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November 29, 1984
RBG- 19,576
File No. G9.5, G9.23,
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

Proposed revisions to FSAR Sections 1.8, 8.3.1 and 14.2 are enclosed for your information. These revisions have been previously discussed with your staff and will be appropriately included in a future FSAR amendment.

The purpose of these revisions is to establish a qualified load for each of the diesel generators, to provide revised positions on Regulatory Guides 1.9 and 1.108 and to address HPCS independence. Gulf States Utilities will be in contact with the Nuclear Regulatory Commission Project Manager regarding submittal of additional information to support these revisions.

Sincerely,

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

JEB/WJR/~~JEP~~/je

Enclosure

B001
1/40

ENCLOSURE 1

TABLE 1.8-1 (Cont)

Regulatory Guide 1.9, Rev. 2 (December 1979)

Selection of Diesel Generator Set
Capacity for Standby Power Supplies

Project Assessment

1. The selection, design, and qualification of the Division I and II standby diesel generators, 1EGS*EG1A and 1EGS*EG1B, comply with Regulatory Guide 1.9, Rev. 2, dated December 1979. 3

2. The selection, design, and qualification of the HPCS diesel generator (Division III), 1E22*S001G1C, comply with the guide with the following exceptions and clarifications promulgated by NEDO-10905 and its three amendments:

   a. The design of the HPCS diesel generator unit complies with IEEE 308-1971. Regulatory Guide 1.32 is addressed in a separate compliance statement.

   b. Paragraph C.4

      Exception is taken to strict conformance to Regulatory Guide 1.9, regarding voltage and frequency limits during the initial loading transient. 11

TABLE 1.8-1 (Cont)

The tests performed and described in NEDO 10905-3 have been determined to be acceptable pursuant to the letter from Olan D. Parr, Chief-Light Water Reactors Branch No. 3 to Dr. G.G. Sherwood of GE, dated April 7, 1980.

c. Paragraphs C.4 and C.13

Clarification of these paragraphs is needed since the HPCS diesel generator carries one large connected load. Sixty-nine valid start-and-load tests with no failures were conducted on the HPCS diesel generator at Lasalle County - 1 and 2, in lieu of the 300 tests required by Section 6.3.2 of IEEE 387-1977.

The HPCS system consists of one large pump motor combination which represents more than 90 percent of the total load; consequently, limiting the momentary voltage drop to 25 percent and the momentary frequency drop to 5 percent would not significantly enhance the reliability of HPCS operation. To meet these regulatory quide requirements, a diesel generator unit approximately two to three times as large as that required to carry the continuous rated load would be necessary. However, the frequency and voltage overshoot requirements of Regulatory Guide 1.9 are met.

motor rated at 2500 hp and one medium size pump motor rated at 450 hp in addition to a few small motor and static loads.

Section 6.3 of IEEE 387-1977 is construed to mean that, in the case of the RBS HPCS diesel generator unit, a type qualification testing program pursuant to Sections 6.3.1, 6.3.2, and 6.3.3 is not explicitly required, since it is a type previously qualified as a standby power source for nuclear generating stations.

d. Paragraph C.5

The HPCS diesel generator unit was qualified pursuant to IEEE 323-1971. Methods of implementing IEEE 323-1974 for GE (NSSS)

TABLE 1.8-1 (Cont)

equipment are defined in NEDO-21898. Regulatory Guide 1.89 is addressed in a separate compliance statement.

e. Paragraphs C.6, C.7, C.8, and C.11

The surveillance system of the HPCS diesel generator unit provides main control room alarms of abnormal values of all bypass parameters individually or grouped. However, it does not provide an indication of which protective trip was activated first because individual alarms for each bypassed trip parameter are provided at either the main control room panel or the local diesel generator control panel. More discussion can be found in the RBS position on Regulatory Guide 1.108, which is addressed in a separate compliance statement. 11

f. Paragraph C.9

The equipment was qualified pursuant to IEEE 344-1971. Regulatory Guide 1.100 is addressed in a separate compliance statement.

g. Paragraph C.14

design load on the HPCS Division III bus (1E22*S004)

Exception is taken to load sequencing. The total load (HPCS pump motor load with HPCS at rated flow) is accepted by the diesel generator at the initiation of the test, and this load is carried for 24 hours.

FSAR Section - 8.3.1.2.2 11

TABLE 1.8-1 (Cont)

Regulatory Guide 1.108, Rev 1 (August 1977)

Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants

Project Assessment - Comply, with the following clarifications:

1. Paragraph C.1.b(4) - The surveillance system for the standby diesel generator units at RBS provides remote indication of the standby diesel generator unit status through the use of the "standby diesel generator inoperative" and the "standby diesel generator trouble" annunciators and the "standby diesel generator tripped" indicating light, all of which are found in the main control room. Indication of the HPCS diesel generator unit status is attained via the engine overspeed trip annunciator, the generator overload alarm, and various protective device bypass alarms which are located in the main control room. There are means of communication between the main control room and the diesel generator control room that provide for the determination of the underlying cause or causes of the particular status.

2. Paragraph C.1.b(5) - There is no first-out annunciation feature for the diesel generator protective trips.

   During an emergency condition only two protective features (generator differential and engine overspeed) trip the HPCS diesel generator. There is no benefit knowing which alarm tripped first. They are mutually independent trips; differential relay trip does not result from overspeed and overspeed does not result from differential relay action). 7

   Standby diesel generator surveillance systems annunciators located in the standby diesel generator control room are separated into subsystem groups. Each subsystem group is provided with a first-out indication.

TABLE 1.8-1 (Cont)

5. Paragraph C.3.b - Regulatory Guide 1.16 is addressed in a separate compliance statement.

FSAR Sections - 8.3.1, 14.2.12

3. Paragraph C.2.a(3) - Exception is taken to performance of the overload test since the diesel generators will not be operated above their rated load.

4. Paragraph C.2.a(9) - The on-site preoperational reliability tests required by this section were performed with the exception that the diesel generators were subjected to two (2) fast starts and ten (10) modified starts as discussed in Section 8.3.1.1.5.2.

Insert 1 - Pg 8.3-8

An exception is the standby service water system. The train A pumps are powered by 1ENS*SWG1A and by 1E22*S004 (one pump on each bus). The train B pumps are both powered by 1ENS*SWG1B.

Insert 2 - Pg 8.3-15

, standby service water pump motor and miscellaneous auxiliaries associated with it.

Insert 3 - Pg 8.3-18

except the standby service water pump is sequenced to start as noted in Table 8.3-2 to allow the HPCS pump to attain its required speed and flow.

Insert 4 - Pg 8.3-30

Standby diesel generators 1EGS*EG1A and 1EGS*EG1B were given thirty-seven type qualification tests each in accordance with IEEE 387 and IEEE 323.

Insert 5 - Pg 8.3-36

In addition to the qualification tests conducted on each diesel generator set at the engine manufacturer's factory, these standby diesel generator sets were subjected to two (2) fast starts and ten (10) modified starts after their installation at the site. A modified start is defined as a start which includes a prelube period as recommended by the engine manufacturer, loading to 75% of the maximum design load within 3 to 5 minutes, and operation at this load for approximately one (1) hour. The modified starts may be performed with the engine at its operating temperature. The fast starts are conducted from the main control room by simulation of an ESF signal with the engine in a ready standby status. During each fast start the engines are loaded to the ESF bus load shown in Table 8.3-2, and run at that load for approximately four (4) hours.

Each diesel generator set was given a load capability test at their rated load of 3500 kw for twenty-four (24) hours. The engines were not tested at their two (2) hour rating since these sets will not be operated above the rated load.

Insert 6 - Pg 8.3-42

However, if a loss of bus voltage is sensed by more than one channel of undervoltage relays, the HPCS pump is inhibited from starting.

Insert 7 - Pg 8.3-52

of the HPCS diesel generator set to start and accelerate to rated speed its required loads, as described in Regulatory Guide 1.108 (see Section 1.8).

Insert 8 - Pg 8.3-54

a. Four (4) cold fast starts;
b. Four (4) hot fast starts; and
c. Twelve (12) modified starts.

The fast starts are conducted from the main control room by simulation of an ESF signal with the engine in a ready standby status. Following each fast start, the engine is loaded to the ESF bus load shown in Table 8.3-3, and run at that load for approximately four (4) hours. The modified starts include a prelube period as recommended by the manufacturer, loading to approximately 2600 kw within 3 to 5 minutes, and operation at this load for approximately one (1) hour. Modified starts may be performed with the engine at its operating temperature.

Insert 9 - Pg 8.3-56

(approximately 2500 hp), one medium size pump (450 hp), and other miscellaneous loads;

Insert 10 - Pg 8.3-53

The HPCS diesel generator comprises of a single generator driven by a single engine. This diesel generator set neither operates in parallel with any other diesel generator set nor has tandom engines driving the single generator.

respectively, if required during loss of preferred power. There is no automatic fast or slow transfer from the preferred transformers to the normal buses for either 1ENS*SWG1A or 1ENS*SWG1B. The third standby 4.16-kV bus 1E22*S004 is energized from the normal 4.16-kV swing bus 1NNS-SWG1C and has access to the preferred sources via the primary normal 4.16-kV buses, 1NNS-SWG1A and 1NNS-SWG1B, upon loss of normal power.

Each of these standby 4.16-kV buses has a standby 4.16-kV diesel generator capable of supporting its respective design load upon loss of normal and preferred power. The ~~3500-kW~~ diesel generator 1EGS*EG1A supports standby 4.16-kV bus 1ENS*SWG1A and ~~3500-kW~~ diesel generator 1EGS*EG1B supports standby 4.16-kV bus 1ENS*SWG1B. The HPCS system ~~2600-kW~~ diesel generator 1E22*S001G1C supports standby 4.16-kV bus 1E22*S004. Each standby diesel generator is physically separated from the others and is located in the Seismic Category I diesel generator building. Failure of one diesel will not impede the operation of the other two diesel generators.

Standby 4.16-kV bus 1ENS*SWG1A and normal 4.16-kV bus 1NNS-SWG1A may be fed from the preferred station service transformer 1RTX-XSR1C simultaneously. If an undervoltage condition were to occur concurrently on both buses, a trip signal would be given to the normal supply breaker on 1NNS-SWG1A and to the motor feeder breakers on that bus. If proper voltage is not available, a trip signal would be given to the preferred supply breaker on 1ENS*SWG1A and the standby diesel generator would start and would energize the standby 4.16-kV bus. Division 2 equipment follows the same operation. Reference 2 provides a description of the standby bus transfers and tripping under loss of power conditions.

The standby 4.16-kV standby buses are electrically independent and physically isolated from one another. Their loads are redundant as required and consist of standby motors and standby 480-V load centers. Dc control power for the standby 4.16-kV switchgear and for 1NNS-SWG1A, 1NNS-SWG1B, and 1NNS-SWG1C is supplied as shown in Table 8.3-8.

Insert 1

4.16-kV switchgear assemblies 1NNS-SWG2A and 1NNS-SWG2B at the circulating water pump area and 1NNS-SWG3A and 1NNS-SWG3B at the cooling tower makeup pump area and 1NNS-SWG4A and 1NNS-SWG4B at the radwaste building are of the split-bus design. Under normal conditions the supply breaker on each bus is closed and the bus tie breaker is open. No automatic closing of the tie breaker takes place after tripping either supply breaker. Closing all breakers is by manual control. When the supply breakers and bus tie breaker are to be closed to parallel two sources for a short

and 120-V ac regulated power supplies. The 125-V dc systems provide dc power for dc loads, uninterruptible power supplies, backup instrumentation and control, and are described in Section 8.3.2. The 120-V ac uninterruptible power supplies provide ac power for security, control, and instrumentation systems for the nonsafety-related and engineered safeguard systems (Section 8.3.1.1.3.7). The 120-V ac regulated power supplies provide ac power for instrumentation, security, and communication systems for the nonsafety-related and engineered safeguard systems.

The instrumentation and status indications of Class 1E switchgear aforementioned are described in Section 7.

8.3.1.1.3.6 Standby Electrical Power Systems

The standby electrical power systems are designed to provide redundant sources of onsite ac electric power which are self-contained within the unit and which are not dependent on the normal and preferred sources of supply. The standby electrical power systems are capable of supplying ac power for electrical loads which are required for a safe shutdown of the reactor.

The standby system ac distribution buses are rated at 4.16-kV and 480-V. There are three standby 4.16-kV ac buses and four standby 480-V ac load centers. The bus configuration (Fig. 8.1-6) is described in Sections 8.3.1.1.3.3 and 8.3.1.1.3.4. Upon loss of voltage on associated standby 4.16-kV buses, or a LOCA signal initiated by an abnormally low water level in the reactor vessel or a high drywell pressure, or a manual start signal, the generators are started and brought up to rated frequency and voltage. If, at this time, the two redundant supply power lines to the buses are open, the standby generator breakers automatically close on their associated dead buses (Section 9.5.6.4). The diesel generators are not automatically connected to their respective standby 4.16-kV buses if the buses are still connected to either the preferred or normal station service transformers.

Unit 1 reactor has three diesel generators: 1EGS*EG1A, 1EGS*EG1B, and 1E22*S001G1C. Diesels 1EGS*EG1A and 1EGS*EG1B are devoted to safety-related equipment as shown in Fig. 8.1-6. Diesel 1E22*S001G1C ~~is devoted exclusively to~~ the HPCS system ~~which is~~ as described in Section 8.3.1.1.3.6.2.

energizes

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 Electric Products Division Porter.

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 nameplate 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.

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).

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.

diesel-generator unit to the automatic load sequencing system.

The standby diesel generator incorporates two modes of control, OPERATIONAL and MAINTENANCE.

a. In the OPERATIONAL mode the diesel starts and comes up to speed when either of the following conditions is present:

   1) A MANUAL START SIGNAL generated from the local control panel and the units entire protective system is reset.

   2) An EMERGENCY START SIGNAL generated by either a LOCA signal or a sustained bus undervoltage or by depressing emergency START push button in the main control room. Except for overspeed and generator differential, no other diesel generator protective device is functional under emergency start conditions. The emergency start overrides all other conditions such as manual running, test, tripping on fault (other than overspeed or generator differential) and returns the unit to rated speed. (Refer to Section 8.3.1.1.4.1)

b. In the MAINTENANCE mode only the engine ROLL pushbutton on the local panel is operative. This feature permits cranking the diesel without effecting a start.

c. The standby diesel generators may be tested while in the operational mode by manually starting the engines and manually closing the circuit breakers connecting the standby diesel generators to the bus. In this manner, the standby diesel generators can be tested under load while in parallel with the grid.

