**ATTACHMENT B**

**PROPOSED CHANGES TO THE TECHNICAL**

**SPECIFICATIONS FOR OPERATING LICENSE**

**NPF-11 AND NPF-18**

| | NPF-11 | NPF-18 |
|---|---|---|
| Revised Pages: | | |
| | 3/4 8-4 | 3/4 8-4 |
| | 3/4 8-6 | 3/4 8-6 |



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

7. Verifying the pressure in all diesel generator air start receivers to be greater than or equal to 200 psig.

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

c. At least once per 92 days and from new fuel oil prior to addition to the storage tanks by verifying that a sample obtained in accordance with ASTM-D270-1975 has a water and sediment content of less than or equal to 0.05 volume percent and a kinematic viscosity @ 40°C of greater than or equal to 1.9 but less than or equal to 4.1 when tested in accordance with ASTM-D975-77, and an impurity level of less than 2 mg of insolubles per 100 ml when tested in accordance with ASTM-D2274-70.

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

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

2. Verifying the diesel generator capability* to reject a load of greater than or equal to 1190 kW for diesel generator 0, greater than or equal to 638 kW for diesel generators 1A and 2A, and greater than or equal to ~~2381~~ 2421 kW for diesel generator 1B while maintaining engine speed less than or equal to 75% of the difference between nominal speed and the overspeed trip setpoint or 15% above nominal, whichever is less.

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

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

a) For Divisions 1 and 2 and for Unit 2 Division 2:

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

*All planned diesel generator starts performed for the purpose of meeting these surveillance requirements may be preceded by an engine prelube period, as recommended by the manufacturer.

2) Verifying the diesel generator starts on the auto-start signal, energizes the emergency busses with permanently connected loads within 13 seconds, energizes the auto-connected emergency loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. After energization, the steady state voltage and frequency of the emergency busses shall be maintained at 4160 ±416 volts and 60 ±1.2 Hz during this test.

b) For Division 3:

1) Verifying de-energization of the emergency bus.

2) Verifying the diesel generator starts on the auto-start signal, energizes the emergency bus with its loads within 13 seconds and operates for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. After energization, the steady state voltage and frequency of the emergency bus shall be maintained at 4160 ±416 volts and 60 ±1.2 Hz during this test.

7. Verifying that all diesel generator 0, 1A, and 1B automatic trips except the following are automatically bypassed on an ECCS actuation signal:

a) For Divisions 1 and 2 - engine overspeed, generator differential current, and emergency manual stop.

b) For Division 3 - engine overspeed, generator differential or overcurrent, and emergency manual stop.

8. Verifying the diesel generator operates* for at least 24 hours. During the first 2 hours of this test, the diesel generator shall be loaded to greater than or equal to 2860 kW and during the remaining 22 hours of this test, the diesel generator shall be loaded to 2400 kW to 2600 kW.*** The generator voltage and frequency shall be 4160 +420, -150 volts and 60 +3.0, -1.2 Hz within 13 seconds after the start signal; the steady state

*All planned diesel generator starts performed for the purpose of meeting these surveillance requirements may be preceded by an engine prelube period, as recommended by the manufacturer.

***Transients, outside of this load band, do not invalidate the surveillance tests.

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

7. Verifying the pressure in all diesel generator air start receivers to be greater than or equal to 200 psig.

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

c. At least once per 92 days and from new fuel oil prior to addition to the storage tanks by verifying that a sample obtained in accordance with ASTM-D270-1975 has a water and sediment content of less than or equal to 0.05 volume percent and a kinematic viscosity @ 40°C of greater than or equal to 1.9 but less than or equal to 4.1 when tested in accordance with ASTM-D975-77, and an impurity level of less than 2 mg of insolubles per 100 ml when tested in accordance with ASTM-D2274-70.

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

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

2. Verifying the diesel generator capability* to reject a load of greater than or equal to 1190 kW for diesel generator 0, greater than or equal to 638 kW for diesel generators 1A and 2A, and greater than or equal to ~~2301~~ 2421 kW for diesel generator 2B while maintaining engine speed less than or equal to 75% of the difference between nominal speed and the overspeed trip setpoint or 15% above nominal, whichever is less.

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

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

   a) For Divisions 1 and 2 and for Unit 1 Division 2:

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

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*All planned diesel generator starts performed for the purpose of meeting these surveillance requirements may be preceded by an engine prelube period, as recommended by the manufacturer.

2) Verifying the diesel generator starts on the auto-start signal, energizes the emergency busses with permanently connected loads within 13 seconds, energizes the auto-connected emergency loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. After energization, the steady state voltage and frequency of the emergency busses shall be maintained at 4160 ±416 volts and 60 ±1.2 Hz during this test.

b) For Division 3:

1) Verifying de-energization of the emergency bus.

2) Verifying the diesel generator starts on the auto-start signal, energizes the emergency bus with its loads within 13 seconds and operates for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. After energization, the steady state voltage and frequency of the emergency bus shall be maintained at 4160 ±416 volts and 60 ±1.2 Hz during this test.

7. Verifying that all diesel generator 0, 2A, and 2B automatic trips except the following are automatically bypassed on an ECCS actuation signal:

a) For Divisions 1 and 2 - engine overspeed, generator differential current, and emergency manual stop.

b) For Division 3 - engine overspeed, generator differential or overcurrent, and emergency manual stop.

8. Verifying the diesel generator operates* for at least 24 hours. During the first 2 hours of this test, the diesel generator shall be loaded to greater than or equal to 2860 kW and during the remaining 22 hours of this test, the diesel generator shall be loaded to 2400 kW to 2600 kW.*** The generator voltage and frequency shall be 4160 +420, -150 volts and 60 +3.0, -1.2 Hz within 13 seconds after the start signal; the steady-state

*All planned diesel generator starts performed for the purpose of meeting these surveillance requirements may be preceded by an engine prelube period, as recommended by the manufacturer.

***Transients, outside of this load band, do not invalidate the surveillance tests.

## ATTACHMENT C

## SIGNIFICANT HAZARDS CONSIDERATION

Commonwealth Edison has evaluated the proposed Technical Specification Amendment and determined that it does not represent a significant hazards consideration. Based on the criteria for defining a significant hazards consideration established in 10CFR50.92, operation of LaSalle County Station Units 1 and 2 in accordance with the proposed amendment will not:

1) Involve a significant increase in the probability or consequences of an accident previously evaluated because:

   The HPCS system automatically initiates on a low reactor water level or a high drywell pressure signal. The system is designed to provide the necessary cooling for the reactor core to prevent fuel cladding damage following any break in the nuclear system piping over a wide range of pressures. For small breaks that do not result in rapid reactor depressurization, the system maintains reactor water level and depressurizes the vessel. For large breaks the HPCS system cools the core by a spray. The HPCS system also serves as a backup to the reactor core isolation cooling system during reactor isolation events. If the normal power source (system auxiliary transformer) for the HPCS system is lost the Division 3 diesel generator provides an alternate source of power.

   The proposed amendment increases the Unit 1 and 2 technical specification surveillance "single large load reject" test value for the ESF Division 3 diesel generators (Technical Specification 4.8.1.1.2.d.2) to the more conservative value specified in the UFSAR (Table 8.3-1). This enhancement to the test program will help to assure the reliability and availability to the ESF Division 3 diesel generators under all operating conditions. This enhancement will be accomplished by ensuring that the technical specification load reject test value is equal to or greater than the maximum load requirement for the HPCS pump which is the single largest Division 3 load. Additionally, this proposed amendment merely clarifies the intent of the technical specification requirements and does not involve any changes to the operation of the facility as described in the UFSAR.

