start the engine three times at receiver pressure of 215 psig~~. At this pressure the diesel-driven air compressor is automatically operated to replenish the air supply to 250 psig. 11 13 13

7. The DGSS will be evaluated for the consequences of moderate energy line breaks in accordance with the guidelines given in Section 3.6. The moderate energy lines installed in the diesel generator room are the air start piping and components, and the standby service water piping and components. There are no high energy lines which could affect the system. 7

9.5.6.2 System Description

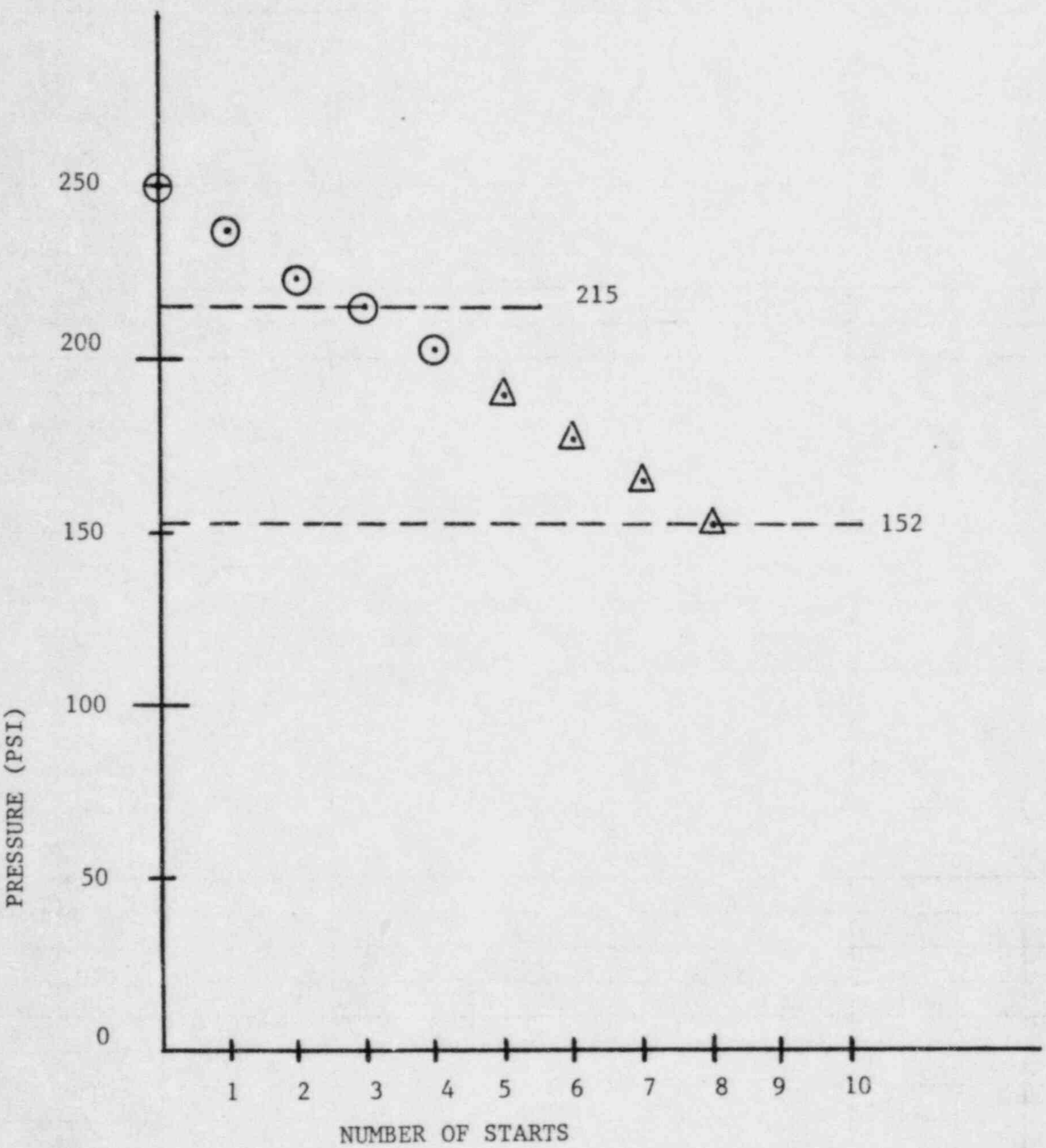
9.5.6.2.1 Standby Diesel Generators

Each DGSS for each standby diesel generator consists of the following major components and associated piping, valves, and controls:

1. Two starting air compressors (nonsafety-related)

ENCLOSURE 10

HPCS DGSS - FIVE START CAPABILITY



△ Extrapolated data points are based on the starting curve trend. Five starts: beginning pressure 215 psi
ending pressure 152 psi

Reference: VPF 5244-55-1 (Perry factory test report)

ENCLOSURE 10

indicating instruments. Battery cells are checked periodically for voltage and specific gravity, while redundant power supplies are isolated for testing to ensure that one does not mask the deficiency of the other. The evacuation alarm signal is tested periodically in accordance with normal station procedures.