   Should the grid go to an undervoltage or underfrequency condition, the circuit breakers in the Fancy Point Substation trip and deenergize the circuit feeding the preferred station service transformers. The pilot wire system also initiates a trip of the 4.16-kV circuit breaker between the preferred station service transformer and the bus. With the preferred or alternate supply breakers in the open position, the generator setting would switch from the parallel operation mode to the isochronous mode, and the standby diesel generator picks up the entire load of the standby 4.16-kV bus, sequentially.

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 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.

Insert 2

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

on the HPCS 4.16 kv bus

an

interlock is provided to avoid accidental paralleling. There is no sharing of the HPCS power system with other standby diesel generators. ~~power systems nor power plant units.~~

The HPCS power system loads consist of the HPCS pump/motor and associated auxiliaries, ~~such as~~ motor-operated valves, ~~engine cooling~~ water pump, and miscellaneous ~~engine~~ auxiliary loads. Table 8.3-3 shows the Division III loads required during normal shutdown, forced shutdown, and LOCA. Table 8.3-3 lists the Division III loads of Class 1E 125-V dc batteries.

The HPCS pump motor is a General Electric 4kV vertical induction motor ~~requiring~~ rated at 2500 hp. The vertical pump was manufactured by the Borg-Warner Byron-Jackson Pump Division. It is rated at 5,125 gpm with 945 ft of head and its motor has a maximum shaft bhp of 2,500 at 1,780 rpm.

The HPCS electric system is capable of performing its function when subjected to the effects of design bases natural phenomena. It is designed in accordance with Seismic Category I and housed in a Seismic Category I structure.

The detailed description of the fuel oil storage and transfer system associated with the HPCS diesel generator unit is described in Section 9.5.4. Fuel for the HPCS diesel engine is provided in a separate day tank and in a storage tank. The day tank permits a minimum of 1 hr of operation at rated load. The combined capacity of the day tank and the storage tank permits the HPCS diesel engine to operate at continuous rated load conditions for at least 7 days.

The engine air starting system contains two complete sets of starting components, either of which is capable of starting the engine. Each set of components consists of dual air start motors, air relay valve, solenoid valve, air receivers, and air compressor assembly. One of the compressors for the HPCS diesel generator is electric motor driven, and the other is diesel engine driven. Both compressors are capable of automatic start and stop and are controlled by pressure switches to maintain required pressure in the air receivers. The two air starting systems are independent and arranged so that failure of start in one system causes automatic transfer to the other system.

Manual controls are provided to permit the operator to select the most suitable distribution path from the power

supply to the load. An automatic start signal overrides the exercise mode. Provisions are made for control from the main control room and external to the main control room from an HPCS diesel generator control panel located external to the main control room in the diesel generator building as shown in Figure 8.3-11. The control panel includes facilities for breaker control of incoming feeder and HPCS generator breaker together with frequency meter, synchroscope, bus, and incoming voltmeters and engine speed control device.

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.

Control power for the HPCS diesel generator unit is supplied from its own 125-V battery system, which consists of a battery with its own battery charger. The charger is designed to carry the continuous load in addition to normal battery charging current. Section 8.3.2.2 provides a discussion of the HPCS 125-V dc system. Tables 8.3-3 and 8.3-6 show the HPCS diesel generator size and the 125-V dc load requirements.

8.3.1.1.3.6.2.2 Starting and Loading

A loss of normal potential at the HPCS bus is one of the three initiating signals which automatically starts the HPCS diesel generator. The other two signals are accident signals of reactor low water level and high drywell pressure which are described in detail in Section 7.3.1. On receipt of a start signal or HPCS supply bus undervoltage, the HPCS diesel generator will start and accelerate to operating voltage and frequency as standby power supply for the HPCS system. On reaching rated speed and voltage, the generator is automatically connected to the HPCS bus if ac power is not available at the bus. Once the diesel generator has been energized, the unit will continue to operate until manually deenergized or until the protective devices of the HPCS diesel generator cause a trip.

The HPCS diesel generator is capable of running unloaded for 4.5 hours without degrading the performance or reliability of the engine, after which, it must be run at a minimum of 40 percent of nameplate rating for 30 minutes.

The HPCS diesel generator has the capacity to start all motors as required by system design basis so that the main pump is at rated speed and all required valve operations are

and 9.2.7.

completed within the time requirements described in Sections 6.3 All HPCS loads associated with the DBA are started concurrently. ~~No load sequencing is required.~~ ← Insert 3

An emergency demand start signal overrides all other operating modes including tests and then returns control to the sequencing system. Refer to Section 5 of NEDO 10905 for a description of control and protection of the HPCS diesel generator.

8.3.1.1.3.7 120-Volt AC Uninterruptible Power Supply System

The 120-V ac uninterruptible power supply system supplies control power to vital computer and instrumentation loads for which power interruption must be avoided. These services are necessary for the normal operation of the plant.

Power from the uninterruptible power supplies is free from extraneous voltage spikes, switching surges, and momentary interruptions, and satisifies the voltage and frequency variation limits of the station computers and instrumentation systems. A high degree of power continuity is provided, with the uninterruptible power supply being able to switch automatically between two independent sources of input power, or to transfer to an independent alternate source of regulated ac power with sufficient speed so the operation of the computer and instrumentation is not affected.

Normally the uninterruptible power supply inverter (Figure 8.3-1 and 8.3-2) receives dc power from a 480-V ac motor control center (MCC) feeding an ac-to-dc rectifier, with a second source of dc power coming from the 125-V dc station battery. Any failure of the MCC feeding the rectifier results in the station battery carrying the uninterruptible power supply load without interruption. Malfunctions of both of the two dc sources of power to the inverter or the inverter itself causes the static switch to automatically transfer the power source to an independent alternate source fed from a 480-V ac MCC feeder through a voltage regulating transformer in all uninterruptible power supplies except 1BYS-INV06. 1BYS-INV06 is located in the Service Building and differs from the nonsafety-related UPS units in that it has an output of 120/208 V ac, three-phase, and has no alternate source transformer. 1BYS-INV06 furnishes power to DRMS, ERIS, and other support service loads. A make-before-break manual bypass switch enables maintenance, inspection, and testing of the uninterruptible power supply components to be safely performed while feeding

6. Each standby diesel generator set is capable of being emergency started in the operational mode from the main control room as well as the standby diesel generator control room near the engines. There is no transfer scheme between these two locations, since the emergency start controls are in parallel. Normal start controls are on the local engine control panel only in the standby diesel generator control room near the engines (Fig. 8.3-11).

7. All standby diesel generator parameters that are bypassed under accident conditions are annunciated in each standby diesel generator control room. These annunciators are located on the associated standby diesel engine control panel.

8. All conditions that render the standby diesel generator incapable of responding to an automatic start signal are annunciated in the main control room.

8.3.1.1.4.1.1 Qualification Testing

In accordance with Branch Technical Position EICSB-2, Diesel Generator Reliability Qualification Testing, the standby diesel generator manufacturer, Delaval Engine and Compressor Division, has performed a series of qualification tests to verify compliance with the requirements of the above-referenced NRC BTP.

Surveillance instrumentation is provided to monitor the status of the power supply and starting equipment of each standby generator. Instrumentation and control are essential requirements in the design, installation, testing, operation, and maintenance of the standby generator. All conditions which can affect performance or indicate unavailability of each standby generator are annunciated in the main control room. Local indicators and controls of each diesel generator are located within their respective rooms. Remote indicators and controls are located in the main control room on separate sections of the control board. Additional information on instrumentation and controls is presented in Section 7.3.1. The controls and instrument cables are routed to prevent common failure. All control switches on the main control board are clearly identified as to the equipment that each switch controls (Section 7.1.2.3).

→ Insert from Pg 8.3-36, with Insert 4.

When the HPCS diesel generator is called upon to operate under accident conditions, the only protective devices used are the generator differential relays and engine overspeed trip device. The engine overspeed trip device is mechanical and trips the engine directly. The trips are annunciated in the main control room. Other protective relays, such as loss of excitation, anti-motoring (reverse power), overcurrent with voltage restraint, high jacket water temperature, and low lube oil pressure, are used to protect the machine when it is operating during periodic tests. These relays are automatically removed from the tripping circuits under accident conditions. In addition to these protective relays, a normal time delay overcurrent relay senses generator overload and causes an alarm in the main control room. The generator differential relays and overspeed trip device are retained under accident conditions to protect against what can be major faults which could cause significant damage. All the bypassed protective devices cause alarms in the main control room and the operator then has sufficient information to take necessary corrective action. Because during accident conditions the HPCS diesel generator is performing a safety-related function, these protective devices are insignificant so far as the engine condition is concerned. The engine is capable of operating under these abnormal conditions, and it is left to the operator's judgment whether to operate the engine or trip it manually.

8.3.1.1.4.2.1 Qualification Testing

A prototype test has been performed to establish the adequacy of the diesel generator unit to successfully accelerate the HPCS pump and system loads. The test consists of starting an HPCS system in an actual HPCS pump loop test (HPCS system in condensate to condensate test mode) with auxiliary loads several times within the design time requirement. A topical report on HPCS power system unit, NEDO-10905, and subsequent amendments describe and show theoretical and experimental evidence as to the adequacy of the design. The topical report has been further amended to include the results of the prototype qualification test cited above.

→ INSERT from Pgs. 8.3-53, 54 & 55, with Insert 8

8.3.1.1.4.3 Containment Electrical Penetration Protection

Electric circuits penetrating the primary containment through Class 1E electrical penetrations are classified as follows:

1. Medium voltage power 4.16-kV, three-phase

The capability for testing and calibrating all actuation devices, circuits, electrical protective relays, and related instrumentation during normal operation is designed into the power systems important to safety and in accordance with the recommendations of Regulatory Guide 1.22. Provisions to perform nondestructive tests under simulated fault conditions are provided. This includes but is not limited to the ability of the protection system to initiate the operation of the actuated equipment.

8.3.1.1.5.2 Standby Electrical Power Supply Systems

Maintenance and testing of the standby diesel generators are conducted to ensure that all components and auxiliaries are operational within their design limits. Factory testing of the standby ac power systems was performed as defined in IEEE-387, Criteria for Diesel-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations.

Insert on Pg 8.3-30 ↓

~~1. Qualification Tests of Standby Diesel Generators 1EGS*EG1A and 1EGS*EG1B~~

Insert 4 →

Qualification tests were performed in the factory in accordance with IEEE 387 and IEEE 323. Qualification tests were performed at River Bend Station in accordance with Regulatory Guide 1.9, Paragraphs C.13 and C.14., and Regulatory Guide 1.108, as discussed in Section 1.8.

Delete here.

~~2. Site Tests~~ ← Insert 5

The following tests were performed in accordance with IEEE-387 after complete installation of the standby diesel generator system at River Bend Station.

a. Acceptance test

(1) Load capability qualification test

(2) Margin qualification test

(3) Start and load acceptance qualification tests ~~(35 starts)~~

a. ~~LAT~~ Starting test

b. ~~LST~~ Load acceptance test

c. ~~LGT~~ Rated load tests

d. ~~(7)~~ Design load tests

e. ~~(8)~~ Load rejection tests

f. ~~(9)~~ Electrical tests

g. ~~(10)~~ Subsystem tests

3. Periodic Tests

Periodic tests are performed to verify that systems and components of the standby diesel generators perform satisfactorily and to ensure that the standby diesel generator systems meet their availability requirements. These tests are performed during nuclear plant operation according to Regulatory Guide 1.108 and are described in the Technical Specifications.

Testing procedures indicate that no-load and light-load conditions are to be avoided and testing should be accomplished with a minimum loading of 25 percent of rated load. Some exceptions to this are allowed such as time start checks when other equipment is found inoperable. The normal maintenance and surveillance schedule provides sufficient loaded running time to minimize detrimental effects of these exceptions.

Emergency diesel generator equipment failures are repaired promptly and an evaluation as to the cause of the failure is performed and documented in equipment history. Administrative procedures provide approved methods for design changes or replacement of equipment with high failure rates.

After major maintenance or extended outage of the diesel, a complete system lineup per the system operating procedure is performed prior to a start attempt. This includes valve, electrical, instrument, and control board lineups as well as a visual inspection of the diesel generator and its auxiliaries. In addition, compliance with the protective tagging and temporary alterations procedures along with system restoration sections of maintenance and surveillance procedures ensure system readiness.

Upon completion of any manual, test, or auto start of the diesel, the operator is directed by the

surveillance or system operating procedure to place the diesel in an automatic standby readiness condition.

Compliance with Technical Specifications, administrative and system operating procedures, and the preventive maintenance and surveillance testing schedule ensures optimum equipment readiness and availability upon demand.

8.3.1.1.5.3 High Pressure Core Spray Power Supply System

12 | Readiness of the HPCS diesel generator connected to this bus, is demonstrated by periodic testing according to Regulatory Guide 1.108 and is described in the Technical Specifications. The testing program is designed to test the ability to start and accept the HPCS ~~system~~ loads ~~or its equivalent load~~. After the HPCS diesel generator has reached its engine temperature equilibrium, it is run under ~~rated~~ load for 22 hr, ~~and then run for 2 hr under the 2 hr rated load~~. This ensures that cooling and lubrication are adequate for extended periods of operation. Full functional tests of the automatic control circuitry are conducted on a periodic basis to demonstrate correct operation (Section 7.3.2).

design its qualified

24

Means are provided for periodically testing the chain of system elements from sensing devices through driven equipment to assure that the HPCS power supply is functioning in accordance with design requirements. The drawout feature of protective relays allows replacement relays to be installed while the relay that is removed is bench tested and calibrated.

Startup of onsite power units can be ~~effected~~ initiated by simulation of LOCA signal or loss of power to the plant auxiliary power system. Connection of the HPCS diesel generator to the HPCS bus takes place automatically on loss of plant auxiliary power to the HPCS bus (HPCS bus low voltage). The HPCS diesel generator bus directional overcurrent, ground overcurrent, and phase overcurrent protective relaying provides a trip to the offsite power feeder breaker in case of loss of offsite power while the diesel generator is in the test mode operation.

preferred transformer 1RTX-XSR1D and normally open circuit breaker 1NNS-ACB15. Onsite power is connected to 4.16-kV buses 1NNS-SWG1A and 1NNS-SWG1B via normal transformer 1STX-XNS1C and normally closed circuit breakers 1NNS-ACB06 and 1NNS-ACB14, respectively. The transfer from onsite power to offsite power is performed and tested as described above for the 13.8-kV buses, with the addition of having the 4.16-kV swing bus 1NNS-SWG1C online. Motors 1CCS-P1C and 1HVN-CHL1C are running and HPCS transformer 1E22*S003, on standby HPCS 4.16-kV bus 1E22*S004, is online during the transfer test.