2) Create the possibility of a new or different kind of accident from any accident previously evaluated because:

   This proposal does not involve any modifications to the facility or changes to the operation of the facility as described in the UFSAR, therefore it cannot create the possibility of a new or different kind of accident.

3) Involve a significant reduction in the margin of safety because:

The proposed amendment raises the Division 3 test load requirement for initiation of the "single large load reject" surveillance test to the more conservative UFSAR value. The proposal does not alter the technical specification acceptance criteria for the test which specifies the amount that the diesel generators are allowed to overspeed following the initiation of the test. Additionally this proposed amendment is an administrative change which does not modify the intent of the technical specifications, therefore, the margin of safety is not decreased and may actually be increased slightly.

Guidance has been provided in "Final Procedures and Standards on No Significant Hazards Considerations," Final Rule, 51 FR 7744, for the application of standards to license change requests for determination of the existence of significant hazards considerations. This document provides examples of amendment which are and are not considered likely to involve significant hazards considerations. This proposed amendment most closely resembles example I.C.2.e.ii, of the examples of amendments which do not involve a significant hazard consideration, "a change that constitutes an additional limitation, restriction or control not presently in the technical specifications, e.g., a more stringent requirement." This proposed amendment does not involve a significant relaxation of the criteria used to establish safety limits, a significant relaxation of the bases for the limiting safety system settings or a significant relaxation of the bases for the limiting conditions for operations. Therefore, based on the guidance provided in the Federal Register and the criteria established in 10CFR50.92(c), the proposed change does not constitute a significant hazards consideration.

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**ATTACHMENT D**

**REFERENCES**


a. Inspection Report 50-373/89018, 50-374/89018, dated November 27, 1989.

b. T.J. Kovach letter to A. Bert Davis, dated January 22, 1990, LaSalle County Station Units 1 and 2 Response to Inspection Report Nos. 50-373/89018 and 50-374/89018 Special Maintenance Team Inspection.

c. UFSAR Section 6.3.2.2.1, High Pressure Core Spray System.

d. UFSAR Section 8.1.2, Onsite Power Systems - Summary Description.

e. UFSAR Section 8.3.1.1.2, Unit Class 1E A-C Power Systems.

f. UFSAR Figure 6.3-3, Revision 5, April 1989, HPCS Pump Characteristics.

g. Selection, Design, and Qualification of Diesel-Generator Units Used as Standby (Onsite) Electrical Power Systems at Nuclear Power Plants, Regulatory Guide 1.9, Revision 2, December 1979.

h. Safety Evaluation Report Related to the Operation of LaSalle County Station Units 1 and 2, NUREG 0519, March 1981.

i. Diesel Generator Protective Trip Circuit Bypasses, Branch Technical Position ICSB 17 (PSB), Revision 1.

j. Diesel Generator Protective Trip Circuit Bypasses, Branch Technical Position ICSB 17 (PSB), Revision 2, July 1981.


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REFERENCE A

from the day tank which led to an incorrect conclusion that the required amount of fuel was present. In fact, the amount of fuel available would be insufficient to meet the UFSAR commitment with the current alarm setting.

The licensee was made aware of this situation and had initiated corrective action while the team was still on site to revise the alarm setpoint. However, the occurrence of this error points to a fault in the licensee's program for performance and review of design calculations.

The failure to detect errors in the calculation to support the current alarm setpoint indicated a weakness in the performance of calculational reviews and verifications that are prescribed in ANSI/ASME NQA-1-1983. This weakness is further discussed in Paragraph 4.1.1.4 below.

4.1.1.3 HPCS Diesel Generator Load Rejection Tests

The team determined that the TS Sections 4.8.1.1.2.d.2 & 3 identified values for performing the full load rejection test and single largest load rejection test that were less than the values given in UFSAR Table 8.3.1. Table 8.3.1 of the UFSAR identified the single largest load on the HPCS diesel as 3050 bhp which equates to 2528 kw and gave the total load as 3280 bhp which equates to 2719 kw. These loads were at variance with the TS which identified 2381 kw for the large load rejection test and 2600 kw for the full load rejection test.

The intent of these TS surveillances was to ensure that the diesel generator would not trip off if the bus it was powering was lost and to ensure that the diesel generator would continue to supply power to the bus with no more than a 75% drop in voltage if the largest load on the bus were to trip off. This position is consistent with that presented in Regulatory Guide 1.9, "Selection, Design, and Qualification of Diesel-Generator Units Used as Standby (Onsite) Electric Power Systems at Nuclear Power Plants," Revision 2.

The team agreed that the single largest load contained in Table 8.3.1 used a conservative pump efficiency of 90% in arriving at the 2528 kw; however, the manufacturer's certified pump curve gave a load of 2408 kw at 3030 bhp. The 2381 kw load specified in TS appeared to come from data obtained during a prototype test performed at LaSalle by General Electric. The team considered that the conditions under which that prototype test was performed did not represent the design or normal operational conditions of the plant, for example, the strainer was not 50% plugged per the design requirement and water temperature of the suppression pool was lower than seen during normal operations. It appeared that a non-conservative value was used for the TS surveillance.

The licensee stated that the requirement for the full load reject test was the continuous rating of the diesel generator, which is 2600 kw. However, the licensee had utilized the 2000 hour rating in the actual sizing of the diesel.

The licensee committed to revise the TS to incorporate the appropriate values for "full load" and "single largest load" that met the intent of the surveillance requirement. This will be tracked as an Open Item (373/89018-02; 374/89018-02).

#### 4.1.1.4 Design Calculations

During the review of the design bases for HPCS, the team found many examples where calculations were inconsistent, utilized different assumptions for the same variable, were incomplete, or were missing. With few exceptions, these calculations had been performed as part of the original station design in 1973. Some examples included the following:

Calculation entitled "HPCS Pump Discharge Pressure - Design" used a maximum suction pressure of 30 psig from the cycled condensate storage tank and 56 psig from the suppression pool, while calculation entitled "HPCS Design Pressure & Temperature" identified the suction line pressure as 100 psig.

Calculation "HPCS Design Pressure & Temperature" was missing the design temperature and pressure for the discharge of the water leg pump, even though the need for this information was noted in the calculation.

Calculation entitled "HPCS Safety/Relief Valve Sizing" identified the set point for valve E22-F035 as 1100 psig and operating pressure as 1225 psig. The 1100 psig should have been 1100 psid, and the operating pressure did not agree with calculation "HPCS Operating Conditions." Further, the portion of the calculation dealing with valve E22-F035 had been superseded by calculation HP-11, "Resetting Valve E22-F035", which was not noted in either calculation. The new calculation used a maximum shutoff head and suction head which differed from those in the "HPCS pump Discharge Pressure - Design" calculation.

Calculation DO-7, "Diesel Oil Storage Capacity," concluded that the HPCS diesel generator fuel oil storage tank capacity was insufficient to meet the seven day fuel storage requirement. Although, the tank was subsequently modified, there was no calculation confirming the adequacy of the modified tank. A preliminary, unreviewed and unapproved calculation, DO-11, "Diesel Oil Storage and Day Tank Usable Capacity - HPCS Diesel," dated 8/7/89 was prepared during this inspection which indicated that sufficient fuel oil storage capacity was available.