9.5.3 Lighting Systems

Lighting systems described in this section include both normal and emergency lighting systems.

9.5.3.1 Design Bases

and the fixtures in the remote shutdown panel rooms,

The station lighting systems provide lighting with power supplied from normal and standby ac sources or from an uninterruptible power system and battery pack systems.
During normal operation, all lighting is supplied from the
5 normal buses, except for 20 percent of the light fixtures in
11 the main control room, which are normally connected to a
standby bus derived from the standby diesel generators. The
loss of offsite power does not affect the normal lighting
5 system. The station lighting systems are designed under the
following bases:

1. The station lighting systems provide lighting intensities at levels recommended by the Illuminating Engineering Society and in accordance with current OSHA requirements.

2. Lighting fixtures are selected with due consideration for environmental conditions and ease of maintenance.

   Fluorescent lamps are used for general lighting throughout the plant with the following exceptions. Incandescent lamps are the only type used within the containment, and in certain areas of the auxiliary, radwaste, and fuel buildings, and in the condensate demineralizer area. Some special quartz-incandescent fixtures are used in the fuel pool and the surrounding area. High-pressure sodium (HPS) lamps are used for high-bay, medium-bay, and roadway lighting. The illumination level and type of fixture to be used in vital and hazardous areas where emergency lighting is needed for safe shutdown of the reactor or the evacuation of personnel in the event of an accident are listed in Table 9.5-2.

5 3. Safety ac lighting, supplied from the normal uninterruptible power system, is provided for

The battery packs are designed to sustain the illumination level for a period of 8 hr. 13

9.5.3.2 System Description

Outdoor area lighting is controlled by light-sensing devices. High-pressure sodium fixtures are used for general yard and roadway lighting. They are supplied by 240-V or 480-V ac, single-phase power. Fluorescent and incandescent fixtures are supplied by 120-V/240-V ac, single-phase, 3-wire power. The station lighting systems are divided into three systems (Fig. 9.5-9):

1. Station lighting System 1 (normal) receives power from the normal service buses of the station service ac power distribution system described in Section 8.3.1.

   In the main control room, the normal ac lighting system feeds approximately 60 percent of ~~a manually controlled backup ac lighting subsystem with approximately 20 percent of~~ the main control room lighting fixtures. 11 Another 20 percent of the ~~These~~ fixtures are ~~can be~~ manually transferable ~~transferred~~ to one of ~~the~~ two available Class 1E buses supplied by a standby 5 diesel generator, which can furnish power for up to 11 7 days. ~~or to a non-Class 1E source of power.~~ It is normally connected to ~~one of~~ the Division II Class 1E bus~~es~~. (Fig. 9.5-9)

2. Station lighting System 2 (safety ac lighting) 5 receives power from the normal uninterruptible power supply (UPS) system and is confined to the main control room. Twenty percent of the total fixtures in the main control room are supplied from System 2.

3. Station lighting System 3 (emergency dc) receives power from the local battery packs, which are normally fed from the normal ac system. Local battery packs are installed in the following areas as indicated in Table 9.5-2: 3

   a. Main control room (egress)

   b. Standby diesel generator building

   c. Class 1E switchgear rooms

   d. Standby service water pump house 13

   e. Class 1E battery rooms

13 h. Means of egress and building exits.

13 5 The main control room and remote shutdown panels are the only areas requiring continuous lighting in excess of 8 hrs, which is provided as described above.

5 In case of failure of the normal ac lighting system, exit signs and means of egress throughout the station are illuminated by System 3. In the event of failure of the normal ac lighting system and a loss of offsite power, portable lighting (battery-powered lanterns) is available for all areas of the plant.

9.5.3.3 Safety Evaluation

In all Seismic Category I structures, the lighting fixtures and conduits are seismically supported. In the main control room, they are seismically supported in accordance with structural requirements for control room design: lighting over the main control and computer areas is supplied from a louvre. All ceiling lighting and fixtures are the fluorescent strip type and are securely mounted above and independent of the louvres. The remaining areas are illuminated by recessed fluorescent fixtures in an acoustical suspended ceiling. The fixtures are double suspended, i.e., from the suspended ceiling and from the structure.

