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Docket No. 50-10

MAR 0 3 1978

Commonwealth Edison Company
ATTN: Mr. Cordell Reed
Assistant Vice President
P. O. Box 767
Chicago, Illinois 60690

Gentlemen:

In response to the NRC Order dated August 22, 1975, Commonwealth Edison Company provided a description of certain proposed modifications to the onsite emergency electric power systems for Dresden Unit 1 to be in compliance with 10 CFR 50 Appendix K. This information was provided in the ECCS Design Report submitted by Commonwealth Edison on October 17, 1975 and the failure mode and effects analysis (FMEA) submitted on October 20, 1976.

To complete our review of the onsite emergency electric power system aspects of the ECCS Design Report and the FMEA, the additional information identified in the enclosure to this letter is required. Other aspects of the Dresden Unit 1 modifications are also under review, and we anticipate that there will be requests for further information before completing our evaluation.

Please provide within 20 days a schedule for full response to this request.

Sincerely,
Original Signed by:
Dennis L. Ziemann

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Division of Operating Reactors

Enclosure:
Request for Additional Information

cc w/enclosure:
See next page

OFFICE	DOR:ORB #2	DOR:ORB #2				
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cc w/enclosure:
Mr. John W. Rowe
Isham, Lincoln & Beale
Counselors at Law
One First National Plaza, 42nd Floor
Chicago, Illinois 60603

Mr. B. B. Stephenson
Plant Superintendent
Dresden Nuclear Power Station
Rural Route #1
Morris, Illinois 60450

Enclosure

DRESDEN, UNIT 1

REQUEST FOR ADDITIONAL INFORMATION

REGARDING MODIFICATIONS TO THE ONSITE EMERGENCY

ELECTRIC POWER SYSTEM

1. The following items deal with specific aspects of the Failure Mode and Effects Analysis (FMEA) provided with your October 20, 1976 letter to the NRC:

   a) Item number 4001 of the FMEA refers to bus ties between 480V a-c power centers connected to independent Division I and II 480V a-c buses 15 and 16. Provide an analysis of all the bus ties between independent power supplies that serve redundant ECCS equipment to demonstrate that no single failure of any equipment (including power, control and protection circuit equipment) can disable power supplies to redundant ECCS components. In your analysis, clearly identify all automatic bus ties or transfers of redundant ECCS equipment between buses. Design provisions acceptable to the staff for interconnections between redundant load centers through bus tie breakers and multi-feeder breakers used to connect extra redundant loads to either redundant distribution system are provided in SRP section 8.3.1 III 2.b.

   b) All control and protection circuits associated with an independent division I or II a-c power distribution system should be provided d-c control power from the associated Division I or II Class 1E d-c power supply. It is not clear from the FMEA (e.g., item number 4010) that you have adopted this criterion. Please clarify the extent to which it will be adopted.

   c) All redundant ECCS and safe shutdown equipment should be provided power (both motive and control power) from separate divisions of the emergency power system. It is not clear from the FMEA (e.g., items 4004 and 4005) that you have adopted this criterion. Please clarify the extent to which it will be adopted.

2. Provide a complete failure mode and effects analysis of all power and control circuits associated with the interconnection of the existing essential service swing diesel generator and existing 480V a-c buses 15 and 16. An objective of the analysis should be to determine whether a single failure can disable the redundant emergency equipment powered from these buses or result in these buses being paralleled.

3. In section 8.3.1.2.B.4 of your ECCS Design Report the following statements are made:

   a) "Load groups are physically and electrically segregated. No means exist for connecting redundant load groups with each other."

   b) "No means are provided for transferring loads between the divisional diesel-generators or simultaneously feeding redundant load groups from the existing diesel."

   Explain how the three 50% capacity core spray pumps will be powered from the two electric system divisions and satisfy these statements and the single failure criterion.

   Identify any other equipment that can be transferred between the redundant division I and II electric power systems either automatically or manually.

4. Provide an analysis with schematic and logic diagrams for the circuits that initiate and control standby power (i.e., start diesel generators) and the transfer of emergency power buses between sources (both offsite and onsite) to demonstrate that no single failure will disable power sources to both divisions of emergency equipment. Particular attention should be given to interlocks between incoming circuits to emergency power buses.

5. Identify the "design basis events" referred to in section 8.3.1.4.1 of the ECCS Design Report and quantify these events as appropriate.