TABLE 8.3-1
(SHEET 1 OF 3)

LOADING ON 4160-VOLT ESF BUSES**

| EQUIPMENT | UNIT #1 LOCA | DELAY TIME AFTER ESF BUS IS ENERGIZED (sec)[1] | UNIT #2 SD | NUMBER INSTALLED UNIT 1 | NUMBER INSTALLED UNIT 2 | REQUIRED BHP EACH | MINIMUM IMMEDIATE REQUIREMENTS UNIT 1 | MINIMUM IMMEDIATE REQUIREMENTS UNIT 2 | ESF BUSES UNIT 1 BUS 141Y DIV. 1 (DG 0) | ESF BUSES UNIT 1 BUS 142Y DIV. 2 (DG 1A) | ESF BUSES UNIT 1 BUS 143 DIV. 3 (DG 1B) | ESF BUSES UNIT 2 BUS 241Y DIV. 1 (DG 0) | ESF BUSES UNIT 2 BUS 242Y DIV. 2 (DG 2A) | ESF BUSES UNIT 2 BUS 243 DIV. 3 (DG 2B) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HPCS pump | X* | 0 | - | 1 | 1 | 3050 | 1 | 0 | | | 3050 | — | — | — |
| LPCS pump | X | [illegible] | - | 1 | 1 | 1490 | 1 | 0 | 1490 | — | — | — | — | — |
| RHR pump 1C | X | [illegible] | X | 1 | 1 | 765 | 1 | 0 | | 765 | — | — | — | — |
| RHR pumps 1A & 1B | XX | 5 | XX | 2 | 2 | 765 | 2 | 1 | 765 | 765 | — | — | 765 | — |
| RHR service water pump | XXX | - | XXX | 4 | 4 | [illegible] | 0 | 2 | — | — | — | — | 360 | — |
| Diesel-generator auxiliaries | | | | | | | | | | | | | | |
| (a) Water pumps | X | 0 | X | [illegible] | 2 | 125/75/77.5 | 3 | 2 | 125 | 75 | 77.5 | | 75 | 77.5 |
| (b) Starting air comp. | XXXX | [illegible] | XXXX | 4 | 4 | 10/7.5 | 3 | 2 | 10 | 20 | --- | — | 20 | --- |
| (c) DG rm. exh. fan | X | [illegible] | X | 3 | 2 | 30.2 | 3 | 2 | 40 | 40 | 30.2 | — | 40 | 30.2 |
| (d) Fuel oil rm. fan | X | 0 | X | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | — | 3 | 3 |
| (e) Fuel oil transf. pump | XXXX | 5 | XXXX | 3 | 2 | 5 | 1 | 0 | — | — | 5 | — | — | --- |
| Battery charger - 250 Vdc | X | [illegible] | - | 1 | 1 | 22.4kW | 1 | 0 | 25 | | --- | — | | --- |
| Battery charger - 125 Vdc | X | 0 | X | 2 | 3 | 17.5/11.7kW | 2 | 1 | 20 | 20 | --- | — | 20 | --- |
| Essential lighting | X | 0 | X | 3 | 3 | 19/40/5kVA | 3 | 2 | 22 | 55 | 6 | — | 55 | 6 |
| Computer power supply | X | 0 | X | 1 | 1 | 25kVA | 1 | 1 | 57 | — | --- | — | — | --- |
| A[illegible] equipment room: | | | | | | | | | | | | | | |
| [illegible]p. sys. refrig. comp. | XXXXXX | [illegible] | - | 1 | 1 | 125 | 1 | 0 | — | 125 | — | — | — | — |
| Air cooled cond. fan | XX | 5 | - | 1 | 1 | 100 | 1 | 0 | — | 100 | — | — | — | — |
| Supply fan | XX | 5 | - | 1 | 1 | 100 | 1 | 0 | — | 100 | — | — | — | — |
| Return fan | XX | [illegible] | - | 1 | 1 | 50 | 1 | 0 | — | 50 | — | — | — | — |
| Cont. rm. refrig. comp. | XXXXXX | 5 | - | 1 | 1 | 100 | 1 | 0 | — | 100 | — | — | — | — |
| Cont. rm. air-cooled cond. fan | XX | [illegible] | - | 1 | 1 | 100 | 1 | 0 | — | 100 | — | — | — | — |
| SLCS tank heater | XXXX | - | XXXX | 1 | 1 | 10kW | 1 | 1 | 11 | — | — | — | — | — |
| SLCS pump | XXX | - | XXX | 2 | 2 | 40kW | 0 | 0 | — | — | — | — | — | — |
| SLCS mixing heater | XXX | - | XXX | 1 | 1 | 40kW | 0 | 0 | — | — | — | — | 46 | — |
| Battery room exhaust fans | X | - | X | 6 | 5 | 1 | 6 | 4 | 3 | 3 | 1 | — | 3 | 1 |
| Standby gas treatment blower | X | [illegible] | X | 1 | 1 | 20 | 1 | 1 | — | 20 | — | — | 20 | — |
| Standby gas elect. duct heater | XX | 5 | XX | 1 | 1 | 20kW | 1 | 1 | — | 23 | — | — | 23 | — |
| Standby gas cooling fan | XXXX | - | XXXX | 1 | 1 | 1.5 | 0 | 0 | — | — | — | — | — | — |
| RX protection MG set | XXX | - | XXX | 2 | 2 | 25 | 0 | 1 | — | — | — | — | 25 | — |
| Primary containment vent. sup. fan | XXX | - | XXX | 2 | 2 | 100 | 0 | 1 | — | — | — | — | 100 | — |
| RX protection MG room supply fan | X | - | X | 1 | 1 | 20 | 1 | 1 | — | 20 | — | — | 20 | — |
| Control room supply fan | XX | 5 | - | 1 | 1 | 50 | 1 | 0 | — | 50 | — | — | — | — |
| Control room return fan | XX | 5 | - | 1 | 1 | 25 | 1 | 0 | — | 25 | — | — | — | — |
| Control room emergency makeup fan | XX | 5 | - | 1 | 1 | 15 | 1 | 0 | — | 15 | — | — | — | — |
| Fuel pool emergency makeup pump | XXX | - | XXX | 2 | 2 | 75 | 0 | 1 | — | — | — | — | — | — |