11 All battery packs are a sealed type and are seismically supported. These battery packs are designed to give sustained illumination for 8 hr following a loss of normal power.

13 ~~Because~~ The remote shutdown panel rooms and 20 percent of the main control room fixtures are connected to a Class 1E bus. Special design considerations have been made [for the control room lighting system]. From the Class 1E bus to ~~and including~~ the power receptacle, the

11 circuit is designed as Class 1E with two independent overcurrent protection devices installed in the circuit to ensure protection of the Class 1E portion of the circuits. [INSERT A] From and including the [receptacle and] plug, it is treated as a non-Class 1E system, with additional safety protection as follows:

1. The transformer load is limited to 75 percent of its maximum rating.

INSERT A

The Class 1E portion of the lighting circuit is installed as are other Class 1E circuits, using Class 1E cables installed in seismically-supported conduit. Under any DBE condition, the Class 1E power supply will remain operable. The non-Class 1E portions, such as the receptacles, cables and raceways, are also seismically supported to remain in place and available after a DBE. The light fixtures are seismically installed and utilize lamp slips to ensure their availability under DBE conditions. The lighting transformer and lighting panelboard are seismically qualified will, therefore, remain available to furnish Class 1E power to this portion of the main control room lighting system under DBE conditions.

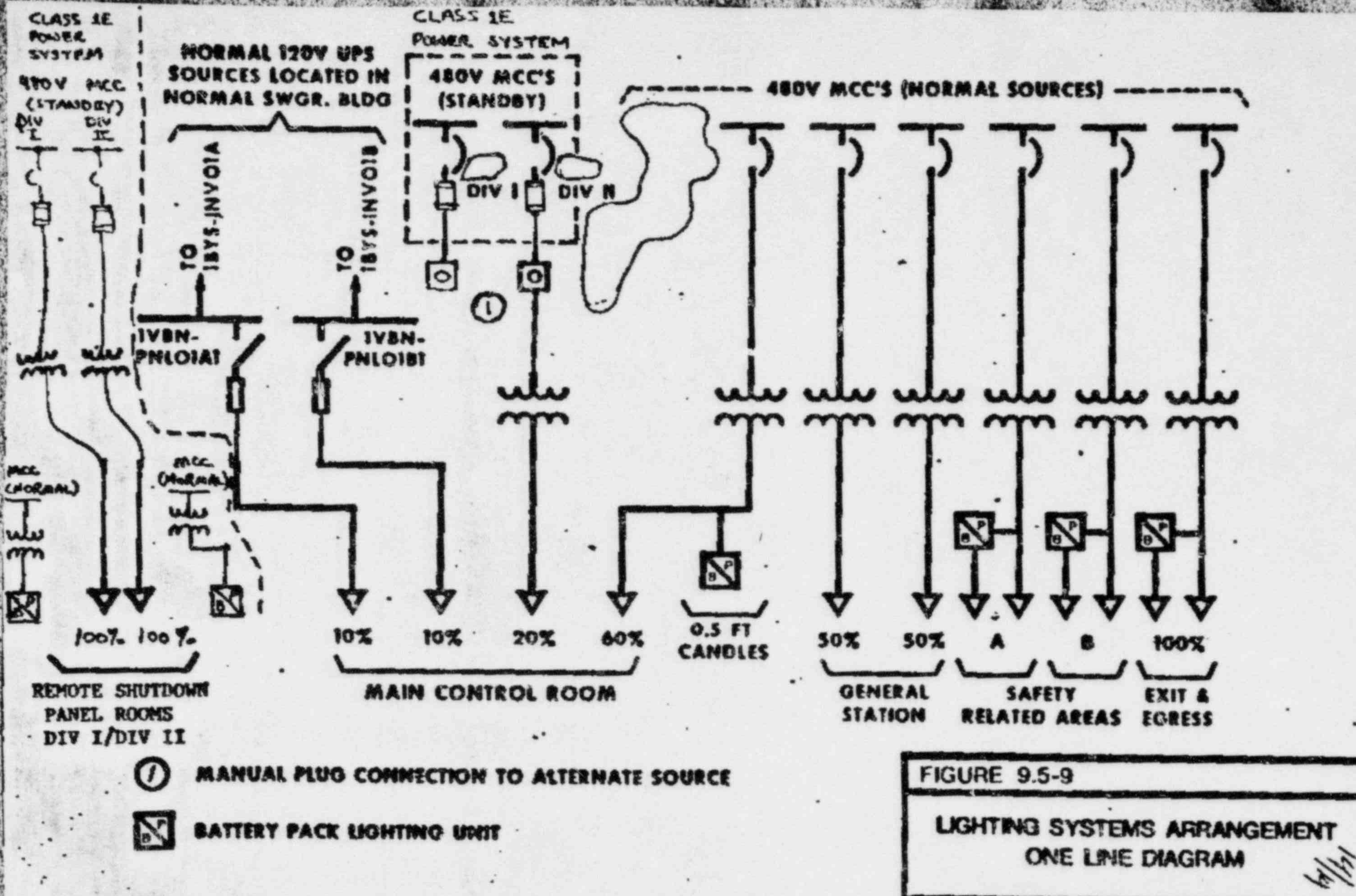


FIGURE 9.5-9

LIGHTING SYSTEMS ARRANGEMENT ONE LINE DIAGRAM

RIVER BEND STATION

FINAL SAFETY ANALYSIS REPORT

ENCLOSURE 11

1. Sufficient thickness has been included in the design of this carbon steel tank to allow for the 1/8 in of corrosion expected over a 40-yr period.

2. System piping is protected against corrosion as follows:

   a) Buried piping is coated with coal tar enamel that conforms to the American Water Works Association Standard C203[3]. 5

   b) Piping not buried is protected by a zinc-rich primer and a polyurethane finish coat.

3. The exterior surface of the storage tank is shot blasted in accordance with the Steel Structure Painting Council (SSPC) standard SPG[4]. The surface is then coated with zinc-rich epoxy primer followed by a top coat of coal tar epoxy that conforms to the SSPC-PA1 standard[5].

4. The storage tank is located in a dry sand-filled, concrete vault and is not exposed to groundwater.

5. A diesel fuel oil stabilizer, such as SDI-35, is added to the fuel oil storage tanks to prevent oxidation of the fuel oil and the formation of gums and tars that could plug fuel lines. The water emulsifier component of SDI-35 keeps any water contamination suspended in the fuel oil and prevents it from settling out in the bottom of the tank. SDI-35 also contains agents to prevent 13 internal storage tank corrosion and biotic growth in the fuel.

