RESPONSES TO SAGINAW INTERVENORS' CROSS-EXAMINATION QUESTIONS WITH RESPECT TO THE EMERGENCY POWER SUPPLY SYSTEM

1. What degree of constancy of speed will be maintained by the Diesel Generator (DG) during the first two minutes of loading and operation?

Answer:

Speed governing stability is expected to be in accordance with the requirements of Section IV of IEEE Standard No. 126 (renamed from AIEE 606), "Recommended Specification for Speed Governing of Internal Combustion Engine Generator Units" attached hereto.

2. What amount of speed droop during the first two minutes of loading and operation of the DG will be considered acceptable?

Answer:

When each diesel generator is operating independently, as is required in the event of LOCA sequence loading, the governor will be required to maintain isochronous operation, which means there will be no speed droop.

3. What provisions will be made to prevent the DG from hunting or tending to hunt?

Answer:

Steady state governing speedband is expected to be in accordance with the requirements of Section IV of IEEE Standard No. 126, "Recommended Specification for Speed Governing of Internal Combustion Engine Generator Units." The need for stability aids such as buffer compensation systems will be determined in accordance with the engine generator manufacturer's recommendations at the time of purchase.

4. With what type of speed governor will the DG be equipped?

Answer:

The engine generator manufacturer's specific recommendation will be considered at the time of purchase. However, it is expected at this time to be of Woodward EG series.

5. What amount of voltage dip will be considered acceptable for the generator?

Answer:

A voltage dip to 75 percent of nominal on the utilization voltage base will be considered acceptable during sequence loading steps.

6. What is the recovery time for voltage to return to 90 per cent of rated voltage after application of each load step?

Answer:

A recovery time of 2 seconds for the voltage to return to normal will be considered acceptable following the application of each load step.

7. What will be the normal jacket temperature of the DG prior to start?

Answer:

This is a design detail which will be determined in cooperation with the engine manufacturer. Temperatures vary from one manufacturer to another.

8. How is the normal standby jacket water temperature controlled?

Answer:

Standby jacket water temperature will be thermostatically controlled and will be monitored by high and low temperature alarms.

9. Will cooling water from the heat exchangers be permitted to flow through the jacket when the DG is not running?

Answer:

Engine jacket water does not normally flow through the heat exchangers when the diesel engine is on standby. Until the engine is at operating temperature, the jacket water bypasses the cooling device.

10. How long can the DG run at full load without operation of the jacket water cooling pump?

Answer:

It is not a design objective to operate without the jacket water cooling pump. However, it is expected the engine will be capable of full load operation without cooling water circulation through the heat exchanger for a period of 3 minutes following a standby start.

11. What will be the normal crankcase temperature prior to start? How is it controlled?

Answer:

This is a design detail which will be determined in cooperation with the engine manufacturer. Heating means which inherently introduce the danger of lubricating oil carbonizing, with consequent fouling, will be avoided.

12. What will be the Diesel engine heat load during full operation?

Answer:

This is a design detail which will be determined at the time of selection of the manufacturer.

13. What will be the generator heat load during full operation?

Answer:

Generator heat load at full operation is expected to be less than 120 kW.

14. Will the DG trip and automatically shut down on a low oil pressure signal?

Answer:

Yes.

15. Will the DG trip and automatically shut down on a high jacket water temperature signal?

Answer:

Yes.

16. With respect to maintenance of the diesel, how frequently will the diesel be run?

Answer:

Each diesel generator shall be manually started each month and demonstrated to be ready for loading within 10 seconds. The generator shall be synchronized to the emergency bus from the control room, and loaded to the nameplate rating.

17. For how long a time period during each test run will the diesel operate?

Answer:

The diesel generator shall be operated with a load equal to the engine nameplate rating for the time required to reach a temperature equilibrium.

18. What design and operating procedures have been incorporated for the Midland Plant that will prevent the sort of DG failure which occurred on all three DGs at the Connecticut Yankee plant April 27, 1968?

Answer:

It is our understanding, based on the description published in Vol. 15, No. 5 of the Atomic Energy Clearing House, February 3, 1969, that load sharing capabilities of the 3 diesel generators were somehow affected during repeated attempts to restore outside power. The diesel generators and engineered safeguards buses as designed for the Midland Plant are in accordance with the recommendations set forth in Safety Guide 6 for independence between redundant standby onsite power sources and between their distribution systems. The diesel generators are never automatically paralleled and manual synchronizing, conducted only for load testing, will be supervised by interlocks.

The foregoing responses to Saginaw intervenors cross examination questions with respect to the emergency power supply and the response to the question from Dr. Goodman on emergency power supply systems have been prepared under my supervision and are true to the best of my knowledge.

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Subscribed and sworn to before me this 13th day of August, 1971

Notary Public
San Francisco County, California
My Commission Expires November 7, 1971