# TABLE 8.3-1
## (SHEET 2 OF 3)

| EQUIPMENT | UNIT #1 LOCA | DELAY TIME AFTER ESF BUS IS ENERGIZED (sec) | UNIT #2 FS | NUMBER INSTALLED UNIT 1 | NUMBER INSTALLED UNIT 2 | REQUIRED BHP EACH | MINIMUM IMMEDIATE REQUIREMENTS UNIT 1 | MINIMUM IMMEDIATE REQUIREMENTS UNIT 2 | ESF BUSES UNIT 1 BUS 141Y DIV. 1 (DG 0) | ESF BUSES UNIT 1 BUS 142Y DIV. 2 (DG 1A) | ESF BUSES UNIT 1 BUS 143 DIV. 3 (DG 1B) | ESF BUSES UNIT 2 BUS 241Y DIV. 1 (DG 0) | ESF BUSES UNIT 2 BUS 242Y DIV. 2 (DG 2A) | ESF BUSES UNIT 2 BUS 243 DIV. 3 (DG 2B) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cleanup recirc. pump | XXX | | XXX | $3^2$ | $3^2$ | 50 | 0 | 0 | | | | | 50 | |
| Switchgear heat removal fan | X | - | X | 2 | 2 | 25 | 2 | 1 | 25 | 25 | — | — | 25 | — |
| LPCS & RCIC pumps cub. cooler fan | XXXX | - | XXXX | 1 | 1 | 25 | 1 | 0 | 25 | | — | — | | — |
| RHR pump cubicle cooler fan | XXXX | | XXXX | 2 | 2 | 20/25 | 2 | 1 | 20 | 25 | — | — | 25 | — |
| LPCS & RHR "A" water leg pump | X | - | X | 1 | 1 | 7.5 | 1 | 0 | 7.5 | — | — | — | 7.5 | — |
| RCIC water leg pump | X | - | X | 1 | 1 | 7.5 | 1 | 0 | 7.5 | | — | — | | — |
| RHR B/C water leg pump | X | - | X | 1 | 1 | 7.5 | 1 | 1 | — | 7.5 | — | — | 7.5 | — |
| RHR service water pump cub. fan | XXXX | - | XXXX | 2 | 2 | 5 | 0 | 1 | — | — | — | — | 5 | — |
| Annunciator supply | X | - | X | 2 | 2 | 5kVA | 0 | 0 | 6 | 6 | — | — | 6 | — |
| 120/208-V dist. pnl. on MCC | X | | X | 4 | 4 | 15kVA | 0 | 5 | 34 | 34 | — | — | 43 | — |
| Primary containment water chiller | XXX | - | XXX | 2 | 2 | 409kW | 0 | 1 | — | — | — | — | 771 | — |
| Control rod drive feed pump | XXX | - | XXX | 2 | 2 | 300 | 0 | 0 | — | — | — | — | 260 | — |
| HPCS water leg pump | X | - | X | 1 | 1 | 7.5 | 1 | 1 | — | — | 7.5 | — | — | 7.5 |
| HPCS - pump cubicle cooler fan | XXXX | - | XXXX | 1 | 1 | 17 | 1 | 0 | — | — | 17 | — | — | — |
| Control room emergency makeup air heaters | XX | 5 | - | 1 | 1 | 20kW | 1 | 0 | — | 23 | — | — | — | — |
| Primary containment water chiller pump | XXX | - | XXX | $2^2$ | $2^2$ | 50 | 0 | 1 | — | — | — | — | 50 | — |
| Carbon dioxide refrig. unit | XXXX | - | XXXX | 1 | 0 | 5 | 1 | 0 | 5 | — | — | — | — | — |
| Laboratory receptacles transformer | X | - | X | 3 | 0 | 15/10kVA | 3 | 0 | 14 | 9 | — | — | — | — |
| Fire evacuation sirens transformer | X | - | X | 1 | 1 | 7.5kVA | 1 | 1 | — | 9 | — | — | 9 | — |
| HPCS switchgear room supply fan | X | - | X | 1 | 1 | 13 | 1 | 1 | — | — | 13 | — | — | 13 |
| HPCS switchgear room exh. fan | X | - | X | 1 | 1 | 13 | 1 | 1 | — | — | 13 | — | — | 13 |
| HPCS diesel air comp. and dryer | XXXX | - | XXXX | $1^2$ | $1^2$ | 14kW/1.3kW | 0 | 0 | — | — | --- | — | — | --- |
| Turbine turning gear | XXXXX | - | XXXXX | $1^2$ | $1^2$ | 60 | 0 | 1 | — | — | — | — | 60 | — |
| Turbine turning gear oil pump | XXXXX | - | XXXXX | $1^2$ | $1^2$ | 50 | 0 | 1 | — | — | — | — | 50 | — |
| Turbine bearing lift pumps | XXXXX | - | XXXXX | $8^2$ | $8^2$ | 5 | 0 | 8 | — | — | — | — | 40 | — |
| Reactor feed pump turb. turbine gear | XXXXX | - | XXXXX | $2^2$ | $2^2$ | 1.5 | 0 | 2 | — | — | — | — | 3 | — |
| Reactor feed pump turb. aux. oil pump | XXXXX | - | XXXXX | $1^2$ | $1^2$ | 2 | 0 | 1 | — | — | — | — | 2 | — |
| Generator main seal oil pump | XXXXX | - | XXXXX | $1^2$ | $1^2$ | 20 | 0 | 1 | — | — | — | — | 20 | — |
| Generator recirc. seal oil pump | XXXXX | - | XXXXX | $1^2$ | $1^2$ | 7.5 | 0 | 1 | — | — | — | — | 7.5 | — |
| Generator seal oil vac. pump | XXXXX | - | XXXXX | $1^2$ | $1^2$ | 2 | 0 | 1 | — | — | — | — | 2 | — |
| Reactor Bldg. closed cooling water pump | XXX | - | XXX | $2^2$ | $2^2$ | 150 | 0 | 1 | — | — | — | — | 150 | — |

| | BUS 141Y | BUS 142Y | BUS 143 | BUS 241Y | BUS 242Y | BUS 243 |
|---|---|---|---|---|---|---|
| Total Coincidental BHP on Each Bus | 2714 | 2613 | 3261 | — | 3169 | 189 |
| Total Motor Output kW - (.746) (BHP) | 2025 | 1949 | 2433 | — | 2364 | 141 |
| Total Motor Input kW @ 90% EFF | 2250 | 2166 | 2597 # | — | 2627 | 153 # |
| Diesel-Generator Rating (kW) (8760-hour maintenance interval) | 2600 | 2600 | 2600 | — | 2600 | 2600 |
| Diesel-Generator Rating-kVA @ 80% PF | 3250 | 3250 | 3250 | — | 3250 | 3250 |
| Diesel-Generator Rating (kW) (2000-hour maintenance interval) | 2860 | 2860 | 2860 | — | 2860 | 2860 |

*Key to symbols used in this table:

X Loads are energized immediately upon restoration of bus voltage
XX Loads are applied automatically in sequence listed above
XXX Loads are applied manually by operator as required within diesel-generator rating
XXXX Loads cycle automatically, as required
XXXXX Bus must be manually reenergized by operator before loads can automatically start
XXXXXX Loads must be manually reset locally upon restoration of bus voltage.

# Based on actual efficiencies for individual loads (Unit 1 Total Input kW includes transformer losses between 4160 V switchgear 143 and 480 V MCC 143-1).

TABLE 8.3-1
(SHEET 3 OF 3)

**Assumptions:

A. Total loss of plant normal ac auxiliary power
B. Unit 1 in LOCA condition
C. Unit 2 in hot shutdown condition
D. Five diesel-generator sets start
E. Intermittent loads expected to operate for very short periods of time, such as motor-operated valves and sump pumps, are not included in the tabulation since inherent conservatism already contained in the tabulated values more than accounts for these loads.