Testing the transfer from offsite preferred power to onsite standby power at the standby 4.16-kV bus level is performed during reactor operation.

Standby 4.16-kV bus 1ENS*SWG1A is connected to preferred transformer 1RTX-XSR1C via normally closed circuit breaker 1ENS*ACB06, to normal 4.16-kV bus 1NNS-SWG1B via normally open circuit breakers, and to standby diesel generator 1EGS*EG1A via normally open circuit breaker 1ENS*ACB07. Standby 4.16-kV bus 1ENS*SWG1B is connected to preferred transformer 1RTX-XSR1D via normally closed circuit breaker 1ENS*ACB26, to normal 4.16-kV bus 1NNS-SWG1A via normally open circuit breakers, and to standby diesel generator 1EGS*EG1B via normally open circuit breaker 1ENS*ACB27. The transfer test is performed for each bus as follows:

1. For testing a standby diesel generator automatic initiation, the voltage sensors on the respective standby 4.16-kV bus are actuated to simulate a loss of voltage on that standby bus. This loss of voltage signal automatically starts the respective standby diesel generator. Upon attaining rated voltage and frequency the standby diesel generator breaker closes, assuming preferred and normal supply breakers have not tripped open on a fault.

2. The loading of a standby diesel generator is performed manually during testing while the reactor is in normal operation. The standby diesel generator is manually synchronized onto the standby bus and then carries selected standby loads. By opening the breaker from the preferred station service transformer and closing the breaker connecting the standby 4.16-kV bus to the normal 4.16-kV bus, the standby diesel generator load can be simulated to its approximate running load. Selected motors are running on the standby bus during the test.

running → qualified

1. High-Pressure Core Spray System (E22)

The HPCS pump does not start if the undervoltage trip on the emergency bus is tripped. Redundant undervoltage devices monitor bus voltage so that failure of one device to detect available HPCS power on the bus does not prevent the motor from starting. ← Insert 6

Certain protective trips can inhibit a HPCS DG start under test conditions; however, all but two of the DG trips are bypassed in the presence of an emergency start signal. The two exceptions are the overspeed trip and the generator differential device trip which protects the diesel generator. These devices are capable of being tested during normal operations. 13

Although redundancy of certain components is applied within HPCS in order to improve reliability, the overspeed and differential trips are not redundant by component. The ECCS network is redundant by system.

2. Residual Heat Removal System (E12)

There are no pressure switches capable of inhibiting a manual or automatic start of the RHR system. The RHR pump motor switchgear receives a stop signal if either the 1E12*MOVF004B or 1E12*MOVF066B valve is full open and the valve 1E12*MOVF006B, 1E12*MOVF009, or 1E12*MOVF007 is not fully open. Limit switches which sense the full open valve position and generate appropriate full open permissive are not redundant. The ECCS network is redundant by system and can tolerate loss of an entire RHR train.

3. Service Water System (SWP)

Emergency start of service water pumps 1SWP*P2A and 1SWP*P2B is inhibited if the respective discharge valve is not fully closed or the standby service water initiation signal is not present.

The limit switch sensing the full closed valve position to generate the appropriate full closed permissive is not redundant. However, redundancy does exist at the system level. The standby service water initiation signal is either reactor plant component cooling water loop loss of pressure or normal standby service water loop loss of pressure. Each loop is provided with four pressure sensors. One-out-of-two-taken-twice logic is

that a single failure does not prevent safety-related systems from performing their intended safety functions.

3. The standby 4.16-kV buses are arranged so that they can be supplied from any one of the normal, preferred, or standby power sources.

4. Sufficient instrumentation is provided to ensure a state of readiness and performance of the standby ac power system.

8.3.1.2.1.2 Standby Electrical Power Supply Systems

The standby electrical power supply systems are designed with sufficient capacity and capability to ensure that they are capable to, in sufficient time, restore ac power in the event that the normal and preferred power supplies become unavailable. They have the ability to reliably supply the required ac load demands of engineered safeguard equipment and controls for post-accident as well as safe and orderly shutdown operations so that the reactor core is cooled and containment integrity and other vital functions are maintained. The following general functional design bases apply:

1. Standby ac diesel generators are housed in a Seismic Category I structure with Seismic Category I walls separating them so that an accident involving one does not involve any others. Each fuel oil tank is contained in a separate Seismic Category I room, filled with sand to reduce the chance of fire around the oil tank.

2. Each standby ac diesel generator produces ac power at the same voltage and frequency as the associated standby station service ac power distribution system. Each is capable of automatic start at any time and of continuous operation at ~~rated~~ qualified load, voltage, and frequency until manually stopped.

3. Each standby ac diesel generator is capable of being manually paralleled with normal or preferred station service ac power source under normal conditions. Provisions are made in the design to prevent the electrical interconnection of the redundant standby ac diesel generators.

4. Each fuel oil system has a storage capacity suitable for operating each standby diesel system

at its maximum required post-accident load conditions for a minimum of 7 days. The fuel oil system and storage is tornado and earthquake protected.

5. Control power required for the operation of each standby ac diesel generator is supplied from its divisional ~~separate~~ standby 125-V battery system. Standby auxiliaries, such as fuel pumps and ventilation systems, necessary for continuous operation of standby ac diesel generators are supplied from their associated standby buses.

6. Upon loss of all normal and preferred ac power supplies, each of the standby bus~~es~~ is isolated from both its normal and preferred sources, and the standby ac diesel generators start automatically and are ready to accept load within 10 sec. Controls, both local and in the main control room, are provided for manual start and stop of each standby ac diesel generator. The output of each standby diesel generator is monitored, and abnormal conditions are alarmed in the main control room.

7. The ~~standby~~ ac diesel generator system is designed so that with loss of any one of the three ~~standby~~ diesel generators the remaining generators ~~is~~ are capable of supplying power to sufficient equipment for a safe shutdown of the unit under normal or accident conditions.

8. Standby bus voltage ~~is~~ does not ~~allowed to~~ dip below 75 percent of motor-rated voltage at any time during the loading sequence, and ~~is required to~~ recovers to 90 percent of motor-rated voltage within 40 percent of each load sequence time interval. The ac diesel generator associated with the HPCS does not comply with this portion of Regulatory Guide 1.9; however, its voltage recovery characteristics are operationally acceptable when starting its loads (Section 8.3.1.2.2.2).

9. All Class 1E motors are capable of starting and accelerating their driven equipment with 70 percent of motor nameplate voltage applied to motor terminals without affecting performance or equipment life.

10. All Class 1E motors are capable of continuous operation with 90 percent of motor nameplate voltage applied to motor terminals.

The degree of reliability of the power sources required for safe shutdown is very high due to independence and redundancy; it equals or exceeds all the requirements of Criterion 17.

Criterion 18

The auxiliary electrical system is designed to permit inspection and testing of all important areas and features, especially those which have a standby function and whose operation is not normally demonstrated. As detailed in the Technical Specifications, periodic component tests are supplemented by extensive functional tests during refueling outages (the latter based on simulation of action accident conditions). These demonstrate the operability of diesel generator sets, battery system components, and logic systems, thus verifying the continuity of the systems and the operation of the components. A complete preoperational test of the onsite ESF power distribution system is a prerequisite to initial fuel loading.

Regulatory Guide 1.6

The three standby ac power system divisions each consist of a diesel generator set ~~exclusively~~ feeding ~~their~~ its own ESF division load group. Each load group has its own dc power system, energized by a battery and battery chargers. The three load groups possess complete independence. The standby power system redundancy is based on the capability of any two of the three load groups to provide the minimum safety functions necessary to shut down the unit and maintain it in the safe shutdown condition.

In addition to the prohibition of sharing standby power system components between load groups, there is also no sharing of diesel generator power sources between units.

Each Division I and II standby power source is composed of a single generator driven by a single diesel engine having fast-start characteristics and sized in accordance with Regulatory Guide 1.9.

The design of the standby power system is therefore in complete compliance with the regulations of Regulatory Guide 1.6.

Regulatory Guide 1.9

In accordance with Regulatory Guide 1.9, the ratings of standy diesel generators 1EGS*EG1A and 1EGS*EG1B are continuous load rating of 3,500 kW each, and a 2-hour rating of 3,850 kW each, which exceeds the sum of the loads required.

The sequencing of large loads at predetermined intervals (Table 8.3-2) ensures that large motors will have reached rated speed and that voltage and frequency will have stabilized before the succeeding loads are applied. The decrease in frequency and voltage has been verified to be within 95 and 80 percent of nominal, respectively.

Recovery of voltage and frequency to within 10 percent and 2 percent of nominal, respectively, has been verified to be accomplished within 40 percent of the sequencing interval of 5 sec. Step loading and disconnection of the total diesel generator nameplate-rating load does not cause the standby diesel generator to exceed 110 percent of normal speed, thus precluding an inadvertent overspeed trip.

The reliability of the standby diesel generators has been substantiated by an extensive test program. The tests verify the following diesel functions:

1. Diesel fast start and modified start capabilities
2. Load carrying capabilities
3. Load shedding capabilities
4. Ability of the system to accept and carry the applied loads up to its rated capacity
5. Long-term no load running of the diesel unit without any detrimental effects.

The reliability of the system to start and accept loads in a prescribed time interval has been demonstrated by prototype qualification test data augumented by analysis to verify the ability of the River Bend Station standby diesel generators to perform their intended function, and has been further verified by preoperational tests. The preoperational tests verify ~~a fast start capability and~~ reliability after plant installation. Full-load ~~and margin~~ tests have been performed during preoperational testing at the River Bend Station on each diesel generator set to demonstrate the start and load capability of the units ~~in excess of the~~ within

(described in Section 8.3.1.1.5.2)

supplemented by extensive functional tests during the refueling outage, the latter based on simulation of actual accident conditions. These tests demonstrate the operability of diesel generator sets, battery system components, and logic systems and thereby verify the continuity of the systems and the operability of the components.

Because the diesel generator is a standby unit, readiness is of prime importance. Readiness is demonstrated by periodic testing. The testing program is designed to test the ability to start the HPCS loads as well as to run under equivalent load as required by Regulatory Guide 1.108. This ensures that cooling and lubrication are adequate for extended periods of operation. Full functional tests of the automatic control circuitry are conducted in accordance with the Technical Specification on a periodic basis to demonstrate correct operation.

Insert 7

Criterion 21

The protection system of the HPCS power supply is designed to be highly reliable and testable during reactor operation. The HPCS diesel generator is only part of the high pressure core spray system. If it fails, the redundant automatic depressurization system reduces the reactor pressure so that flow from LPCI and LPCS systems enters the reactor vessel in time to cool the core and limit fuel cladding temperature.

Regulatory Guide 1.6

The HPCS other diesel generator unit as shown in Table 8.3-3; supplies power for the HPCS and its HPCS auxiliaries; therefore, failure of any single component of the HPCS diesel generator does not prevent the startup and operation of any other standby power supply. The failure of any other standby diesel generator does not impede the operation of the HPCS diesel generator, thus meeting the requirements of Regulatory Guide 1.6.

Regulatory Guide 1.6, Position 1 Conformance

The HPCS Class 1E loads are assigned to a single division of the load groups and its load group. The assignment is determined by the nuclear safety functional redundancy of the loads such that the loss of any one division does not prevent the minimum safety functions from being performed.

Regulatory Guide 1.6, Position 2 Conformance

The HPCS bus (Division III of the ac load groups) is connectable to two different (preferred) offsite power sources. The HPCS bus is also connectable to the HPCS diesel generator as the standby onsite power source (Fig. 8.3-3).

The HPCS diesel generator breaker can be closed automatically only if all other source breakers to the HPCS bus are open. There is no automatic connection to any other division load group.

Regulatory Guide 1.6, Position 3 Conformance

There is no automatic or manual connection of the HPCS system dc load group to any other division load group.

Regulatory Guide 1.6, Position 4 Conformance

1. The diesel generators connected to the other divisions of the load groups are physically and electrically independent of each other. The diesel generator connected to the HPCS division load group cannot be automatically paralleled with the diesel generator that is connected to another division load group.

2. The HPCS diesel generator is connected to one independent division. No means exist for automatically connecting the HPCS load group with any other.

3. The HPCS load group is fed from only one diesel generator, as shown in Fig. 8.3-3. No means are provided for transferring its loads to any other diesel generator.

4. No means exist for manually connecting the HPCS load group to those of another division. The HPCS load group is physically and electrically independent of all others.

Insert 10) → Insert on Pg 8.3-33

Regulatory Guide 1.6, Position 5 Conformance

In order to comply with the requirements, the tests described in NEDO 10905, Section 6.6 have been, or will be, performed.

Start and Load Reliability Test

1. Prior to initial fuel loading of the reactor unit, a series of tests will be conducted to establish the capability of the HPCS diesel generator unit to consistently start and load within the required time.

2. With the exception of those diesel engine/generator designs that are identical (minor changes may be justified by analysis) to the diesel generator unit(s) which have been previously qualified for the HPCS application, all other different diesel engine/generator combinations will be individually qualified for reliable start and load acceptance requirements.

3. An acceptable start and load reliability test is defined as follows: A total of ~~69~~ 20 valid start and loading tests with no failure or ~~128~~ 40 valid start and loading tests with a single failure will be performed. Failure of the unit to successfully complete this series of tests as prescribed will require a review of the system design adequacy, the cause of the failure to be corrected, and the tests continued until ~~128~~ 40 valid tests are achieved without exceeding the one failure. The start and load tests will be conducted as follows:

Insert on Pg 8.3-33

Insert 8 →

a. Engine cranking will begin upon receipt of the start signal, and the diesel generator set will accelerate to specified frequency and voltage within the required time interval.

b. Immediately following step No. 1 (Paragraph a.) the diesel generator set shall accept a single step load consisting of the main HPCS pump motor load (fully loaded) or larger motor load (fully loaded) and additional loads (inductive and/or resistive) as required to total at least 100 percent of the continuous rating of the diesel generator unit.

c. At least 90 percent of these tests shall be performed with the diesel generator set initially at "warm standby," based on jacket water and lube oil temperatures at or below values recommended by the engine manufacturer. After load is applied, the diesel generator set will continue to operate until jacket water and lube oil temperatures are within

±10°F (5 1/2°C) of normal engine operating temperatures for the corresponding load.

d. The remainder of these tests (10 percent or less) will be performed with the engine initially at normal operating temperature equilibrium (defined as jacket water and lube oil temperature within ±10°F (5 1/2°C) of normal operating temperatures as established by the engine manufacturer for the corresponding load).