6. The tanks are kept normally full to minimize air contact with tank surfaces.

The fuel oil forwarding filters described in Section 9.5.4.2.3 are designed to remove any sediment that 3 might be stirred up during refueling.

INSERT A

Plant operating procedures require staggered refill of the diesel fuel oil storage tanks. ~~and~~ the following considerations when filling during required diesel generator operation. The day tank is verified to be full prior to 13 refilling its associated fuel oil storage tank. ~~Refill is at a controlled rate to minimize turbulence in the storage tank and is initiated in sufficient time to allow sufficient settlement prior to refilling the next tank~~. Confirmation

INSERT A

Refilling of one standby diesel generator fuel oil storage tank will begin after 72 hours of continuous diesel generator operation. Refilling of the second diesel generator fuel oil storage tank will begin after 96 hours of continuous diesel generator operation. Refill is at a controlled rate to minimize turbulence in the storage tank and is completed in time to allow sufficient settlement prior to refilling the next tank. In addition, the procedures require

ENCLOSURE 12

(temperature, humidity, etc) that would be expected if actual demands were placed on the system.

Periodic surveillance testing and inservice inspection programs for the DGCAIES components, instrumentation, controls and alarms are in accordance with Regulatory Guide 1.108, Revision 1, and engine manufacturer recommendations. 5

The system is designed so that testing can be accomplished on a diesel generator with the plant in normal operation or shut down without impairing the reliability or redundancy of the remaining diesel generators.

9.5.8.5 Instrumentation Requirements

(taken between the turbocharger and the engine cylinder head)

Control panels located in each diesel generator control room accommodate instruments and controls for operation of the diesel generator combustion air intake and exhaust system. Combustion air intake manifold pressure and crankcase vent pressure indicators are provided ~~(taken between the turbocharger and the engine)~~. Exhaust stack and cylinder exhaust port temperature indicators are also provided. 3

INSERT A

For the standby diesel generators, a high crankcase vent pressure condition automatically trips the diesel engine in all operating modes, except during engine startup or an emergency operation. The HPCS diesel generator does not have an automatic high crankcase vent pressure trip, but can be tripped manually either from the main control room or the HPCS diesel generator control panel (after receipt of the alarm).