Notes:

[1]Delay times may exceed those indicated by 2 seconds

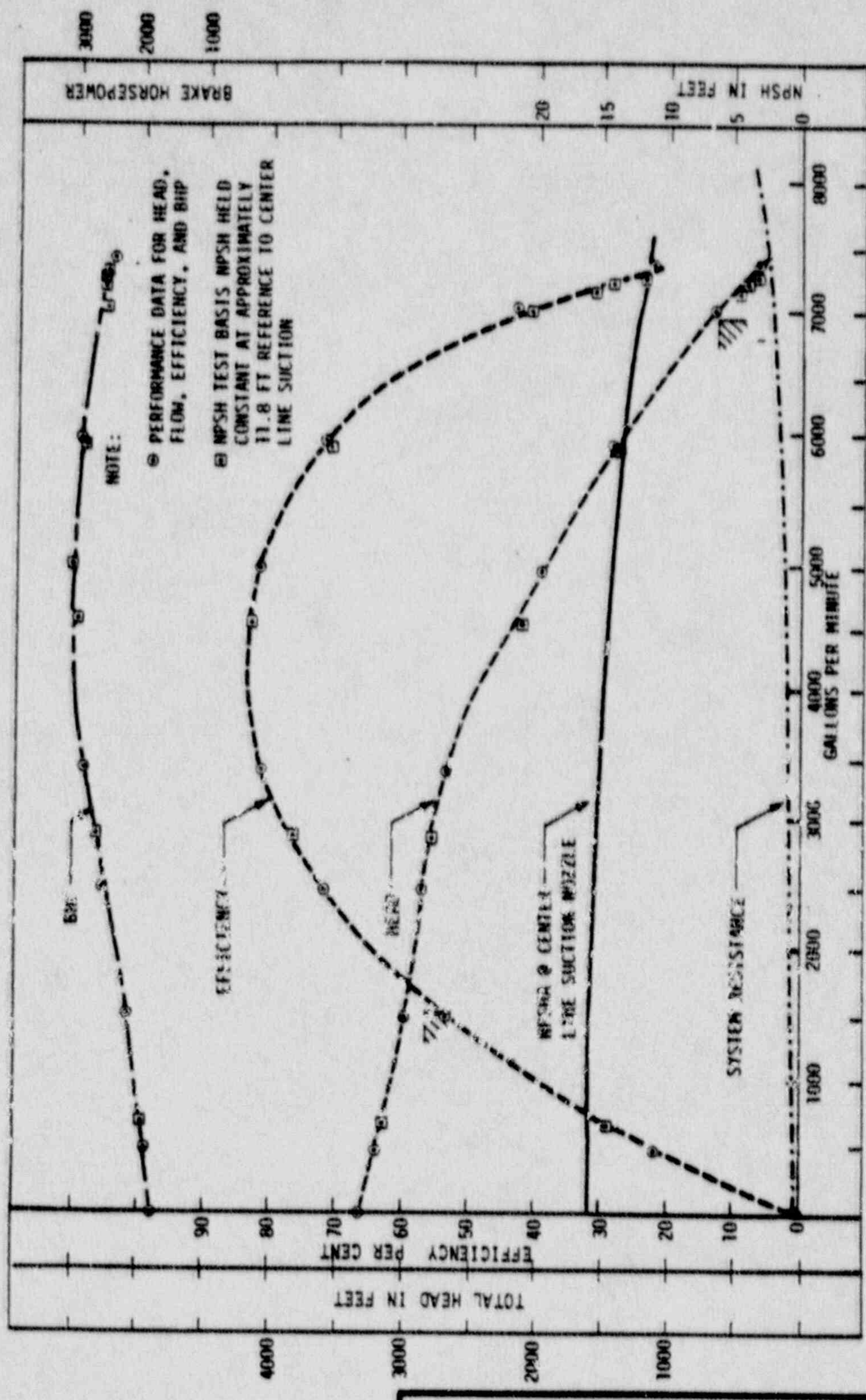
[2]Loads have access to ESF buses (manual)

[3]Electric motor driven only

[4]Computer power supplies can be powered from either unit

[5]Delay time is dependent on system component operating times

REFERENCE F




This Figure used for Initial LOCA Analysis. For SAFER/GESTR Information, see Reference 8.

**LA SALLE COUNTY STATION**
UPDATED FINAL SAFETY ANALYSIS REPORT

FIGURE 6.3-3

HPCS PUMP CHARACTERISTICS

 REFERENCE G

Revision 2
December 1979

U.S. NUCLEAR REGULATORY COMMISSION

# REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 1.9

## SELECTION, DESIGN, AND QUALIFICATION OF DIESEL-GENERATOR UNITS USED AS STANDBY (ONSITE) ELECTRIC POWER SYSTEMS AT NUCLEAR POWER PLANTS

### A. INTRODUCTION

General Design Criterion 17, "Electric Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," includes a requirement that the onsite electric power system have sufficient capacity and capability to ensure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents.

Criterion III, "Design Control," of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50 includes a requirement that measures be provided for verifying or checking the adequacy of design by design reviews, by the use of alternative or simplified calculational methods, or by the performance of a suitable testing program.

Diesel-generator units have been widely used as the power source for the onsite electric power systems. This regulatory guide describes a method acceptable to the NRC staff for complying with the Commission's requirements that diesel-generator units intended for use as onsite power sources in nuclear power plants be selected with sufficient capacity and be qualified for this service. The Advisory Committee on Reactor Safeguards has been consulted concerning this guide and has concurred in the regulatory position.

### B. DISCUSSION

A diesel-generator unit selected for use in an onsite electric power system should have the capability to (1) start and accelerate a number of large motor loads in rapid succession and be able to sustain the loss of all or any part of such loads and maintain voltage and frequency within acceptable limits and (2) supply power continuously to the equipment needed to maintain the plant in a safe condition if an extended loss of offsite power occurs.

IEEE Std 387-1977, "IEEE Standard Criteria for Diesel-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations,"[1] delineates principal design criteria and qualification testing requirements that, if followed, will help ensure that selected diesel-generator units meet their performance and reliability requirements. IEEE Std 387-1977 was developed by Working Group 4.2C of the Nuclear Power Engineering Committee (NPEC) of the Institute of Electrical and Electronics Engineers, Inc. (IEEE), approved by NPEC, and subsequently approved by the IEEE Standards Board on September 9, 1976. IEEE Std 387-1977 is supplementary to IEEE Std 308-1974, "IEEE Standard Criteria for Class 1E Power Systems and Nuclear Power Generating Stations,"[1] and specifically amplifies paragraph 5.2.4, "Standby Power Supplies," of that document with respect to the application of diesel-generator units. IEEE Std 308-1974 is endorsed, with certain exceptions, by Regulatory Guide 1.32, "Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants."

A knowledge of the characteristics of each load is essential in establishing the bases for the selection of a diesel-generator unit that is able to accept large loads in rapid succession. The majority of the emergency loads are large induction motors. This type of motor draws, at full voltage, a starting current five to eight times its rated load current. The sudden large increases in current drawn from the diesel generator resulting from the startup of induction motors can result in substantial voltage reductions. The lower voltage could prevent a motor from starting, i.e., accelerating its load to rated speed in the required time, or cause a running motor to coast down or stall. Other loads might be lost if their contactors drop out. Recovery from the transient caused by starting large motors or from the loss of a large load could cause diesel engine overspeed which, if excessive, might result in a trip of the engine.

*Lines indicate substantive changes from Revision 1.