6. Section 8.3.1.4.2 of the ECCS Design Report states that separation of Class IE components "...shall be maintained except where not possible due to interface with existing (non-Class I) structures and (non-Class IE) equipment..." Describe all of the specific examples where separation of redundant division I and II electric power (a-c and d-c) components (including existing 480V a-c buses 15 and 16 and safety-related equipment connected to the buses) will not be maintained. It is also stated that the specific separation requirements of the ECCS Design Report are minimum requirements unless the adequacy of a particular design can be demonstrated by analysis. Describe all of the specific cases where exceptions to these minimum separation requirements are made on the basis of analysis.

7. Section 8.3.1.4.2 of the ECCS Design Report states that "separation criteria shall be in accordance with IEEE Standard 384-1974." However, the information presented in section 8.3.1.4.2.2.3

Division-Associated Cables and table 8.3-7 Color Codes and Segregation Codes does not appear to be compatible with this statement (i.e., non-class IE cables associated with Division I are the same color as non-Class IE cables associated with Division II). Provide a more complete discussion of your separation and identification criteria for division-associated cables that clearly demonstrates the degree of compliance of these criteria with IEEE Standard 384-1974.

8. Your discussion of separation criteria for "Protected Zones" (ECCS Design Report section 8.3.1.4.2.1.3) is not adequate. Please define "Protected Zones." Provide both verticle and horizontal separation criteria for redundant Division I and II raceways including existing 480V a-c buses 15 and 16 and safety-related equipment connected to the buses. Where separation criteria is based on analysis rather than the minimum separation distances specified in IEEE Standard 384-1974, provide a detailed description of the analysis and the test results the analysis is based on.

9. Identify all redundant safety-related equipment that is located in hazard zones and is not protected by a physical barrier (reference ECCS Design Report section 8.3.1.4.2.1.4 and 8.3.1.4.7). Identify the hazard in all such cases.

10. Your discussion of separation criteria for raceways "General Plant Zones" (ECCS Design Report Section 8.3.1.4.2.1.5) does not address verticle separation. Provide a more detailed discussion of minimum separation distances and the barriers to be used when the minimum criteria cannot be satisfied. Include all redundant division I and II raceways including existing 480V a-c buses 15 and 16 and circuits for safety-related equipment connected to these buses. Specify the specific composition and rating of "fire-resistant" materials relied upon as barriers. Acceptable separation criteria for general plant areas are provided in section 5.1.4 of IEEE standard 384-1974.

11. The information provided in section 8.3.1.4.2.4 of the ECCS Design Report and your letter dated May 31, 1977 is not sufficient for us to verify that the Class IE containment electrical penetrations will satisfy all of the physical separation criteria listed in section 8.3.1.4.2 and the general requirements for electric penetrations listed in Regulatory Guide 1.63. Please provide additional information to clarify the extent to which your design will satisfy these requirements. Justify any exceptions to the Regulatory Guide.

12. Your criteria for Class IE panels (reference ECCS Design Report Section 8.3.1.4.2.3.2) are not acceptable and appear to be in conflict with section 8.3.1.4.1 of the ECCS Design Report. All redundant division I and II electric power (a-c and d-c) components, including existing buses 15 and 16 and safety-related equipment connected to the buses should be protected from hazards that could disable redundant equipment regardless of the source of the hazard. Clarify the extent to which your design will satisfy this requirement.

13. Describe the design features of the new category I HPCI building that will assure that events such as fire and flooding in one portion of the structure will not propagate to another portion housing redundant equipment.

14. The discussion in section 8.3.1.1.2.12.6 of the ECCS Design Report regarding exercising the HPCI diesel generators is not legible, apparently due to printing errors. Clarify this discussion to describe the design provisions that will assure separation of the HPCI diesel generators from the offsite system when offsite power is lost during exercising.

15. The information provided in the ECCS Design Report sections 8.3.1.2.1, 8.3.1.2.3.2 and 8.3.1.2.5.1 is not sufficient to support your conclusion that an immediate access source of electrical power from offsite is not required for the HPCI pumps. Provide additional justification for your position or revise your design.

16. Describe the circuit interrupting devices controlling the incoming 480V a-c circuits to MCCs 115 and 116. What are the normal operating positions for these devices for the various conditions listed on figure 8.3-2 of the ECCS Design Report? Describe any automatic controls for these devices.

17. In section 8.3.1.2.4.2 of the ECCS Design Report you state that information regarding the ratings of each diesel generator will be provided at a later date. We will require complete information about the diesel generator ratings and the loads they are based on prior to installation of the diesel generators.