If the cause for failure to start or accept load in accordance with the preceding sequence falls under any of the following categories, that particular test may be disregarded, and the test sequence resumed without penalty following identification of the cause for the unsuccessful attempt:

a. Unsuccessful start attempts which can definitely be attributed to operator error including setting of alignment control switches, rheostats, potentiometers, or other adjustments that may have been changed inadvertently prior to that particular start test.

b. A starting and/or loading test performed during routine maintenance or trouble-shooting. All maintenance procedures are defined prior to conducting the start and load acceptance qualification tests and become a part of the normal maintenance schedule after installation.

c. Failure of any of the temporary service systems such as dc power source, output circuit breaker, load, interconnecting piping, and any other temporary setup which will not be part of the permanent installation.

d. Failure to carry load which can be definitely attributed to loadings in excess of the HPCS diesel generator rating.

Insert on Pg 8.3-33

Regulatory Guide 1.9

Conformance with Regulatory Guide 1.9 is described in the following subsections for each regulatory position of Paragraph C of the guide.

Regulatory Guide 1.9, Position 1 Conformance

Table 8.3-3 shows that the continuous rating of the diesel generator is greater than the maximum coincidental steady-state loads requiring power at any time. Intermittent loads such as motor-operated valves are not considered for long-term loads.

Regulatory Guide 1.9, Position 2 Conformance

See Table 8.3-3 for the 2,000-hr rating of the HPCS diesel generator, the 30-min rating, and the maximum coincidental load for conformance with this position. The ratings are described in Table 8.3-3. The long-term steady-state load shown ~~therein~~ is within the continuous rating of the diesel generator.

Regulatory Guide 1.9, Position 3 Conformance

The load requirements will be verified and test data will be included in this SAR following the preoperational tests.

Regulatory Guide 1.9, Position 4 Conformance

Insert 9

The design function of the HPCS diesel generator unit is considered to be a justifiable departure from strict conformance to Regulatory Guide 1.9, 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 percent of the total load; consequently, limiting the momentary voltage drop to 25 percent and the momentary frequency drop to 5 percent would not significantly enhance the reliability of HPCS operation. To meet these 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. However, the frequency and voltage overshoot requirements of Regulatory Guide 1.9 are met. A factory testing program on a prototype unit has verified the following functions:

full

1. System fast-start capabilities
2. Load carrying capability
3. Load rejection capability
4. Ability of the system to accept and carry the required loads

Delete ENTIRE table and replace with attached.

TABLE 8.3-2

AUTOMATIC AND MANUAL
LOADING AND UNLOADING OF
ENGINEERED SAFETY FEATURES BUS

Item Description[7]	Number on Bus	Redundant Equipment Identification	kW Ea[6,9]	Minimum Operating Requirement — Forced Shutdown — Number Required	Running kW	Time to Start[1]	Time to Stop	Loss-of-Coolant Accident — Number Required	Running kW	Time to Start[1]	Time to Stop
DIVISION I (1EGS*EG1A Running) (1EGS*EG1B Unavailable)											
ENGINEERED SAFETY FEATURE LOADS											
1E21*C002	1	None	2.15	1	2.15	10 sec[3]	[3]	1	2.15	10 sec[3]	[3]
1HVK*P1A&C	2	Division II Systems	31	1	31	10 sec[3]	[3]	1	31	10 sec[3]	[3]
1SWP*P3A&C	2	Division II Systems	5.6	1	5.6	10 sec[3]	[3]	1	5.6	10 sec[3]	[3]
1HVC*ACU3A	1	Division II Systems	1.9	1	1.9	10 sec[3]	[3]	1	1.9	10 sec[3]	[3]
1HVC*FLT3AH	1	Division II Systems	23	-	-	-	-	1	23	10 sec[3]	[3]
1HVC*FN1A	1	Division II Systems	16.3	-	-	-	-	1	16.3	10 sec[3]	[3]
1HVC*FN2A	1	Division II Systems	19.2	1	19.2	10 sec[3]	[3]	1	19.2	10 sec[3]	[3]
1HVC*FN3A&3D	2	Division II Systems	0.90	1	0.90	10 sec[3]	[3]	1	0.90	10 sec[3]	[3]
1HVB*UC2	1	None	2.9	1	2.9	10 sec[3]	[3]	1	2.9	10 sec[3]	[3]
1HVB*UC3	1	None	4.7	1	4.7	10 sec[3]	[3]	1	4.7	10 sec[3]	[3]
1HVB*UC6	1	None	33	1	33	10 sec[3]	[3]	1	33	10 sec[3]	[3]
1HVB*UC7	1	None	9.6	1	9.6	10 sec[3]	[3]	1	9.6	10 sec[3]	[3]
1HVB*UC8	1	None	8.1	1	8.1	10 sec[3]	[3]	1	8.1	10 sec[3]	[3]
1HVF*FN3A	1	Division II Systems	25	1	25	10 sec[3]	[3]	1	25	10 sec[3]	[3]
1HVF*FLT2AH	1	Division II Systems	57	1	57	10 sec[3]	[3]	1	57	10 sec[3]	[3]
1HVY*FN1A&C	2	Division II Systems	5.3	1	5.3	10 sec[3]	[3]	1	5.3	10 sec[3]	[3]
1HVY*FN2A&C	2	Division II Systems	2.0	2	4.0	10 sec[3]	[3]	2	4.0	10 sec[3]	[3]
1LSW*C3A	1	Division II Systems	10.8	-	-	-	-	1	10.8	10 sec[3]	[3]
1E51*C003	1	None	3.63	1	3.63	10 sec[3]	[3]	1	3.63	10 sec[3]	[2]
Motor-operated Valves[12]	Set	Division II Systems	98 kW total	98 kW total	98	10 sec[2]	[2]	98 kW total	98	10 sec[2]	[2]
120-V ac Standby Power	Misc. Load	Division II Systems	50 kW total	50 kW total	50	10 sec[3]	[3]	50 kW total	50	10 sec[3]	[3]
1ENB*INV01A	1	Division II Systems	20	1	20	10 sec[3]	[3]	1	20	10 sec[3]	[3]
120V INSTR. (NSSS)	1	None	10	1	10	10 sec[3]	[3]	1	10	10 sec[3]	[3]
1ENB*CHGR1A	1	Division II Systems	71.7	1	71.7	10 sec[3]	[3]	1	71.7	10 sec[3]	[3]
RAD. MON.	1	Division II Systems	20	1	20	10 sec[3]	[3]	1	20	10 sec[3]	[3]
1EGP*P1A	1	Division II Systems	0.61	1	0.61	10 sec[3]	[3]	1	0.61	10 sec[3]	[3]

TABLE 83-2A

AUTOMATIC AND MANUAL LOADING OF ESF BUSES

CASE I: DG's 1EGS*EG1A AND 1E22*S004G1C OPERATING. DG 1EGS*1EG1B HAS FAILED

LOAD DESCRIPTION	LOAD ID NO.	NO. ON BUS	NO. REQ'D	TIME START (1)	NAMEPLATE (2) HP/kW	RUNNING BHP (2)	RUNNING kW (2)	TIME STOP	Block Load Total - kW	Reference To
Control Bldg. Chilled Water Pump	1HVK*P1A OR 1C	2	1	10	50	37	31.0	(3)		(3)
Control Bldg Chilled Cond. Recirc. Pump	1SWP*P3A OR 3C	2	1	10	15	6.3	5.6	(3)		(3)
Equipt. Room Air Condition Unit M/A	1HVC*ACU3A	1	1	10	5	1.93	1.9	(3)		(3)
Charcoal Filter Heater	1HVC*FLT3AH	1	1	10	23 kW	-	23.0	(3)		(3)
Filter Train Booster Fan	1HVC*FN1A	1	1	10	25	19	16.3	(3)		(3)
Std-by Sugar Room Exhaust Fan	1HVC*FN2A	1	1	10	30	22.4	19.2	(3)		(3)
Battery Room Exhaust Fan	1HVC*FN3A/B	2	1	10	1.5	0.9	0.9	(3)		(3)
Auxiliary Bldg Unit Cooler	1HVR*UC2	1	1	10	5	3.22	2.9	(3)		(3)
DO	1HVR*UC3	1	1	10	7.5	5.22	4.7	(3)		(3)
DO	1HVR*UC6	1	1	10	40	39.0	33.0	(3)		(3)
DO	1HVR*UC7	1	1	10	15	11.0	9.6	(3)		(3)
Filter Train Exhaust Blower	1HVF*FN3A	1	1	10	40	30.0	25.0	(3)		(3)
Filter Train Heater	1HVF*FLT2AH	1	1	10	57 kW	-	57.0	(3)		(3)
Std-by Serv. Water PP Hse Supply Fan	1HVY*FN1A	2	1	10	7.5	5.85	5.3	(3)		(3)(10)
Leakage Cont. Sys. Air Compressor	1LSV*C3A	1	1	10	50	50	43.0	(3)		(3)
Motor operated Valves	Misc.	Misc.	Misc.	10	-	-	98.0	(3)(4)		(4)(3)
120V AC Std-by Power	Misc.	Misc.	Misc.		50 kW		45.0	(5)		(3)
Std-by Vital Bus 'A' UPS System	1ENB*INV.01A	1	1	10	20 kVA	-	14.0	(5)		(3)
120V Instrumentation - NSSS	Misc.	Misc.	Misc.	10	10 kW	-	10 kW	(5)		(3)

TABLE 8.3-2A

AUTOMATIC AND MANUAL LOADING OF ESF BUSES

CASE 2: DG's 1EGS*EG1A AND 1E22*S001GIC OPERATING. DG 1EGS*1EG1B HAS FAILED

LOAD DESCRIPTION	LOAD ID NO.	NO. ON BUS	NO. REQ'D	TIME START (1)	NAMEPLATE (2) HP/KW	RUNNING (2) BHP	RUNNING (2) KW	TIME STOP	Block Load Totals KW	REFERENCES TO
125 V DC Battery charger	1ENB*CHGR1A	1	1	10 sec	71.7kW	-	71.7	(5)		(3)
Radiation Monitoring System	1ME*RMS	1	1	10 sec	20 kW	-	19.0	(5)		(3)
Safety Ltg - Aux. Bldg.	1LAC-XLC9	1	1	10 sec	19 kW	-	10.0	(5)		(3)(6)
Std-by Cooling Tower*1 Swgr. Fan	1HVY*FN2A	2	1	10 sec	3	2.03	2.0	(3)		(3)
Std-by D/G Fuel Trans. Pump.	1EGF*P1A	1	1	10 sec	3	0.81	0.61	(3)		(3)
Total: 10 second Load Block →									544.71 kW	
Low Pressure Core Spray Pump	1E21*C001	1	1	12 sec	1290HP	1290	917.2	(10)(3)		(3)(4)
Total: 12 Second Load Block →									917.2 kW	
Residual Heat Removal Pump 'A'	1E12*C002A	1	1	17 sec	700HP	630	509.2	(3)		(3)
Total: 17 seconds Load Block →									509.2 kW	
Std-by DG Room Vent Fan	1HVP*FN2A/3A	2	1	30	100	90.2	73.2	(3)		(3)
Annulus Mixing System Fan	1HVR*FN11A	1	1	30	150	135.0	109.0	(3)		
Std-by Gas Treatment Exhaust Blower	1GTS*FN1A	1	1	30	60	50.5	41.6	(3)		
Std-by Gas Treatment Heater	1GTS*H1A	1	1	30	72 kW	-	72.	(3)		(3)
Total: 30 Seconds Load Block →									295.8	

TABLE 83-2A

AUTOMATIC AND MANUAL LOADING OF ESF BUSES

CASE 2: DG's 1EGS*EG1A AND 1E22*S004GIC OPERATING. DG 1EGS*1EG1B HAS FAILED

LOAD DESCRIPTION	LOAD ID NO.	NO. ON BUS	NO. REQ'D	TIME START (1)	NAMEPLATE HP (2)	RUNNING BHP	RUNNING KW (2)	TIME STOP	BLOCK LOAD TOTAL-KW	REF. NO.
Std-by Service Water Pump Motor 1A	1SWP*P2A	1	1	40 sec	450HP	413	328.5	(3)		(3)(10)
Total: 40 Seconds Load Block →									328.5 kW	
Control Building Chillers	1HVK*CHL1A/1C	2	2	60	250	242.6	200	(3)		(3)(9)
Cont. Room Air Conditioning Unit	1HVC*ACU1A	1	1	60	75	60	50	(3)		(3)
Std-by Swgr Room Air Handling Unit	1HVC*ACU2A	1	1	60	75	63.8	53	(3)		(3)
Cont. Bldg Chillers-C.O. Pumps	1HVK*CH1APL	2	2	60	1.5	1.5	1.4	(3)		(3)(9)
	1HVK*CH1CPL				1.5	1.5	1.4	(3)		
Total: 60 Seconds Load Block →									305.8	
Control Building Chillers	1HVK*CHL1A/1C	2	2	>10 MIN	250	242.6	200	(3)		(3)(9)
Containment Unit Cooler	1HVR*UC1A	1	1	>10 MIN	150	83.6	68	(5)		(5)
Auxiliary Bldg Unit Cooler	1HVR*UC11A	1	1	>10 MIN	75	63.3	52.5	(5)		(5)
Total: >10 Minutes Load Block →									320.5	

TABLE 83-2A

AUTOMATIC AND MANUAL LOADING OF ESF BUSES

CASE 2: DG's 1EGS*EG1A AND 1E22*S004GIC OPERATING. DG 1EGS*1EG1B HAS FAILED

LOAD DESCRIPTION	LOAD ID NO.	NO. ON BUS	NO. REQ'D	TIME START (1)	NAMEPLATE HP	RUNNING BHP	RUNNING KW (2)	TIME STOP	BLOCK LOAD TOTAL - KW	REF TO
Standby Cooling Tower Fans	1SWP*FN1A	10	10	>2.0HR	40	40	34	(5)		(5)(8)
	1SWP*FN1C				40	40	34	(5)		(5)(8)
	1SWP*FN1E				40	40	34	(5)		(5)(8)
	1SWP*FN1G				40	40	34	(5)		(5)(8)
	1SWP*FN1J				40	40	34	(5)		(5)(8)
	1SWP*FN1L				40	40	34	(5)		(5)(8)
	1SWP*FN1N				40	40	34	(5)		(5)(8)
	1SWP*FN1Q				40	40	34	(5)		(5)(8)
	1SWP*FN1S				40	40	34	(5)		(5)(8)
	1SWP*FN1U				40	40	34	(5)		(5)(8)
Fuel Pool Cooling Pump	1SFC*P1A	1	1	>2.0HR	100	75	62	(5)		(5)(8)
Drywell Hydrogen Mixing Fan	1CPM*FN1A	1	1	>2.0Hr	1.5	1.0	0.97	(5)		(5)(8)
Stdby Liquid Control Pump	1C41*C001A	1	1	>2.0 Hr	40	–	37.3	(5)		(5)(7)(8)
Hydrogen Recombiner	1HCS*RBNR1A	1	1	>2.0Hr	75 KW	–	75.0	(5)		(5)(8)
Total: >2HR Load Block →									515.27	
TOTAL LOAD: 3736.98 KW (SEE NOTES AND LOAD PROFILE FOR EFFECTIVE LOADS)										

TABLE 83-2B

AUTOMATIC AND MANUAL LOADING OF ESF BUSES

CASE II: DG's 1EGS*EG1B AND 1E22*S001GIC OPERATING. DG 1EGS*1EG1A HAS FAILED.

