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April 6, 1976

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U.S. NUCLEAR REGULATORY COMMISSION
MAIL SECTION

Mr. Dennis L. Ziemann, Chief
Operating Reactors - Branch 2
Division of Operating Reactors
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Dresden Station Unit 2 - Response to Request for Additional Information dated March 19, 1976 - NRC Docket No. 50-237

Dear Mr. Ziemann:

The response to your March 19, 1976 request for information regarding possible failure modes of the ECCS equipment is found on the enclosed attachments.

Please contact this office if there are any additional questions.

Enclosed are one (1) signed original and 39 copies for your use.

Very truly yours,

R. L. Bolger
Assistant Vice President

Enclosure

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Attachment 1

1. Describe the design of the ECCS actuation system. Identify any nonconformance of this design with the single failure requirements of IEEE Std 279-1971. Describe any changes proposed for meeting these requirements.

2. Describe the design of the onsite emergency power system, a-c and d-c. Identify any nonconformance of this design with the single failure requirements of IEEE Std 279-1971. Describe any changes proposed for meeting these requirements.

Response to 1 and 2

The designs of the ECCS actuation systems are described in the Dresden FSAR as follows:

A. Core Spray - Section 6.2.3.2, pages 6.2-7, and 6.2-8.

B. LPCI - Section 6.2.4.2, pages 6.2-18, 6.2-19, and 6.2-20.

Amendment No. 7 to FSAR Question 5.11, LPCIS Logic page 5.11-1

Question 5.12 - Containment Spray Controls

Amendment No. 8 to FSAR Question 5.12, Containment Spray Controls

C. HPCI - Section 6.2.5.2, pages 6.2-26, 6.2-27, and 6.2-28.

D. Automatic Pressure Relief - Section 6.2.6.2, pages 6.2-33, and 6.2-34.

The design of the onsite emergency power system, a-c and d-c, is described in the Dresden FSAR under Section 8.2.3, "Emergency Power".

The question of conformance with the single failure requirements of IEEE Std 279 has been previously reviewed by the NRC. Enclosure I to the May 5, 1975 letter from Mr. E. G. Case, Deputy Director, Office of Nuclear Reactor Regulation, to Mr. David Comey, Business and Professional People for the Public Interest, is a listing of operating nuclear power reactors evaluated by the NRC against IEEE Std 279 and found acceptable. This list shows that Dresden Unit 2 was found to be in compliance with IEEE 279, 1968. Comparison of the "Single Failure Criterion" (Section 4.2) as contained in the 1968 and 1971 issues of IEEE 279 shows that there is only a minor difference in wording, and this tends to make the scope of the 1968 issue more inclusive.

Response to 1 and 2 (Cont'd)

Additional treatment of the single failures is found in Amendment No. 11 to FSAR questions in Section II.B.

Appendix B to the FSAR titled "Plant Comparative Evaluation with Design Criterion" contains information on the ECCS system reliability and conformation with various design criterion.

No modifications to systems are needed to conform to single failure criterion of IEEE 279.

3. Identify all the electrical equipment required for the ECCS and supporting subsystems to enable performance of the ECCS safety function. Define the qualification status (ability to withstand the design basis seismic and environmental conditions) of this equipment, and the basis for such qualification, to provide reasonable assurance that the equipment will be capable of performing its safety function. Describe any proposed design modifications, analyses, or test programs for meeting the environmental and seismic qualification requirements.

Response 3

Environmental qualification of drywell components is discussed in FSAR Amendment No. 7 Question 5.23, ECCS components environmental tests. This section discusses all components subject to drywell environment and no further qualification tests are required.

Amendment No. 19 of the FSAR provides supplemental seismic design information. Several ECCS components are included in this report.

Seismic provisions for instruments are answered by Northern States Power Company's Monticello Plant, NRC Docket No. 50-263. The results apply to Dresden Units 2 and 3.

Commonwealth Edison has contracted Sargent and Lundy to prepare a list of the electrical components required for the ECCS and supporting subsystems and to review the seismic and environmental qualifications of those components not previously evaluated.

4. Identify all electrical equipment, both safety and non-safety, that may become submerged as a result of a LOCA. For all such equipment that is not qualified for service in such an environment, provide an analysis to determine the following: (1) the safety significance of the failure of the equipment (e.g., spurious operation, loss of function, loss of accident/post-accident monitoring, etc.) as a result of flooding, (2) the effects on Class IE electrical power sources serving this equipment as a result of such failures, and

4. (Cont'd)

(3) the proposed design changes resulting from your analysis. Your response to item (2) should specifically address breaker and fuse coordination and the isolation capabilities of this aspect of your design.