[1] Copies may be obtained from the Institute of Electrical and Electronics Engineers, Inc., United Engineering Center, 345 East 47th Street, New York, New York 10017.

These same consequences can also result from the cumulative effect of a sequence of more moderate transients if the system is not permitted to recover sufficiently between successive steps in a loading sequence.

Generally it has been industry practice to specify a maximum voltage reduction of 10 to 15 percent when starting large motors from large-capacity power systems and a voltage reduction of 20 to 30 percent when starting these motors from limited-capacity power sources such as diesel-generator units. Large induction motors can achieve rated speed in less than 5 seconds when powered from adequately sized diesel-generator units that are capable of restoring the voltage to 90 percent of nominal in about 1 second.

Protection of the diesel-generator unit from excessive overspeed, which can result from a loss of load, is afforded by the immediate operation of a diesel-generator unit trip, usually set at 115 percent of nominal speed. In addition, the generator differential trip must operate immediately in order to prevent substantial damage to the generator. There are other protective trips provided to protect the diesel-generator units from possible damage or degradation. However, these trips could interfere with the successful functioning of the unit when it is most needed, i.e., during accident conditions. Experience has shown that there have been numerous occasions when these trips have needlessly shut down diesel-generator units because of spurious operation of a trip circuit. Consequently, it is important that measures be taken to ensure that spurious actuation of these other protective trips does not prevent the diesel-generator unit from performing its function.

The uncertainties inherent in estimates of safety loads at the construction permit stage of design are sometimes of such magnitude that it is prudent to provide a substantial margin in selecting the load capabilities of the diesel-generator unit. This margin can be provided by estimating the loads conservatively and selecting the continuous rating of the diesel-generator unit so that it exceeds the sum of the loads needed at any one time. A more accurate estimate of safety loads is possible during the operating license stage of review because detailed designs have been completed and preoperational test data are available. This permits the consideration of a somewhat less conservative approach, such as operation with safety loads within the short-time rating of the diesel-generator unit.

## C. REGULATORY POSITION

Conformance with the requirements of IEEE Std 387-1977, "IEEE Standard Criteria for Diesel-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations," dated June 17, 1977, is acceptable for meeting the requirements of the principal design criteria and qualification testing of diesel-generator units used as onsite electric power systems for nuclear power plants subject to the following:

1. When the characteristics of loads are not accurately known, such as during the construction permit stage of design, each diesel-generator unit of an onsite power supply system should be selected to have a continuous load rating (as defined in Section 3.7.1 of IEEE Std 387-1977) equal to or greater than the sum of the conservatively estimated loads needed to be powered by that unit at any one time. In the absence of fully substantiated performance characteristics for mechanical equipment such as pumps, the electric motor drive ratings should be calculated using conservative estimates of these characteristics, e.g., pump runout conditions and motor efficiencies of 90 percent or less and power factors of 85 percent or less.

2. At the operating license stage of review, the predicted loads should not exceed the short-time rating (as defined in Section 3.7.2 of IEEE Std 387-1977) of the diesel-generator unit.

3. In Section 5.1.1, "General," of IEEE Std 387-1977, the requirements of IEEE Std 308-1974 should be used subject to the regulatory position of Regulatory Guide 1.32.

4. Section 5.1.2, "Mechanical and Electrical Capabilities," of IEEE Std 387-1977 pertains, in part, to the starting and load-accepting capabilities of the diesel-generator unit. In conjunction with Section 5.1.2, each diesel-generator unit should be capable of starting and accelerating to rated speed, in the required sequence, all the needed engineered safety feature and emergency shutdown loads. The diesel-generator unit design should be such that at no time during the loading sequence should the frequency and voltage decrease to less than 95 percent of nominal and 75 percent of nominal, respectively. (A larger decrease in voltage and frequency may be justified for a diesel-generator unit that carries only one large connected load.) Frequency should be restored to within 2 percent of nominal, and voltage should be restored to within 10 percent of nominal within 60 percent of each load-sequence time interval. (A greater percentage of the time interval may be used if it can be justified by analysis. However, the load-sequence time interval should include sufficient margin to account for the accuracy and repeatability of the load-sequence timer.) During recovery from transients caused by step load increases or resulting from the disconnection of the largest single load, the speed of the diesel-generator unit should not exceed the nominal speed plus 75 percent of the difference between nominal speed and the overspeed trip setpoint or 115 percent of nominal, whichever is lower. Further, the transient following the complete loss of load should not cause the speed of the unit to attain the overspeed trip setpoint.

5. In Section 5.4, "Qualification," of IEEE Std 387-1977, the qualification testing requirements of IEEE Std 323-1974, "IEEE Standard for Qualifying Class IE Equipment for Nuclear Power Generating Stations,"[1] should be used subject to the regulatory position of Regulatory Guide 1.89, "Qualification of Class IE Equipment for Nuclear Power Plants."

6. Section 5.5, "Design and Application Considerations," of IEEE Std 387-1977 pertains to design features for consideration in diesel-generator unit design. In conjunction with Section 5.5, diesel-generator units should be designed

to be testable during operation of the nuclear power plant as well as while the plant is shut down. The design should include provisions so that the testing of the units will simulate the parameters of operation (outlined in Regulatory Guide 1.108, "Periodic Testing of Diesel-Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants") that would be expected if actual demand were to be placed on the system.

Testability should be considered in the selection and location of instrumentation sensors and critical components (e.g., governor, starting system components), and the overall design should include status indication and alarm features. Instrumentation sensors should be readily accessible and, where practicable, designed so that their inspection and calibration can be verified in place.

7. Section 5.6.2.2, "Automatic Control," of IEEE Std 387-1977 pertains to automatic startup requirements and their relationship to other operating modes. In conjunction with Section 5.6.2.2, engine-overspeed and generator-differential trips may be implemented by a single-channel trip. All other diesel-generator protective trips should be handled in one of two ways: Either, (1) a trip should be implemented with two or more independent measurements for each trip parameter with coincident logic provisions for trip actuation, or (2) a trip may be bypassed under accident conditions, provided the operator has sufficient time to react appropriately to an abnormal diesel-generator unit condition. The design of the bypass circuitry should satisfy the requirements of IEEE Std 279-1971 at the diesel-generator system level and should include the capability for (1) testing the status and operability of the bypass circuits, (2) alarming in the control room abnormal values of all bypass parameters, and (3) manually resetting of the trip bypass function. (Capability for automatic reset is not acceptable.)

8. Section 5.6.3.1, "Surveillance Systems," of IEEE Std 387-1977 pertains to status indication of diesel-generator unit conditions. In conjunction with Section 5.6.3.1, in order to facilitate trouble diagnosis, the surveillance system should indicate which of the diesel-generator protective trips is activated first.

9. In Section 6.3, "Type Qualification Testing Procedures and Methods," of IEEE Std 387-1977, the requirements of IEEE Std 344-1975, "Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations," for seismic analysis or seismic testing by equipment manufacturers should be used subject to the regulatory position of Regulatory Guide 1.100, "Seismic Qualification of Electric Equipment for Nuclear Power Plants."

10. The option indicated by "may" in Section 6.3.2(5)(e) of IEEE Std 387-1977 should be treated as a requirement.

11. Section 6.5, "Site Acceptance Testing," and Section 6.6, "Periodic Testing," of IEEE Std 387-1977 should be supplemented by Regulatory Guide 1.108.