LOAD DESCRIPTION	LOAD ID NO.	NO. ON BUS	NO. REQ'D	TIME START (1)	NAMEPLATE HP (2)	RUNNING BHP	RUNNING KW (2)	TIME STOP	BLOCK LOAD TOTAL - KW	REF TO
Control Building Chilled Water Pump	1HVK*P1B OR 1D	2	1	10	50	37	31.0	(3)		(3)
Cont. Bldg. Chilled Cond. Recirc. Pump	1SWP*P3B OR D	2	1	10	15	6.3	5.6	(3)		(3)
Equipment Room Air Conditioning Unit	1HVC*ACU3B	1	1	10	5	1.93	1.9	(3)		(3)
Charcoal Filter Heater	1HVC*FLT3BH	1	1	10	23KW	-	23.0	(3)		(3)
Filter Train Booster Fan	1HVC*FN1B	1	1	10	25	19	16.3	(3)		(3)
Std-by Surge Room Exhaust Fan	1HVC*FN2B	1	1	10	30	22.4	19.2	(3)		(3)
Battery Room Exhaust Fan	1HVC*FN3B/E	1	1	10	1.5	0.9	0.9	(3)		(3)
Auxiliary Building Unit Cooler	1HVR*UC4	1	1	10	7.5	4.37	4.0	(3)		(3)
DO	1HVR*UC9	1	1	10	30	26	21.8	(3)		(3)
DO	1HVR*UC10	1	1	10	5	1.9	1.7	(3)		(3)
Filter Train Exhaust Blower	1HVF*FN3B	1	1	10	40	30	25.0	(3)		(3)
Filter Train Heater	1HVF*FLT2BH	1	1	10	57KW	-	57.0	(3)		(3)
Leakage Cont. System - Air Comp.	1LSV*C3B	1	1	10	50	50	43.0	(3)		(3)
Motor Operated Valves	Misc.	Misc.	Misc.	10	-	-	98.0	(4)(5)		(3)(4)
120V AC Std-By Power	Misc.	Misc.	Misc.	10	50KVA	-	45.0	(5)		(3)
Std-by Vital Bus 'B' UPS	1ENB*INV01B	1	1	10	20KW	-	20.0	(5)		(3)
120V Power - NSSS Instrumentation	Misc.	Misc	Misc	10	10KW	-	10.0	(5)		(3)
Std-by Cooling Tower Surge Fan	1HVY*FN2B/2D	2	1	10	3	2.03	2.0	(5)(3)		(3)(12)
Std-by Serv. Water Pump House Fan	1HVY*FN1B/1D	2	1	10	7.5	5.85	5.3	(5)(3)		(3)(12)

TABLE 83-2B

AUTOMATIC AND MANUAL LOADING OF ESF BUSES

CASE II; DG's 1EGS*EG1B AND 1E22*SOOGIC OPERATING. DG 1EGS*1EG1A HAS FAILED

LOAD DESCRIPTION	LOAD ID NO.	NO. ON BUS	NO. REQ'D	TIME START (1)	NAMEPLATE HP (2)	RUNNING BHP	RUNNING KW (2)	TIME STOP	BLOCK LOAD TOTAL - KW	REF TO
Std-by DG Fuel Transfer Pump	1EGF*P1B	1	1	10	3	0.81	0.61	(3)		(3)
125 V DC Battery charger	1ENB*CHGR1B	1	1	10	71.7KW	-	71.70	(3)		(3)
Radiation Monitoring	1ME*RMS	1	1	10	20KW	-	15.0	(3)		(3)(6)
Safety Lighting - Aux. Bldg.	1LAC-XLC9	1	1	10	15KW		10.0	(4)		(3)
Total: 10 Second Load Block →									528.01	
Residual Heat Removal Pump	1E12*C002C	2	2	12	700	630	509.2	(3)		(3)(13)
Total: 12 Second Load Block →									509.2	
Residual Heat Removal Pump	1E12C002B	2	2	17	700	630	509.2	(3)		(3)(13)
Total: 17 Seconds Load Block →									509.2	
Std-by DG Room Vent. Fan	1HVP*FN2B 1HVP*FN3B	2	1	30	100	90.2	73.2	(3)		(3)
Annulus Mixing System fan	1HVR*FN11B	1	1	30	150	135	109.0	(3)		(3)

TABLE 83-28

AUTOMATIC AND MANUAL LOADING OF ESF BUSES

CASE II: DG's 1EGS*EG1B AND 1E22*S001GIC OPERATING. DG 1EGS*1EG1A HAS FAILED

LOAD DESCRIPTION	LOAD ID NO.	NO. ON BUS	NO. REQ'D	TIME START (1)	NAMEPLATE HP (2)	RUNNING BHP	RUNNING KW (2)	TIME STOP	BLOCK LOAD TOTAL - KW	REF TO
Std-by Gas Treatment Exh. Blower	1GTS*FN1B	1	1	30	60	50.5	41.6	(3)		(3)
Std-by Gas Treatment Heater	1GTS*H1B	1	1	30	72 KW	—	72.0	(3)		(3)
									295.8	
Total: 30 Seconds Load Block →										
Std-by Service Water Pump	1SWP*P2B	2	2	40	450	413	328.5	(3)		(3)(14)
									328.5	
Total: 40 second load Block →										
control Building Chillers	1HVK*CHL1B&1D	2	2	60	250	242.6	200.0	(3)		(3)(9)
Control Building Air Conditioning Unit	1HVC*ACU1B	1	1	60	75	60 -	50.0	(3)		(3)
Std-by Surge Room Air Handling Unit	1HVC*ACU2B	1	1	60	75	63.8	53.0	(3)		(3)
Cont Bldg Chillers-L.O. Pumps	1HVK*CHL1BPL	2	2	60	1.5	1.5	1.4	(3)		(3)
	1HVK*CHL1DPL				1.5	1.5	1.4	(3)		
Total: 60 Seconds Load Block →									305.8	

TABLE 83-2B

AUTOMATIC AND MANUAL LOADING OF ESF BUSES

CASE II: DG's 1EGS*EG1B AND 1E22*SOOGIC OPERATING. DG 1EGS*1EG1A HAS FAILED.

LOAD DESCRIPTION	LOAD ID NO.	NO. ON BUS	NO. REQ'D	TIME START (1)	NAMEPLATE HP (1)	RUNNING (2) BHP	RUNNING (2) KW	TIME STOP	BLOCK LOAD TOTAL-KW	REF TO
Standby Service Water Pump	1SWP*P2D	2	2	>10 min	450	413	328.5	(5)		(14)(8)
Auxiliary Building Unit Cooler	1HVR*UC11B	1	1	>10 Min	75	63.3	52.5	(5)		(5)
Containment Unit Cooler	1HVR*UC1B	1	1	>10 MIN	150	83.6	68.0	(5)		(4)
Control Building Chiller	1HVK*CHL1B/1D	2	2	>10 MIN	250	242.5	200.0	(5)		(3)(9)
Total: >10 Min. Load Block →									649.0	

TABLE B3-2B

AUTOMATIC AND MANUAL LOADING OF ESF BUSES

ASS II; DG's 1EGS*EG1B AND 1E22*S001GIC OPERATING. DG 1EGS*1EG1A HAS FAILED

LOAD DESCRIPTION	LOAD ID #	NO. on BUS	NO. REQ'D	TIME START (1)	NAMEPLATE HP	RUNNING BHP	RUNNING KW (2)	TIME STOP	BLOCK LOAD TOTAL - KW	REF TO
Standby Cooling Tower Fans	1SWP*FN1B	10	10	>2.0 HR	40	40	34	(5)		(5)(6)
	1SWP*FN1D				40	40	34	(5)		(5)(6)
	1SWP*FN1F				40	40	34	(5)		(5)(6)
	1SWP*FN1H				40	40	34	(5)		(5)(6)
	1SWP*FN1K				40	40	34	(5)		(5)(6)
	1SWP*FN1M				40	40	34	(5)		(5)(6)
	1SWP*FN1P				40	40	34	(5)		(5)(6)
	1SWP*FN1R				40	40	[illegible]	(5)		(5)(6)
	1SWP*FN1T				40	40	34	(5)		(5)(6)
	1SWP*FN1V				40	40	34	(5)		(5)(6)
Fuel Pool Cooling Pump	1SFC*P1B	1	1	>2.0 HR	100	75	62	(5)		(5)(8)
Drywell Hydrogen Mixing Fan	1CPM*FN1B	1	1	>2.0 Hr	1.5	1.0	0.97	(5)		(5)(6)
Std by Liquid Control Pump	1C41*C001B	1	1	>2.0 Hr	40	-	37.3	(5)		(5)(7)(8)
Hydrogen Recombiner	1HCS*RBNR1B	1	1	>2.0 Hr	75 KW	-	75.0	(5)		(5)(8)
Total: >2 HR Load Block →									515.27	
TOTAL LOAD: 3640.78 KW										
(SEE NOTES AND LOAD PROFILE FOR EFFECTIVE LOADS)										

TABLE 83-2C

AUTOMATIC AND MANUAL LOADING OF ESF BUSES

CASE III: DG's 1EGS*EG1A AND 1EGS*EG1B OPERATING. DG 1E22*S001G1C HAS FAILED

LOAD DESCRIPTION	LOAD ID. NO.	NO. ON BUS	NO. REQ'D	TIME START (1)	NAMEPLATE (2) HP/KW	RUNNING BHP (2)	RUNNING KW (2)	TIME STOP	Block Load Total - kW	Reference To
Control Bldg. Chilled Water Pump	1HVK*P1A OR 1C	2	1	10	50	37	31.0	(3)(15)		(3)(15)
Contrd Bldg Chilled Cond. Recirc. Pump	1SWP*P3A OR 3C	2	1	10	15	6.3	5.6	(3)(15)		(3)(15)
Equipt. Room Air Condition Unit Mtr	1HVC*ACU3A	1	1	10	5	1.93	1.9	(3)(15)		(3)(15)
CharCoal Filter Heater	1HVC*FLT3AH	1	1	10	23 KW	-	23.0	(3)		(3)
Filter Train Booster Fan	1HVC*FN1A	1	1	10	25	19	16.3	(3)		(3)
Std-by Surge Room Exhaust Fan	1HVC*FN2A	1	1	10	30	27.4	19.2	(3)		(3)
Battery Room Exhaust Fan	1HVC*FN3A/D	2	1	10	1.5	0.9	0.9	(3)		(3)
Auxiliary Bldg Unit Cooler	1HVR*UC2	1	1	10	5	3.22	2.9	(3)		(3)
Do	1HVR*UC3	1	1	10	7.5	5.22	4.7	(3)		(3)
Do	1HVR*UC6	1	1	10	40	39.0	33.0	(3)		(3)
Do	1HVR*UC7	1	1	10	15	11.0	9.6	(3)		(3)
Filter Train Exhaust Blower	1HVF*FN3A	1	1	10	40	30.0	25.0	(3)		(3)
Filter Train Heater	1HVF*FLT2AH	1	1	10	57 KW	-	57.0	(3)		(3)
Std-by Serv. Water PP Hse Supply Fan	1HVY*FN1A	2	1	10	7.5	5.85	5.3	(3)		(3)(10)
Leakage Cont. Sys. Air Compressor	1LSV*C3A	1	1	10	50	50	43.0	(3)		(3)
Motor operated Valves	Misc.	Misc.	Misc.	10	-	-	98.0	(3)(4)		(4)(3)
120V AC Std-by Power	Misc.	Misc.	Misc.		50 KW		45.0	(5)		(3)
Std-by Vital Bus 'A' UPS System	1ENB*INV.01A	1	1	10	20 KVA	-	14.0	(5)		(3)
120V Instrumentation + NSSS	Misc.	Misc.	Misc.	10	10 KW	-	10 KW	(5)		(3)