Response 4

As indicated in J. S. Abel's letter to Dennis L. Ziemann dated July 7, 1975, there are no safety related components subject to submergence following a LOCA.

The only non-safety related components which could be submerged following a LOCA are the drywell floor drain and equipment drain sump pumps.

There is no safety significance to the submergence of the pumps and their controls in the drywell. The pumps are prevented from starting when their discharge valves located outside the drywell close on a Group II (drywell) isolation. Should any of the pumps start despite the isolation signal, the associated feed breaker would trip.

There should be no effect on the motor control center feeding the sump pumps and hence no design changes are necessary.

5. Identify any single electrically operated fluid system component, including manually-controlled electrically-operated valves, whose failure could result in loss of capability of the ECCS to perform its safety function. Failure in both the "fail to function" sense and in the "undesirable function" sense should be considered, and this should apply even though the component may not be required to function in a given safety operational sequence.

Response 5

The fail to function and undesirable function are discussed in the following documents: J. S. Abel's letter to D. L. Ziemann dated June 23, 1975; and part of Dresden Station Special Report No. 40.

In addition, the consequences of single failures are tabulated in Table 2 of Supplement C to Quad-Cities Station Special Report No. 15, NRC Docket 50-254 and 50-265. The latest revision was promulgated by G. A. Abrell's letter to D. L. Ziemann dated February 26, 1976.

6. With regard to the equipment identified in item (5), provide a detailed description of any proposed design changes deemed necessary by your analysis for meeting the single failure criterion. Your response should specifically address but should not be limited to changes made to meet the single criterion by conformance to Branch Technical Position EICSB 18, "Application of the Single Failure Criterion to Manually-Controlled Electrically-Operated Valves", of Appendix 7A of the Regulatory Standard Review Plan. This position establishes the acceptability of disconnecting power to the electrical components of a fluid system as one means of meeting the single failure criterion.

Response 6

No equipment was identified in the response to item 5 which could defeat the ECCS function. Several failures were noted which could prevent components from functioning, but the consequences as tabulated in Table 2 to Supplement C of Quad-Cities Station Special Report No. 15 show these to be acceptable. No additional changes to the systems are necessary.

7. Identify any electrical interlocks between redundant portions of the ECCS and supporting subsystems. Define the consequence of failure of any interlock on the capability of the ECCS to perform its safety function. Describe any proposed design modifications resulting from this review.

Response 7

Preliminary review indicates no electrical interlocks betwen redundant portions of the ECCS systems.

There are interlocks to prevent paralleling two sources of power to Buses 28 and 29. The consequences of a failure of this interlock most probably would be the inability to provide an alternate feed to Buses 28 or 29. Another possible, but less likely consequence, could be the loss of feed to one of the buses. The loss of feed to Buses 28 or 29 would result in the loss of availability of one of the diesel generators. Inasmuch as the loss of a diesel generator has been analyzed and found to be acceptable, no design changes are contemplated.

The interlock is required to function only when switching power supplies for the 480v switchgear. No switching is required in the event of a LOCA, and switching during plant operation is very rare because safety systems are powered from these buses. The value of the crosstie

Response 7 (Cont'd)

is to maintain normal safety system, essential service, and instrument power whenever electrical maintenance is conducted during plant outages.

8. Provide the electrical and physical separation criteria for your design of redundant safety equipment and functions. Include the features in your design that minimize the vulnerability of the ECCS and supporting subsystems to common failure modes.

Response 8

The separation criteria used in the design of the Dresden Station Unit 2 reactor safety and engineered safeguards systems is contained in the attached copy of General Electric Company Specification 22A2501, Revision 0.

9. Provide the following drawings for the ECCS and supporting subsystems:

a. Piping and Instrument Diagrams (P&ID).

b. Electrical Control Schematic Diagrams.

c. One Line Diagram of the Onsite AC Power Distribution System.

d. One Line Diagram of the DC Power Distribution System.

e. One Line Diagram of the Vital Instrument Power Distribution System.