18. In section 8.3.1.2.4.4 of the ECCS Design Report you take exception to the maximum acceptable voltage and frequency dips specified in Regulatory Guide 1.9 for ECCS equipment started from the HPCI diesel generators. You state that even with voltage and frequency dips greater than 25% and 5% respectively the HPCI pump and the required auxiliaries can be started in the required time. Please provide a complete description of the test results and analysis that this statement is based on. Include the diesel generator load profile curves, voltage and frequency recovery characteristic curves, and the response time of the excitation system to load variations. Describe the design provisions that will prevent adverse effects (e.g., contractors dropping out) on auxiliary and control equipment.

19. The discussion in section 8.3.1.2.4.5 of the ECCS Design Report is not sufficient for us to determine the extent to which your Class IE diesel generator reliability test qualification program will comply with NRC Branch Technical Position EICSB 2 (See SRP Appendix 7A). Provide the additional information necessary for us to make this determination.

20. You have included IEEE Standard 387-1972 in Table 8.3-1 of the ECCS Design Report. By including this standard in the table, are you indicating that the Class IE diesel generators will be designed to comply with the standard? If not, identify the portions of the standard to which you will take exception.

21. Provide a description of the circuits and devices used to automatically sequence loads onto, and strip non-Class IE loads off of, the Class IE diesel generators (include loads connected to 480V a-c buses 15 and 16). Include copies of the appropriate schematic and logic diagrams.

22. Identify all ECCS equipment (a-c and d-c) that is protected with thermal overload devices and provide the criteria used to establish the overload set point. Where thermal overload protection is used describe any periodic tests that will be performed to verify the accuracy and reliability of the overload trip setpoint. Acceptable design criteria for thermal overload devices is provided in NRC Branch Technical Position EICSB 27 (see SRP Appendix 7A).

23. Identify all auxiliary and supporting systems (e.g., HVAC, service water, and diesel generator fuel oil systems) necessary for the proper operation of the onsite emergency electric power system (a-c and d-c). Clarify the extent to which each supporting system will be designed to the same safety standards and requirements as the system it supports.

24. Provide a description of the preoperational and initial startup test programs for the onsite emergency electrical power system (a-c and d-c) and its vital supporting systems to demonstrate the extent to which these programs will be conducted in accordance with Regulatory Guides 1.41 and 1.68. Test outlines for each individual test that will be conducted should be provided. The outlines should identify each test by title, specify the prerequisites and major plant operating conditions necessary for ach test (such as power level and mode of operation of major control systems), provide a summary description of the test method, describe the test objectives and provide a summary of the acceptance criteria for each test.

25. Provide a description of the means proposed for automatically indicating in the control room at the system level the inoperative status of a redundant portion of the emergency electrical power system (a-c and d-c). Include conditions resulting from equipment failure or deliberate operator actions or bypasses. Specifically identify all of the conditions (i.e., lockout) that could render a Class IE diesel generator out of service and verify that all will result in a "diesel-generator out-of-service" alarm (See ECCS Design Report section 8.3.1.1.2.12.6).

26. Provide a complete description and the results of the seismic and environmental qualification tests or analyses performed for the Class IE 4160-V a-c switchgear (Buses 110, 111, 112, and 113). The description and test results should demonstrate conformance with IEEE standards 344-1975 and 323-1974 as identified in your August 31, 1976 letter.

27. Provide electrical schematic diagrams for the class IE 125V d-c power system which shows all loads served from each division bus. Identify any non-safety loads connected to the Class IE batteries.

28. Verify that no cable splices will be permitted in conduits or cable trays.

29. The information you have provided in the ECCS Design Report and your letter dated May 31, 1977 is not sufficient for us to determine the adequacy of the diesel generator fuel oil supply system. Provide updated piping and instrumentation diagrams for the fuel oil supply system. Verify that the fuel oil supply system will be capable of providing a minimum of seven days supply of fuel oil to meet the maximum engineered safety features load requirements (i.e., both divisions) following a loss of offsite power and any design basis event.

30. In section 8.3.1.4.2 of the ECCS Design Report you state that, "separation criteria shall be in accordance with IEEE Standard 384-1974." Section 5.1.4 of the standard specifies a minimum one-inch distance between redundant enclosed raceways and between barriers and raceways. Identify all locations(for both new and existing raceways) where the one-inch separation criterion will be used and provide an analysis to demonstrate that no single event (e.g., fire, either from cable failure or other causes) can result in damage to redundant safety equipment and simultaneously cause a condition (i.e., LOCA or transient resulting from failures of safety or non-safety related equipment) that requires operation of the damaged redundant safety equipment.