TABLE 83-26

AUTOMATIC AND MANUAL LOADING OF ESF BUSES

CASE III: DG's 1EGS*EG1A AND 1EGS*EG1B OPERATING. DG 1E22*S00/G/C HAS FAILED

LOAD DESCRIPTION	LOAD ID NO.	NO. ON BUS	NO. REQ'D	TIME START (1)	NAMEPLATE (2) HP/KW	RUNNING (2) BHP	RUNNING (2) KW	TIME STOP	Block Load Totals KW	REFERENCES TO
125 V DC Battery charger	1ENB*CHGR1A	1	1	10 sec	71.7kw	-	71.7	(5)		(3)
Radiation Monitoring System	1ME*RMS	1	1	10 sec	20 kW	-	19.0	(9)		(3)
Safety Ltg - Aux. Bldg.	1LAC-xLC9	1	1	10 sec	19 kW	-	10.0	(5)		(3)(6)
Std. by Cooling Tower #1 Swgr. Fan	1HVY*FN2A	2	1	10 sec	3	2.03	2.0	(3)		(3)
Std. by D/G Fuel Trans. Pump.	1EGF*P1A	1	1	10 sec	3	0.81	0.61	(3)		(3)
Total: 10 second Load Block →									544.71 KW	
Low Pressure Core Spray Pump	1E21*C001	1	1	12 sec	1290HP	1290	917.2	(10)(3)		(3)(8)
Total: 12 Second Load Block →									917.2 KW	
Residual Heat Removal Pump 'A'	1E12*C002A	1	1	17 sec	700HP	630	509.2	(3)(5)		(3)(8)
Total: 17 Seconds Load Block →									509.2 KW	
Std. by DG Room Vent. Fan	1HVP*FN2A/3A	2	1	30	100	90.2	73.2	(3)		(3)
Annulus Mixing System Fan	1HVR*FN11A	1	1	30	150	135.0	109.0	(3)		
Std. by Gas Treatment Exhaust Blower	1GTS*FN1A	1	1	30	60	50.5	41.6	(3)		
Std. by Gas Treatment Heater	1GTS*H1A	1	1	30	72 kw	-	72.	(3)		(3)
Total: 30 Seconds Load Block →									295.8	

TABLE 83-2C

AUTOMATIC AND MANUAL LOADING OF ESF BUSES

CASE III: DG's 1EGS*EG1A AND 1EGS*EG1B OPERATING. DG 1E22*S00GKCHAS FAILED

LOAD DESCRIPTION	LOAD ID NO.	NO. ON BUS	NO. RQD	TIME START (1)	NAMEPLATE HP (2)	RUNNING BHP	RUNNING KW (2)	TIME STOP	BLOCK LOAD TOTAL-KW	REF TO
Std-by Service Water Pump Motor 1A	1SWP*P2A	1	1	40	450HP	413	328.5	(3)		(3)(10)
Total: 40 Seconds Load Block →									328.5 kW	
Control Building Chillers	1HVK*CHL1A/1C	2	2	60	250	242.6	200	(3)(15)		(3)(9)(15)
Cont. Room Air Conditioning Unit	1HVC*ACU1A	1	1	60	75	60	50	(3)(15)		(3)(15)
Std-by Swgr. Room Air Handling Unit	1HVC*ACU2A	1	1	60	75	63.8	53	(3)(15)		(3)(15)
Cont. Bldg Chillers-C.O. Pumps	1HVK*CH1APL 1HVK*CH1CPL	2	2	60	1.5 1.5	1.5 1.5	1.4 1.4	(3)(15) (3)(15)		(3)(9)(15) (3)(9)(15)
Total: 60 Seconds Load Block →									305.8	
Control Building Chillers	1HVK*CHL1A/1C	2	2	>10 MIN	250	242.6	200	(3)(15)		(3)(9)(15)
Containment Unit Cooler	1HVR*UC1A	1	1	>10 MIN	150	83.6	68	(5)		(5)
Auxiliary Bldg Unit Coolers	1HVR*UC11A	1	1	>10 MIN	75	63.3	52.5	(5)		(5)
Total: >10 Minutes Load Block →									320.5	

TABLE 83-2C

AUTOMATIC AND MANUAL LOADING OF ESF BUSES

CASE III: DG's 1EGS*EG1A AND 1EGS*EG1B OPERATING. DG 1E22*S004S/C HAS FAILED

LOAD DESCRIPTION	LOAD ID BID.	NO. ON BUS	NO. REQ'D	TIME START (1)	NAMEPLATE HP	RUNNING BHP	RUNNING KW (2)	TIME STOP	BLOCK LOAD TOTAL - KW	REF. TO
Standby Cooling Tower Fans	1SWP*FN1A	10	10	>2.0 HR	40	40	34	(5)		(5)(8)
	1SWP*FN1C				40	40	34	(5)		(5)(8)
	1SWP*FN1E				40	40	34	(5)		(5)(8)
	1SWP*FN1G				40	40	34	(5)		(5)(8)
	1SWP*FN1J				40	40	34	(5)		(5)(8)
	1SWP*FN1L				40	40	34	(5)		(5)(8)
	1SWP*FN1N				40	40	34	(5)		(5)(8)
	1SWP*FN1Q				40	40	34	(5)		(5)(8)
	1SWP*FN1S				40	40	34	(5)		(5)(8)
	1SWP*FN1U				40	40	34	(5)		(5)(8)
Fuel Pool Cooling Pump	1SFC*P1A	1	1	>2.0 HR	100	75	62	(5)		(5)(8)
Drywell Hydrogen Mixing Fan	1CPM*FN1A	1	1	>2.0 Hr	1.5	1.0	0.97	(5)		(5)(8)
Stdby Liquid Control Pump	1C41*C001A	1	1	>2.0 Hr	40	–	37.3	(5)		(5)(7)(8)
Hydrogen Recombiner	1HCS*RB1P1A	1	1	>2.0 Hr	75 KW	–	75.0	(5)		(5)(8)
Total: >2 HR Load Block →									515.27	
TOTAL LOAD: 3736.98 KW										
(SEE NOTES AND LOAD PROFILE FOR EFFECTIVE LOADS)										

TABLE 83-2C

AUTOMATIC AND MANUAL LOADING OF ESF BUSES

CASE III: DG's 1EGS*EG1B AND 1EGS*EG1A OPERATING. DG 1E22*S001G1C HAS FAILED.

LOAD DESCRIPTION	LOAD ID DES.	NO. ON BUS	NO. REQ'D	TIME START (1)	NAMEPLATE HP (2)	RUNNING BHP	RUNNING KW (2)	TIME STOP	BLOCK LOAD TOTAL - KW	REF TO
Control Building Chilled Water Pump	1HVK*P1B OR 1D	2	1	10	50	37	31.0	(3)(15)		(3)(15)
Cont. Bldg. Chilled Cond. Recirc. Pump	1SWP*P3B OR 3D	2	1	10	15	6.3	5.6	(3)(15)		(3)(15)
Equipment Room Air Conditioning Unit	1HVC*ACU3B	1	1	10	5	1.93	1.9	(3)(15)		(3)(15)
Charcoal Filter Heater	1HVC*FLT3BH	1	1	10	23KW	-	23.0	(3)		(3)
Filter Train Booster Fan	1HVC*FN1B	1	1	10	25	19	16.3	(3)		(3)
Std-by Switgr. Room Exhaust Fan	1HVC*FN2B	1	1	10	30	22.4	19.2	(3)		(3)
Battery Room Exhaust Fan	1HVC*FN3B/E	1	1	10	1.5	0.9	0.9	(3)		(3)
Auxiliary Building Unit Cooler	1HVR*UC4	1	1	10	7.5	4.37	4.0	(3)		(3)
DO	1HVR*UC9	1	1	10	30	26	21.8	(3)		(3)
DO	1HVR*UC10	1	1	10	5	1.9	1.7	(3)		(3)
Filter Train Exhaust Blower	1HVF*FN3B	1	1	10	40	30	25.0	(3)		(3)
Filter Train Heater	1HVF*FLT2BH	1	1	10	57KW	-	57.0	(3)		(3)
Leakage Cont. System - Air Comp.	1LSV*C3B	1	1	10	50	50	45.0	(3)		(3)
Motor Operated Valves	Misc.	Misc.	Misc.	10	-	-	98.0	(4)(3)		(3)(4)
120V AC Std-By Power	Misc.	Misc.	Misc.	10	50KVA	-	45.0	(5)		(3)
Std-by Vital Bus 'B' UPS	1ENB*INV01B	1	1	10	20kW	-	20.0	(5)		(3)
120V Power - NSSS Instrumentation	Misc.	Misc	Misc	10	10kW	-	10.0	(*)		(3)
Std-by Cooling Tower Swgr. Fan	1HVY*FN2B/2D	2	1	10	3	2.03	2.0	(5)(3)		(3)(12)
Std-by Serv. Water Pump House Fan	1HVY*FN1B/1D	2	1	10	7.5	5.85	5.3	(5)(3)		(3)(12)

TABLE 83-2C

AUTOMATIC AND MANUAL LOADING OF ESF BUSES

CASE III: DG's 1EGS*EG1B AND 1EGS*EG1A OPERATING. DG 1E22*S001C HAS FAILED

LOAD DESCRIPTION	LOAD ID NO.	NO. OF BUS	NO. REQ'D	TIME START (1)	NAMEPLATE HP (2)	RUNNING BHP	RUNNING KW (2)	TIME STOP	BLOCK LOAD TOTAL - KW	REF TO
Std-by DG Fuel Transfer Pump	1EGF*P1B	1	1	10	3	0.81	0.61	(3)		(3)
125 V DC Battery charger	1ENB*CHGR1B	1	1	10	71.7KW	-	71.70	(9)		(3)
Radiation Monitoring	1ME*RMS	1	1	10	20KW	-	15.0	(5)		(3)(6)
Safety Lighting - Aux. Bldg.	1LAC-XLC9	1	1	10	15KW		10.0	(4)		(4)
Total: 10 second Load Block →									528.01	
Residual Heat Removal Pump	1E12*C002C	2	2	12	700	630	509.2	(3)(10)(15)		(3)(13)(15)
Total: 12 second Load Block →									509.2	
Residual Heat Removal Pump	1E12C002B	2	2	17	700	630	509.2	(3)(10)(15)		(3)(13)(15)
Total: 17 Seconds Load Block →									509.2	
Std-by DG Room Vent Fan	1HVP*FN2B 1HVP*FN3B	2	1	30	100	90.2	73.2	(3)		(3)
Annulus Mixing System fan	1HVR*FN11B	1	1	30	150	135	109.0	(3)		(3)

TABLE 83-2C

AUTOMATIC AND MANUAL LOADING OF ESF BUSES

CASE III: DG's 1EGS*EG1B AND 1EGS*EG1A OPERATING. DG 1E22*S001G1CHAS FAILED

LOAD DESCRIPTION	LOAD ID. NO.	NO. OF BUS	NO. REQ'D	TIME START (1)	NAMEPLATE HP (2)	RUNNING HP	RUNNING KW (2)	TIME STOP	BLOCK LOAD TOTAL - KW	REF. TO
Std-by Gas Treatment Exh. blower	1GTS*FN1B	1	1	30	60	50.5	41.6	(3)		(3)
Std-by Gas Treatment Heater	1GTS*H1B	1	1	30	72KW	—	72.0	(3)		(3)
Total: 30 Seconds Load Block →									295.8	
Std-by Service Water Pump	1SWP*P2B	2	2	40	450	413	328.5	(3)		(3)(14)
Total: 40 second load Block									328.5	
control Building Chillers	1HVK*CHL1B or 1D	2	2	60	250	242.6	200.0	(3)(5)		(3)(9)(15)
Control Building Air Conditioning Unit	1HVC*ACU1B	1	1	60	75	60 -	50.0	(3)(5)		(3)(19)
Std-by Supp. Room Air Handling Unit	1HVC*ACU2B	1	1	60	75	63.8	53.0	(3)(4)		(3)(19)
Cont Bldg Chillers-L.O. Pumps	1HVK*CHL1BPL	2	2	60	1.5	1.5	1.4	(3)(5)		(3)(15)
	1HVK*CHL1DPL				1.5	1.5	1.4	(3)(9)		
Total: 60 Seconds load Block →									305.8	

TABLE 83-22

AUTOMATIC AND MANUAL LOADING OF ESF BUSES

CASE III: DG's 1EGS*EG1B AND 1EGS*EG1A OPERATING. DG 1E22*S00LG1C HAS FAILED.

LOAD DESCRIPTION	LOAD ID NO.	NO. ON BUS	NO. ROCD	TIME START (1)	NAMEPLATE HP (2)	RUNNING BHP	RUNNING KW (2)	TIME STOP	BLOCK LOAD TOTAL-KW	REF TO
Standby Service Water Pump	1SWP*P2D	2	2	>10 min	450	413	328.5	(5)		(4)(5)
Auxiliary Building Unit Cooler	1HVR*UC11B	1	1	>10 Min	75	63.3	52.5	(5)		(5)
Containment Unit Cooler	1HVR*UC1B	1	1	>10MW	150	83.6	68.0	(5)		(9)
Control Building Chiller	1HVK*CHLIB/D	2	2	>10MW	250	242.5	200.0	(5)(15)		(3)(9)(15)
Total: >10 MW Load Block →									649.0	

TABLE 8.3-2

AUTOMATIC AND MANUAL LOADING OF ESF BUSES

CASE III: DG's 1EGS*EG1B AND 1EGS*EG1A OPERATING. DG 1E22*S001G/CNMS FAILED

LOAD DESCRIPTION	LOAD ID No.	NO. OF BUS	NO. OF LOADS	TIME START (1)	NAMEPLATE HP	RUNNING HP	RUNNING KW (2)	TIME STOP	BLOCK LOAD TOTAL - KW	SEE NOTE
Standby Cooling Tower Fans	1SWP*FN1B	10	10	>2.0 HR	40	40	34	(5)		(5)(8)
	1SWP*FN1D				40	40	34	(5)		(5)(8)
	1SWP*FN1F				40	40	34	(5)		(5)(8)
	1SWP*FN1H				40	40	34	(5)		(5)(8)
	1SWP*FN1K				40	40	34	(5)		(5)(8)
	1SWP*FN1M				40	40	34	(5)		(5)(8)
	1SWP*FN1P				40	40	34	(5)		(5)(8)
	1SWP*FN1B				40	40	34	(5)		(5)(8)
	1SWP*FN1T				40	40	34	(5)		(5)(8)
	1SWP*FN1V				40	40	34	(5)		(5)(8)
Fuel Pool Cooling Pump	1SFC*P1B	1	1	>2.0 HR	100	75	62	(5)		(5)(8)
Drywell Hydrogen Mixing Fan	1CPM*FN1B	1	1	>2.0 HR	1.5	1.0	0.97	(5)		(5)(8)
Stdby Liquid Control Pump	1C41*C001B	1	1	>2.0 HR	40	-	37.3	(5)		(5)(10)(12)
Hydrogen Recombiner	1HCS*RCN1B	1	1	>2.0 HR	75 KW	-	75.0	(5)		(5)(8)
Total: >2 HR Load Block →									515.27	
TOTAL LOAD: 3640.78 KW (SEE NOTES AND LOAD PROFILE FOR EFFECTIVE LOADS)										

NOTES for Tables 8.3-2A, 2B & 2C

1. The time indicated in this column is reckoned from the instant LOCA and LOOP signals are given to emergency diesel generators. Maximum time for standby diesel generators to start and attain rated speed and frequency, including diesel generator air circuit breaker (ACB), to close is 10 sec. Time is in seconds unless indicated otherwise.