Response 9:

Five copies of the drawings listed below are provided:

Drawing Number	Title	Revision	Date
12E2301	Single Line Diagram	H	09/19/75
12E2302A	Station Key Diagram PT.1 4160 & 480v SWGR'S	D	03/07/75
12E2302B	Station Key Diagram PT.2 480 Motor Control Center	J	08/21/74
12E2303	Key Diagram 4160 SWGR'S 21, 22, 23, and 24	E	02/09/73
12E2304	Key Diagram 4160 SWGR'S 23-1, and 24-1	D	02/24/70

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Drawing Number	Title	Revision	Date
12E2306	Key Diagram Reactor Building 480v Switch Groups 28 and 29	G	11/16/72
12E2321	Key Diagram 250 v D.C. Motor Control Centers	D	03/10/70
12E2322	Key Diagram 125v D.C. Distribution	F	11/18/71
12E2324	Key Diagram and ELEV 48/24 V.D.C. Dist. for Neutron Monitoring	E	01/22/75
12E2325	Key Diagram 120 and 120/240 V.A.C. Dist. for Essential Instrument and reactor Prot. Buses	M	08/15/75
12E2428	Schematic Control Diagram Annunciator and Computer Core Spray System 1 and 2	S	05/25/71
12E2429	Relaying Metering, and Schematic Diagram Core Spray Pumps 2A, 2C	M	02/20/75
12E2430	Schematic Diagram Core Spray Systems 1 and 2	Y	05/25/71
12E2431	Schematic Control Diagram Core Spray Motor Operated Valves	N	01/22/75
12E2432	Schematic Control Diagram Core Spray Motor Operated Valves	P	01/22/75
12E2433	Schematic Control Diagram Core Spray Motor Operated Valves	H	01/22/75
12E2436	Schematic Control Diagram 4160v SWGR 23-1 and 24-1 LPCI/Containment Cooling System Pumps: 2A-1502, 2B-1502, 2C-1502, 2D-1502	K	06/25/69

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Drawing Number	Title	Revision	Date
12E2437	Schematic Control Diagram LPCI/Containment Cooling System I	V	5/25/71
12E2437A	Schematic Control Diagram LPCI/Containment Cooling System I	U	09/20/75
12E2438	Schematic Control Diagram LPCI/Containment Cooling System 2	X	08/15/75
12E2438A	Schematic Control Diagram LPCI/Containment Cooling System 2	V	09/02/71
12E2439	Schematic Control Diagram LPCI/Containment Cooling Check Valves 1501-25A, and 25B	N	05/25/71
12E2440	Schematic Control Diagram LPCI/Containment Cooling System Motor Operated Valves	Q	01/22/75
12E2441	Schematic Control Diagram LPCI/Containment Cooling System Motor Operated Valves	Q	09/20/75
12E2441A	Schematic Control Diagram LPCI/Containment Cooling System Motor Operated Valves	R	09/20/75
12E2461	Schematic Control Diagram Auto Blowdown Part 1	AC	08/23/74
12E2462	Schematic Control Diagram Auto Blowdown Part II	AD	02/20/75
12E2484	Schematic Diagram Isolation Condenser System Motor Operated Valves	D	05/20/75
12E2526	Schematic Control Diagram High Pressure Coolant Injection System Block Diagram and Cont. SW's Development	J	11/07/75
12E2527	Schematic Control Diagram High Pressure Coolant Injection System Sensors and Auxiliary Relays	AC	10/18/75
12E2528	Schematic Control Diagram HPCI System Valves and Turbine Auxilaries	Y	10/18/75

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Drawing Number	Title	Revision	Date
12E2529	Schematic Diagram HPCI System Steam, Main Pumps, and Condensate Valves	V	11/07/75
12E2530	Schematic Control Diagram HPCI System Auxiliary Valves	L	01/22/75
12E2531	Schematic Control Diagram HPCI System Alarms	R	08/15/75
12E2532	Schematic Control Diagram HPCI System Turbine Auxiliary Pump	M	08/15/75
12E2533	Schematic Diagram HPCI Turbine Motor Gear Unit, Speed Changer, and auxiliary valves	L	10/18/75
12E2534A	Schematic Control Diagram HPCI System Signal Converter Part I	B	06/15/70
12E2534B	Schematic Control Diagram HPCI System Signal Converter Part 2	B	06/15/70
12E2328	Single Line Diagram Emergency Power System	A	03/14/69
M-12	Diagram of Main Steam Piping	FF	09/08/75
M-25	Diagram of Pressure Suppression Piping	HH	02/27/75
M-26	Diagram of Nuclear Boiler and Reactor Recirculation Piping	X	12/15/75
M-27	Diagram of Core Spray Piping	BB	05/07/75
M-29	Diagram of L.P. Coolant Injection Piping	GG	05/23/75
M-51	Diagram of H.P. Coolant Injection Piping	AA	03/27/75
M-29	Diagram of Shutdown Reactor Cooling System	T	03/27/75
M-35	Diagram of Well Water Piping	LL	09/02/75