12. Section 4, "Reference Standards," of IEEE Std 387-1977 lists additional applicable IEEE standards. The specific applicability or acceptability of these referenced standards has been or will be covered separately in other regulatory guides, where appropriate.

13. Section 6.3.2, "Start and Load Acceptance Qualification," pertains to test requirements for diesel-generator unit qualification. In conjunction with Section 6.3.2, fewer successful start-and-load tests and allowed failures than that specified–300 valid tests with no more than 3 failures–may be justified for a diesel-generator unit that carries only one large connected load tested under actual conditions, provided an equivalent reliability/confidence level is demonstrated.

14. In Section 6.3.1, "Load Capability Qualification," of IEEE Std 387-1977, the order of sequence of load tests described in parts (1) and (2) should be as follows: Load equal to the continuous rating should be applied for the time required to reach engine temperature equilibrium, at which time, the rated short-time load should be applied for a period of 2 hours. Immediately following the 2-hour short-time load test, load equal to the continuous rating should be applied for 22 hours.

## D. IMPLEMENTATION

Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used in the evaluation of applications for construction permits docketed after December 1979.

REFERENCE H

## 8.3 Onsite Power Systems

### 8.3.1 General Description

#### 8.3.1.1 Alternating Current Power System

The alternating current power system serves as a standby to the offsite power system. The safety function of the alternating current power system (assuming the offsite power system is not functioning) is to provide sufficient capacity and capability to assure that the structures, systems and components important to safety perform as intended. The objectives of our review were to determine that the onsite power system has the required redundancy; meets the single failure criterion; and has the capacity, capability and reliability to supply power to all required safety loads. Our review utilized the criteria set forth in Section 8.1.1 of this report in evaluating the system.

The alternating current power system for each of the two units is comprised of three physically independent electrical distribution system divisions. These three electrical divisions are designated as Divisions 1, 2 and 3 for each unit. For Divisions 2 and 3 of each unit a separate diesel-generator is provided to power each of these electrical divisions. An additional shared diesel-generator provides power to electrical Division 1 of either unit. Each of the Division 2 and 3 diesel-generators receives direct current control power from its respective divisional station emergency battery. The shared diesel-generator may receive control power from either of the two divisions (Division 1 associated with each unit) by way of transfer circuitry. Each distribution system division includes 4160- and 480-volt load centers to accommodate the power requirements of the safety loads. The safety loads for each unit are distributed among the three divisions in such a manner that the operation of any two divisions is all that is required to meet minimum safety requirements. Table 8.1 depicts the divisional arrangement of the various safety systems and/or equipment.

Each of the five diesel-generators and selected associated auxiliaries is located in a separate room within a seismic Category I structure and is provided with an independent source of ventilation air.

Each of the five diesel-generators has a continuous rating, 2000-hour rating, 7-day rating, and 30-minute rating of 2600 kilowatts, 2860 kilowatts, 2987 kilowatts and 3040 kilowatts respectively. Each diesel-generator will be automatically started by an undervoltage signal from its respective 4160 volts emergency bus, or low reactor vessel water level, or high primary containment (drywell) pressure (provisions are also included in the design to manually start each diesel-generator). Upon loss of offsite power, the 4160-volt emergency buses for Divisions 1 and 2 will be automatically isolated from all supply sources and all associated 4160-volt motor loads will be tripped. The Division 3 electrical loads (the high pressure core spray system motor and associated controls) are not tripped following the loss of offsite power to the associated 4160-volt bus. All diesel-generator sets will be connected automatically to their respective emergency bus and the safety loads will be automatically connected in a predetermined sequence to their respective diesel-generator.

The following items address areas of concern noted during our review and provide pertinent information concerning these areas:

(1) Diesel-Generators

Prototype Testing for General Electric Supplied High Pressure Core Spray Diesel-Generators

For the two diesel-generator sets supplied by General Electric (one associated with each of the two, Division 3, electrical safety divisions of the station) and attendant distribution system which includes the high pressure core spray pump motors, we have determined that the arrangement of these diesel-generator sets does not satisfy the recommendations of Position 4 of the Regulatory Guide 1.9, "Selection of Diesel-Generator Set Capacity for Standby Power Supplies," with regard to frequency and voltage variations. In response to this concern, the applicant committed to perform a test (with the associated equipment as installed at the plant site) to demonstrate that these diesel-generator sets can start and accelerate to rated speed (with some margin) for the high pressure core spray pump motor successfully within the limiting required time and report their findings. The applicant provided the subject test report, General Electric Topical Report NEDO-10905-3 dated August 1979, "High Pressure Core Spray System Supply Unit." This report was reviewed generically by us and found acceptable. Based on our review of this report (letter dated April 7, 1980 from O. D. Parr to Dr. G. G. Sherwood), we conclude that the high pressure core spray diesel-generator units as installed at La Salle are acceptable.

Prototype Tests for Non-General Electric Supplied Diesel-Generators

The three diesel-generator sets which were not supplied by General Electric, the applicant has documented that factory prototype testing has been performed which includes six starting tests, a sequential loading test, and the 300 start qualification test. In addition, these sets received at the factory a full load test, a 110 percent overload test, and a voltage stability and transient response test. Also these diesel-generator sets satisfy the recommendations contained in Regulatory Guide 1.9, with regard to frequency and voltage variations during loading transients. Further, during preoperational testing at the site, two additional tests which relate to margin will be performed on each set. For one of these tests which is called "steady-state margin test" a load in excess of the total design accident loads (sum of all the applied accident load blocks) are applied to the set so as to demonstrate some margin in excess of the total design requirements. For the other test called "start-load margin test" a load in excess of the largest single load block is applied as a step function to the set to demonstrate the start and load capability of the set with some margin.

Test results will be available for our review following completion of the preoperational testing program. The test results will be reviewed by our Office of Inspection and Enforcement. We conclude that the non-General Electric-supplied diesel generators as installed at La Salle are acceptable.

Diesel-Generator Testing

The applicant has indicated that periodic diesel-generator testing will not be performed in accordance with positions C2a and C2b of Regulatory Guide 1.108, "Periodic Testing of Diesel-Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants." Based on Criterion 18 of the General Design Criteria, it is our requirement that high reliability must be designed into diesel-generator units and maintained throughout their service lifetime by appropriate testing, maintenance, and operating programs. Periodic diesel-generator testing provisions set forth in Regulatory Guide 1.108 have been designed to provide a basis for taking corrective actions needed to maintain high inservice reliability of installed diesel-generator units. The provisions of Regulatory Guide 1.108, including periodic testing, will be imposed as part of La Salle Technical Specifications.

Reliability of Diesel-Generators

To provide further assurance of long-term reliability of diesel-generators, a report prepared for the NRC, NUREG/CR-0660, "Enhancement of Onsite Emergency Diesel Generator Reliability" made specific recommendations on increasing the reliability of nuclear power plant emergency diesel-generators. We requested from the applicant information concerning these recommendations, and also concerning the design of the fuel oil storage and transfer system, described in the Final Safety Analysis Report. The applicant responded in Amendments 48 and 49, stating how they meet or will meet the recommendations of NUREG/CR-0660 and our additional concerns.