2. Nameplate horsepower and brake horsepower are supplied by vendors for their furnished equipment. The required kilowatts for each load are calculated by using brake horsepower and the efficiency data supplied by vendors of the respective equipment.

3. This load starts and/or stops automatically with satisfactory complete actuation or energization of its associated pump, valves, pressure or temperature switches' interlocks, or energization of the required buses from the standby power sources.

4. Motor operators of the MOVs stop automatically when the valve action is completed. All MOV loads complete their intended operation and are deenergized within 10 min of diesel generator ACB closing.

5. Started and/or stopped manually by operator.

6. 1LAC-XLC9 has three sources of power from which it may select. This is not tripped on LOCA and is normally connected to diesel generator 1EGS*EG1A.

7. 1C41*C001A and B may be energized at the discretion of the plant operator.

8. These loads shall be manually activated by the operator after LPCS in Case I or RHR C in Case II are manually tripped by the operator after 2.0 hr of operation of either pump.

9. One control building chiller receives an automatic start signal at 60 sec. Due to inherent design, a chiller shall automatically start after a time delay of 10 to 13 sec from receipt of a start signal (i.e., the chiller would start at 70 to 73 sec). The second control building chiller is manually started after 10 min, when all MOVs have cycled off.

10. 1HVY*FN1A is supplied from diesel generator 1EGS*EG1A. 1HVY*FN1C and 1SWP*P2C are supplied from 1E22*S001G1C independently. The operator shall shutoff either 1HVY*FN1A or 1HVY*FN1C at his discretion if both fans operate simultaneously.

11. The LPCS pump shall be manually tripped after >2.0 hr of operation to permit additional loading of the diesel generator.

12. One cooling fan shall start at 10 sec. Only one of the two fans shall operate.

13. RHR C pump actuates at 12 sec and RHR B actuates at 17 sec.

14. One standby service water pump is sequenced to start at 40 sec. The second service water pump is started manually at >10 min. Since discharge valves associated with each standby service water pump take 30 sec to cycle, actual start of the first service water pump occurs at 30 sec from the diesel generator circuit breaker closing.

15. During LOCA with LOOP concurrent with HPCS diesel generator failure, load reduction of 1EGS*EG1A and 1EGS*EG1B is accomplished by manuevering the following control building heating, ventilation, and air-conditioning (CB-HVAC) loads:

    Control building chilled water pumps (1HVK*P1A and 1C), chilled condensate recirculation pumps (1SWP*P3A and 3C), equipment room air-conditioning unit (1HVC*ACU3A), which actuate instantly at 10 sec and control building chillers 1HVK*CHL1A and 1C and their associated lubricating oil pumps, control room air-conditioning unit (1HVC*ACU1A), and standby switchgear room air-handling unit (1HVC*ACU2A), which actuate at 60 sec, would be manually tripped by the operator from diesel generator 1EGS*EG1A after verifying that their redundant units are running satisfactorily on diesel generator EGS*EG1B. The transfer of these loads shall be accomplished within 10 min of the start of the diesel generator's loading. In this case, RHR C operating on 1EGS*EG1B shall be manually tripped after 2 hr of operation.

    It shall be noted that all components of CB-HVAC have to operate as a group. If there is a failure of either of these components in Division B, the whole load group shall be kept operating in Division A (on 1EGS*EG1A), and the corresponding loads in Division B shall be tripped. In this case, load reduction of diesel generator 1EGS*EG1A shall be accomplished by manually tripping RHR A after 2.0 hr. However, tripping of RHR C operating on diesel generator 1EGS*EG1B shall not be required if RHR A is tripped from diesel generator 1EGS*EG1A.

16. This standby service water pump receives an automatic start signal at 40 sec from LOCA/LOOP occurrence or 30 sec from diesel generator 1EGS*EG1A air circuit breaker closure.

17. 1SWP*P2C shall be delayed to start automatically until 60 sec from the HPCS diesel generator circuit breaker closure. This delay assures eliminating any potential of water hammer in a division piping in the event 1SWP*P2A has started operating already.

TABLE 8.3-3

HPCS DIESEL GENERATOR LOADING

Equipment ID No.	Description	Connected Load	Running Load	
1E22*C001	HPCS pump motor	2,500 hp	1,875 kW	3
1E22*S001C1	Air compressor	5 hp	3.7 kW	
1E22*S001C0P	Circulation oil pump	1 hp	1.0 kW	
1E22*S001CGR	125-V dc battery charger	5.0 kW	5.0 kW	
1EGF*P1C	Fuel oil transfer pump	3 hp	0.61 kW	3
1HVC*FN3C	Battery room exhaust fan	1.5 hp	0.9 kW	
1HVC*FN3F	Battery room exhaust fan	1.5 hp	----	
1E22*C003	Fill subsystem pump motor	5 hp	2.6 kW	
1HVR*UC5	Auxiliary building unit cooler	40 hp	28.3 kW	3
1HVP*FN5A	Diesel generator room vent fan motor	100 hp	74.6 kW	
1E22*F(Various)	Valve load	56 hp	26 kW	
-----	control power	----	1.0 kW	
TOTAL		2,742.0 hp	2,013.0 kW	

REPLACE with Insert A

NOTE:

Total running load	2,013 kW	3
HPCS diesel generator continuous rating	2,600 kW	
HPCS diesel generator 2,000-hr rating	2,850 kW	
HPCS diesel generator 30-min rating	3,050 kW	

The continuous rating is subject to 10 percent overload for 2 hr out of a 24-hr period of operation. The 2,000-hr and 30-min ratings are not subject to overload.

Retain this portion

INSERT A

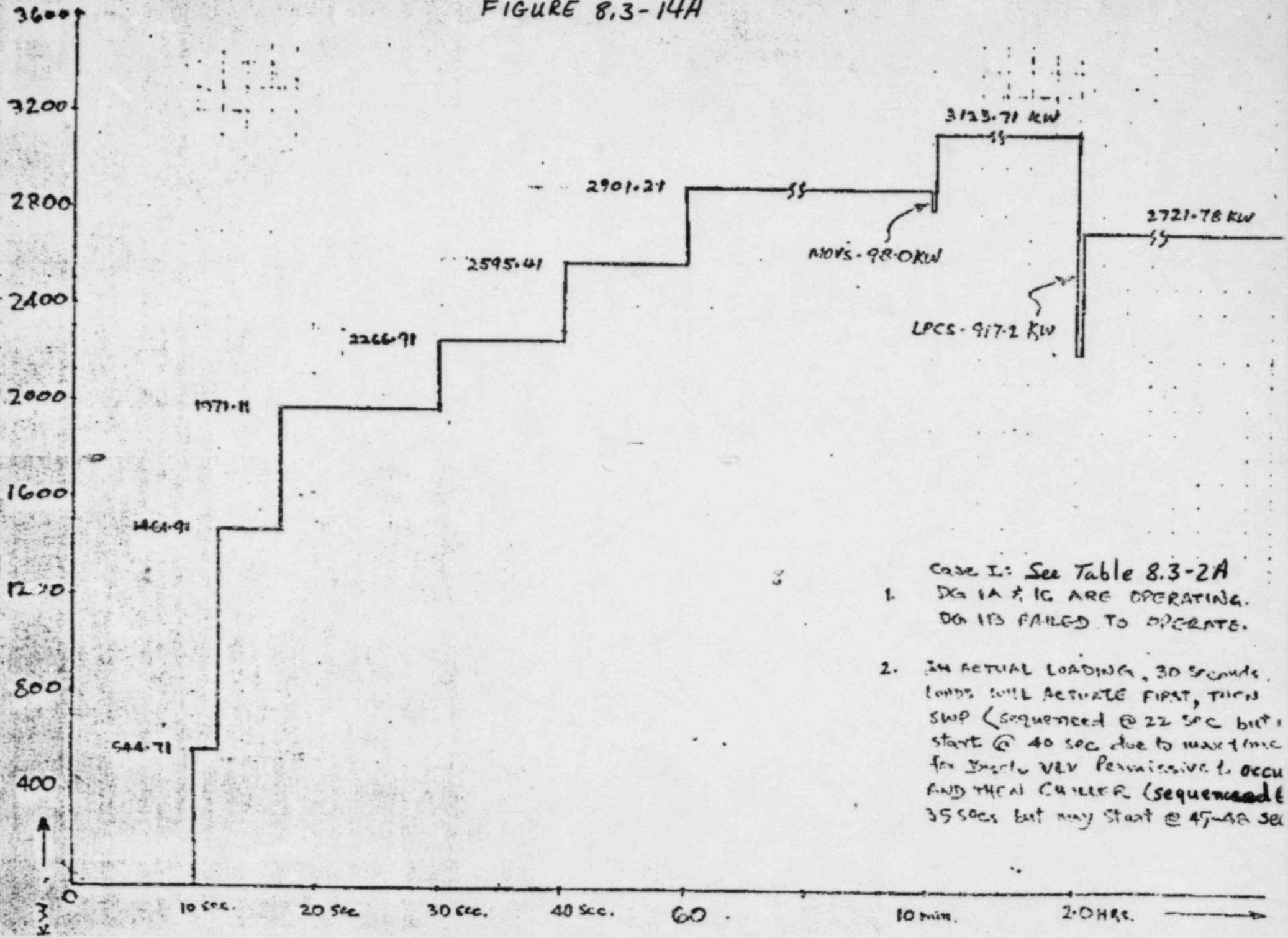
TABLE 8.3-3

HPCS DIESEL GENERATOR LOADING DURING A DBE

EQUIPMENT ID NO.	DESCRIPTION	CONNECTED LOAD	MAXIMUM RUNNING LOAD
1E22*C001	HPCS Pump Motor	2500 HP	1875.00 KW
1SWP*P2C	Standby Service Water Pump Motor	450 HP	328.5 KW(1)
1HVC*FN3F	Gen. Battery Room Exhaust Fan	150 HP	0.9 KW
1HVP*FN6C	Gen. Vent Supply Fan	1.0 HP	0.8 KW
1HVR*UC5	HPCS Pump & Room Unit Cooler	40 HP	28.3 KW
1HVC*FN3C	Battery Room Exhaust Fan	(Redundant)	
1E22*5001CMP	HPCS DG Air Compressor	7.5 HP	5.5 KW
1E22*5001DGH	DG IMRS Heater	-	15.0 KW
1EGF*P1C	Fuel Oil Transfer Pump	3.0	0.61 KW
1E22*5001COP	Circulating Oil Pump	1.0	1.0 KW
1E22*5001CGR	Battery Charger	29 KVA	20.0 KW
1E22*5002PNL	Misc. 120V AC loads	10 KVA	8.0 KW
1HVP*FN3A	DG Room Vent Fan	100 HP	74.6 KW
Misc. Valves (HPCS)	Max. Coincident Load	15.8 HP	11.7 KW
1HVY*FN1C	Standby Service Water Pump Room Vent Fan	7.5 HP	5.3 KW
1SWP*MOV40C	Standby Service Water Pump Discharge Valve	0.7 HP	0.5 KW
			2375.71 KW

(1) Standby Service Water Pump shall be sequenced to operate at 30 seconds after HPCS DG circuit breaker closes.

FIGURE 8.3-14A

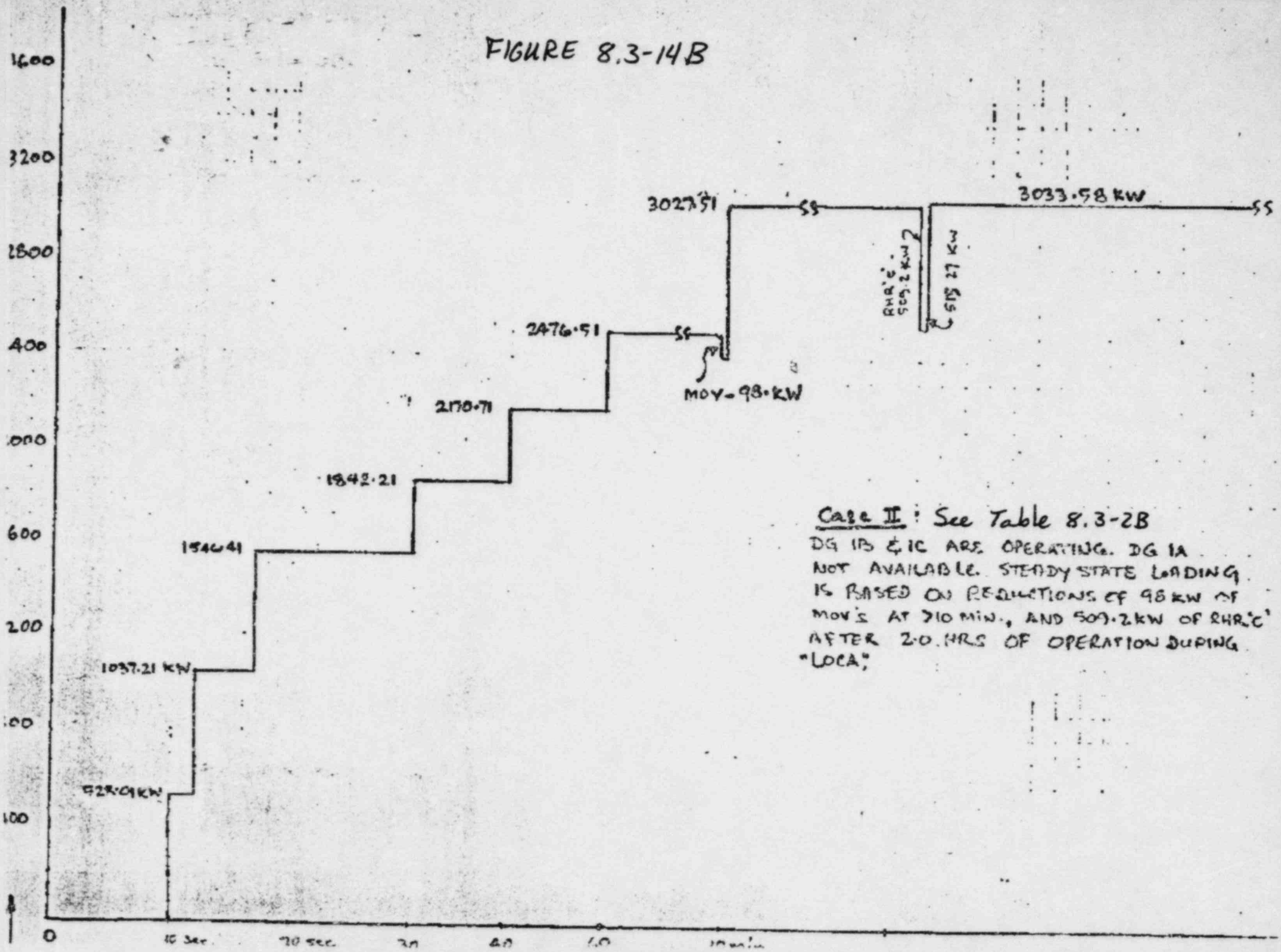


Case I: See Table 8.3-2A

1. DG 1A & 1C ARE OPERATING. DG 1B FAILED TO OPERATE.

2. IN ACTUAL LOADING, 30 seconds loads will ACTUATE FIRST, THEN SWP (sequenced @ 22 sec but start @ 40 sec due to max time for Inertia VLV Permissive to occu AND THE AI CHILLER (sequenced 35 secs but may start @ 45-48 se

FIGURE 8.3-14B



Case II : See Table 8.3-2B

DG 1B & 1C ARE OPERATING. DG 1A NOT AVAILABLE. STEADY STATE LOADING IS BASED ON REDUCTIONS OF 98 KW OF MOV'S AT 10 MIN., AND 509.2 KW OF RHR'C' AFTER 2.0 HRS OF OPERATION DURING "LOCA".