A high crankcase vent pressure condition for each of the diesel generators in any operational mode also activates a trouble alarm on the main control room panel and on the diesel generator control panel. Diesel generator protective functions are further discussed in Section 8.3.1.1.4. 5

Indications of DGCAIES system conditions alert the operator to the possible need for system maintenance. There are no annunciated alarms for the combustion air intake and exhaust system for which the operator must take action. 5

9.5.9 Storage of Gases Under Pressure

The storage of gases under pressure is required for routine operation of the power plant.

INSERT A

at the engine control panels located in each diesel generator control room. Low pressure measured by the intake manifold pressure sensor provides an indication of turbocharger malfunction or intake air filter clogging.

ENCLOSURE 13

in the distributors causes spool valves to engage and follow the profile of the air starting cams on the ends of the camshaft. The cam profiles are so designed that at least one spool valve is always in position to emit a pilot signal to the proper cylinder, causing that cylinder's air starting valve to admit 250 psig air into the combustion chamber, forcing the piston down to rotate the crankshaft. As the engine rotates, timed and sequenced pilot air signals are emitted, starting 5 deg before top dead center and ending at 115 deg after top dead center. When the starting signal is cut off, the spool valves lift off the cam.

9.5.6.2.2 HPCS Diesel Generator

The DGSS for the HPCS diesel generator consists of the following major components and the associated piping, valves, and controls:

1. Two starting air compressors
2. Two starting air dryers
3. Two starting air receivers (64 cu ft each)
4. Two starting air motors.

There are two independent air starting systems. The air supply system contains one receiver in each redundant system. Each system has one air compressor for charging air into the air receivers. One of the air compressors is electric motor driven and the other is diesel engine driven.

1. The electric motor-driven air compressor is powered from the HPCS bus. It is automatically started when the air pressure in the receiver drops below 225 psig and shuts off when the air pressure reaches 250 psig. 11
2. The diesel-driven air compressor is air-cooled and supplied by a 2 1/2-gallon, engine-mounted, fuel tank. It is automatically started when the air pressure in the receiver drops below 215 psig and shuts off when the air pressure reaches 250 psig. The exhaust for the engine discharges to atmosphere within the HPCS DG exhaust silencer missile enclosure.

The air supply train with a diesel-driven air compressor thus provides a backup for the electric motor-driven air compressor train. Additional discussion of instrumentation 13

The diesel-driven air compressor is started by a 125 VDC motor which is connected to the 125 VDC standby bus C and associated battery chargers (see Fig. 8.3-6).

ENCLOSURE 14

QUESTION 430.101 (9.5.7)

In section 9.5.7.2, you discuss the HPCS diesel generator soak back pump, and state that this pump is used to pre-lube the HPCS diesel engine. Expand your discussion of this pump and its function to demonstrate that the entire engine has adequate pre-lubrication. Use P&IDs, and/or any other drawings and diagrams, as required, to demonstrate there is adequate pre-lubrication.

RESPONSE

The response to this request is provided in revised 5
Section 9.5.7.2 and Fig. 9.5-5b.

A description of the automatic prelube modifications 11
consistent with LRG-II Item 1-PSB is provided below. ①

The HPCS lube oil system piping and connections will be modified to implement diesel manufacturer's recommendation MI-9644. Lube oil flows to the preheat system and to the turbocharger will be separated. The ac motor-driven circulating pump will provide 6 gpm flow to the preheat system and the VDC motor-driven soakback pump will provide 3 gpm flow to the turbocharger. Both of these pumps will have the capability to operate continuously. Vent lines
with orifices will be added to the lube oil filter and lube 13
oil cooler to bleed off any entrapped air and the vents will be connected to the engine camshaft housing to discharge any oil flows back to the engine. A vent will also be added to the lube oil cooler discharge pipe to prevent a siphon effect that would draw oil out of the cooler into the engine strainer box. Two new sight glasses will be added for visual monitoring of the oil level during standby.

In addition, the cooler discharge pipe will be changed to form an inverted U connection to the oil strainer tank. An additional piping connection will be made from the bottom of the cooler to the pressure pump discharge line through a check valve and then to the gallery. This will flood the main oil gallery that supplies oil to the main bearing, the accessory drive, the turbo, and the top deck. This will minimize the time for oil to reach these components during a fast start, as well as maintain lubrication of the main bearings.

① FSAR Fig. 9.5-5b will be revised to incorporate the modifications described below by November 1984.