We have reviewed these responses and have determined that conformance to the recommendations is as follows:

| Recommendation | Conformance | Section of this Report |
|---|---|---|
| (a) Moisture in Air Start System | Yes | 9.6.3.3 |
| (b) Dust and Dirt in D/G Room | Yes | 9.6.3.5 |
| (c) Turbocharger Gear Drive Problem | Partial | 8.3.1.1 |
| (d) Personnel Training | Yes | 8.3.1.1 |
| (e) Automatic Prelube | Partial | 9.6.3.4 |
| (f) Testing, Test Loading and Preventive Maintenance | Yes | 8.3.1.1 |
| (g) Improve Identification of Root Cause of Failures | Yes | 8.3.1.1 |
| (h) D/G Ventilation and Combustion Air Systems | Yes | 9.6.3.5 |
| (i) Fuel Storage and Handling | Yes | 9.6.3.1 |

| Recommendation | Conformance | Section of this Report |
|---|---|---|
| (j) High Temperature Insulation for Generator | * | 8.3.1.1 |
| (k) Engine Cooling Water Temperature Control | Yes | 9.6.3.2 |
| (l) Concrete Dust Control | Yes | 8.3.1.1 |
| (m) Vibration of Instruments and Controls | Partial | 8.3.1.1 |

On the basis of our review we have concluded that there is sufficient assurance of diesel-generator reliability to warrant unrestricted plant operation through the first refueling period. However, to assure long term reliability of the diesel-generator installations we require that the following design and procedure modificatons be implemented.

(a) Turbocharger Gear Drive Problem: The diesel-generators at La Salle have a turbocharger mechanical drive gear assembly whose gear ratio is 18:1. This drive gear assembly has not been designed to operate at no load or light load conditions and full rated speed for prolonged periods. To improve the reliability and availability of the diesel-generators on demand we require the installation of a heavy duty turbocharger drive gear assembly with a gear ratio of 16.8:1 as recommended by NUREG/CR-0660. We require the implementation prior to the first refueling. The manufacturer, Electro-Motive Division of General Motors Corporation, has developed another heavy duty turbocharger drive gear assembly which has a gear ratio of 17.9:1 and will be available in the near future. This new gear assembly will have the desired characteristics of the 16.8:1 gear assembly without reducing the engine rating as would be required with the 16.8:1 assembly. Therefore, we require that a heavy duty turbocharger gear drive assembly be installed on the diesel-generators. The gear ratio may be as recommended by NUREG/CR-0660 or it may be the new 17.9:1 drive gear assembly as recommended by Electro-Motive Division of General Motors Corporation, provided it is available within the time limit imposed above.

(b) Automatic Prelube: This item is discussed in Section 9.6.3.4 of this report.

(c) Vibration of Instruments and Controls: The applicant stated that some monitoring instrument and controls are installed on the engine and the engine skid. It also stated that the instrumentation and controls will be inspected and calibrated periodically, and if the inspections show any

*Explicit conformance is considered unnecessary by the staff in view of the equivalent reliability provided by the design margin and qualification testing requirements that are normally applied to emergency standby diesel-generators.

detrimental effects to the instrumentation, either the calibration interval will be reduced, shock mounts for the engine and engine skid mounted panels will be provided, or the panels will be removed from the engine and floor mounted. We find this unacceptable. We require that the controls and monitoring instrumentation be removed from the engine and engine skid, except for sensors and other equipment that must be directly mounted on the engine or associated piping. The controls and monitoring instruments should be installed on a free standing floor mounted panel and located on a vibration free floor area. If the floor is not vibration free, the panel should be equipped with vibration mounts.

As stated above, we have concluded that there is sufficient assurance of diesel-generator reliability to warrant unrestricted plant operation through the first refueling period. To assure long-term reliability, the operating licenses will be conditioned to require La Salle to implement the above design and procedural modifications prior to startup following the first refueling outage.

The present diesel-generator design meets the requirements of Criteria 17, 18 and 21 of the General Design Criteria. Upon completion of the above changes and modifications, the design of the diesel-generator and its auxiliary systems will also be in conformance with the recommendations of NUREG/CR-0660 for enhancement of diesel-generator reliability, and our related guidelines and riteria. We, therefore, conclude that this will provide reasonable assurance f diesel-generator reliability through the design life of the plant.

(2) Alarms and/or Indicators for Diesel-Generator Inoperable

In response to our concern, the applicant supplied a list of control room alarms and/or indicators pertaining to conditions that render the diesel-generator sets incapable of responding to an automatic emergency start signal. We have reviewed this information and related electrical diagrams in accordance to Branch Technical Position ICSB-21, "Guidance for Application of Regulatory Guide 1.47, Bypass and Inseparable Station Indication for Nuclear Power Plant Safety Systems," and conclude that this design is acceptable.

(3) Bypass of Diesel-Generator Protective Trips

To minimize the likelihood of false diesel-generator trip during accident conditions, we require the La Salle design to meet the positions set forth in Branch Technical Position ICSB-17, "Diesel-Generator Protective Trip Circuit Bypass." Based on our review of selected diagrams documented in Section 1.7 of the Final Safety Analysis Report, we conclude that the design provides for bypassing of all diesel-generator protective trips except for overspeed trips and the essential electric protective relay trips during an accident condition. This meets the Branch Technical Position ICSB-17 and is acceptable.

8.3.1.2 Direct Current Power Systems

The direct current power system provides the alternating current onsite emergency power systems with control power as required. Also, it provides both motive and control power to selected safety-related equipment.

REFERENCE J

# BRANCH TECHNICAL POSITION ICSB 17 (PSB)
# DIESEL-GENERATOR PROTECTIVE TRIP CIRCUIT BYPASSES

A. **BACKGROUND**

Where protective trips are provided to protect the standby diesel-generators from possible damage or degradation, these protective trips could interfere with the successful functioning of the diesel-generators when they are most needed, i.e., during an accident condition. In nuclear power plant applications, the criterion should be to provide standby power when needed to mitigate the effects of an accident condition, rather than to protect the diesel-generators from possible damage or degradation.

B. **BRANCH TECHNICAL POSITION**

1. The design of standby diesel generator systems should retain only the engine overspeed and the generator differential trips and bypass all other trips under an accident condition. All those trips that are bypassed for an accident condition may be retained for the diesel-generator routine tests. This concept will reduce the probability of spurious trips during accident conditions and will also reduce the exposure of the equipment to damage from malfunctions during routine tests.

2. The design should include capability for testing the status and operability of the bypass circuits and should alarm abnormal values of all the bypassed parameters in the control room.

3. If other trips, in addition to the engine overspeed and generator differential, are retained for accident conditions, an acceptable design should provide two or more independent measurements of each of these trip parameters. Trip logic should be such that diesel-generator trip would require specific coincident logic.

4. The bypass circuitry for the diesel-generator protective trips should be designed to meet the requirements of IEEE Std 279.

C. **REFERENCES**


1. SERs for St. Lucie Units 1 and 2 (operating license and construction permit).

2. SER for SWESSAR-P1, Stone and Webster Corporation Standard Plant Design.

3. IEEE Std 279, "Criteria for Protection Systems for Nuclear Power Generating Stations."

# BRANCH TECHNICAL POSITION ICSB-17 (PSB)
# DIESEL-GENERATOR PROTECTIVE TRIP CIRCUIT BYPASSES

BTP ICSB-17 (PSB) has been Superceeded by
Position 7 of Regulatory Guide 1.9 (Revision 2)