FIGURE 8.3-15A

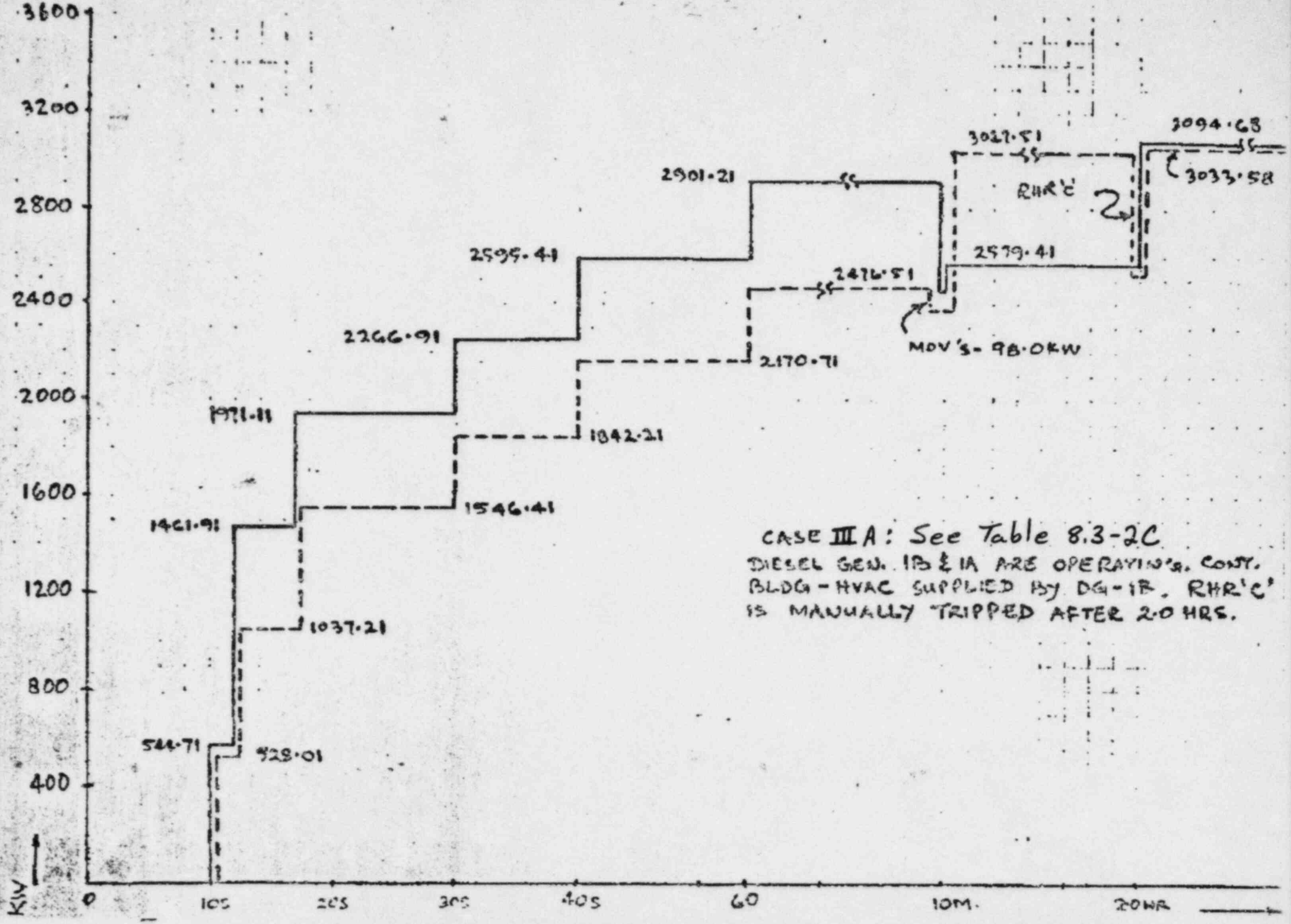
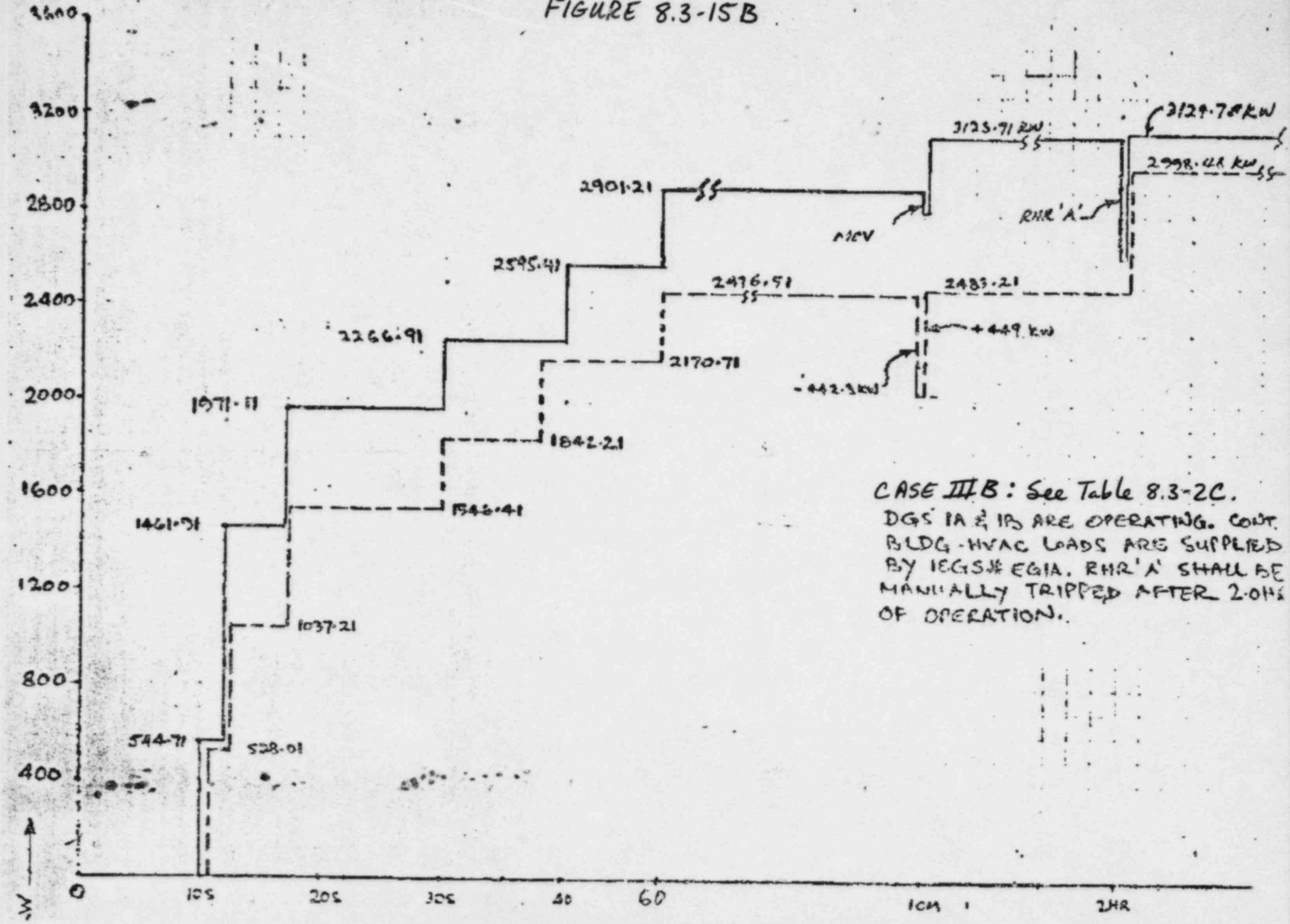


FIGURE 8.3-15B



CASE IIIB: See Table 8.3-2C.
DGS 1A & 1B ARE OPERATING. CONT. BLDG-HVAC LOADS ARE SUPPLIED BY 1EGS# E61A. RHR 'A' SHALL BE MANUALLY TRIPPED AFTER 2.0Hr OF OPERATION.

d. Demonstrate in conjunction with the RHR preoperational test that the RHR system can be operated in the suppression pool cooling mode and the shutdown cooling mode from the remote shutdown panel. 5

e. Demonstrate in conjunction with the nuclear boiler preoperational test that the three designated safety relief valves can be operated from the remote shutdown panel.

4. Acceptance Criteria

a. Remote shutdown system valves, controls, instruments, and pumps operate in all required modes as specified by the GE Preoperational Test Specification.

5 b. Operation of the RHR, RCIC, standby service water, and safety relief valve systems functions as specified by the GE Preoperational Test Specification.

14.2.12.1.36 Standby Diesel Generator Preoperational Test

1. Test Objectives

a. To demonstrate the reliability of the standby diesel generator power sources

b. To provide assurance that the system is capable of providing standby electrical power during normal and simulated accident conditions

c. To demonstrate the system's ability to pick up standby loads during simulated accident conditions

d. To demonstrate the operability of the diesel generator auxiliary systems, i.e., diesel fuel oil transfer and diesel generator starting air supply system

2. Prerequisites

13 a. Required preliminary tests completed

b. All instrument calibration and loop checks completed

c. The following system and/or components available:

(1) Fire protection system in diesel generator room

(2) SWP

(3) Pneumatic sources

(4) Electrical power to motors, fans, etc

(5) Diesel generator building ventilation system as required to support testing | 13

d. Sufficient diesel fuel on site to perform tests

3. Test Procedure

a. Test all diesel starting and trip sequences to assure proper operation.

b. Test all auxiliary systems to demonstrate that they operate in accordance with test specifications.

c. Verify that all interlocks, controls, and alarms operate in accordance with test specifications.

d. Demonstrate proper manual and automatic operation of the diesel generators and that they can start automatically upon simulated loss of ac voltage and attain the required frequency and voltage within the specified limits.

e. Demonstrate proper response and operation for test basis accident (DBA) loading sequence to test basis load requirements, and verify that voltage and frequency are maintained within specified limits.

f. Demonstrate proper operation of the diesel generator during load shedding, load sequencing, and load rejection. Include a test of loss of the largest single load while maintaining voltage and frequency within test limits, and a test of the complete loss of

load in which overspeed limits are not exceeded.

g. Demonstrate full-load carrying capability of the diesel generators for a period of not less than 24 hr, of which 22 hr are not less than the equivalent DBA full load value for the respective standby bus, and 2 hr are at the DEMA standard 2-hr load rating (110 percent of nameplate rating). Verify that voltage and frequency are maintained within test limits and that the diesel cooling systems function within test limits.

at 3500 kw.

h. Demonstrate functional capability at operating temperature conditions by reperforming tests d and e above immediately (within 5 min), after completion of the 24-hr load test g above.

i. Demonstrate the ability to:

(1) Synchronize the diesel generators with offsite power while connected to the standby load

(2) Transfer the load from the diesel generators to the offsite power

(3) Isolate the diesel generators and restore them to standby status.

j. Demonstrate that the rate of fuel consumption while operating at the DBA load is such that the requirements for 7-day storage inventory are met for each diesel generator.

k. The reliability of each diesel generator unit is demonstrated as per Regulatory Guide 1.108, paragraph C.2.a(9), the RBS position on as stated in Section 1.8.

l. Demonstrate that the capability of the diesel generators to supply standby power within the required time is not impaired during periodic surveillance testing.

m. Demonstration of reliability and independence of the redundant diesel generator units is provided through their simultaneous starting during the testing discussed in Section 14.2.12.1.44.

n. Demonstrate that the standby diesel generator can be started from minimum design starting air pressure and that the starting air system provides the number of starts by design with the recharging compressors isolated. 5

4. Acceptance Criteria

a. System configuration and operation are comparable to that shown in the manufacturer's technical instruction manual.

b. Automatic sequencing of generator-driven equipment occurs as specified by FSAR Chapter 8, Table 8.3-2.

c. All auxiliary systems function as specified by FSAR Chapter 9, Sections 9.5.4, 9.5.5, 9.5.6, 9.5.7, and 9.5.8, and the manufacturer's technical instruction manual. 5

d. Rated load and frequency can be attained.

e. Load rejection does not result in exceeding speeds or voltages which cause diesel generator tripping or mechanical damage.

f. The standby diesels start with minimum air pressure and start with the recharging air compressors isolated, as specified by FSAR Chapter 9, Sections 9.5.6.1 and 9.5.6.2.1.

14.2.12.1.37 Vessel Internals Vibration Preoperational Test

1. Test Objective 00414

Vibration tests are conducted to verify the structural integrity of core support structure and reactor internals in accordance with Regulatory Guide 1.20. The jet pumps are part of this program.

2. Prerequisites

a. Reactor recirculation system operational

b. Capability to maintain reactor pressure and temperature requirements has been established.