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Department of Nuclear Energy

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July 9, 1980

Mr. Robert L. Ferguson  
Chemical Engineering  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

RE: Safe Shutdown Analysis, Dresden Nuclear Power Station, Units 2 and 3

Dear Bob:

Mr. Vincent Lettieri and Mr. Ed MacDougall of Brookhaven National Laboratory (BNL) and Mr. Mario Antonetti of Gage-Babcock and Associates, Inc. have completed the mini-review of the Dresden Nuclear Power Station, Units 2 and 3. This mini-review consisted of a review of the documentation submitted by the licensee (ref. d and e) to see if it was complete and in enough detail for BNL to evaluate the safe shutdown analysis. The licensee's Fire Hazard Analysis was referred to as needed.

- A review of the documentation was made for completeness.
- A comparison of the material submitted by the licensee to the requirements of the SER (ref. a) was conducted. This comparison was made solely for completeness and not a detailed compliance check.
- A review of the material submitted for gross and obvious variations from the requirements of Appendix A (ref. c) and Appendix R (ref. b) was also conducted.

We have listed our comments under the following headings in this report:

1. Adequacy of Documentation
2. Comparison of the Licensee's Submittal to the S.E.R.
3. Comparison of the Licensee's Submittal to Appendices A and R
4. Conclusions
5. References

1. Adequacy of Documentation

A review was made of each fire zone to determine if the licensee has supplied adequate documentation. A matrix giving our findings is shown in Table 1 and Table 1A following.

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- 1.1 The documentation submitted is legible and provides references back to the Fire Hazard Analysis prints which show the fire zones and safety related equipment clearly. Some safety related electrical trays are shown in plan view; however, no electrical prints were submitted showing tray elevation and no conduit prints were submitted with this documentation. As a result cable identification and location are not available for review.
- 1.2 Accurate valve and instrument locations cannot be determined from the submitted documentation; these are needed to make a complete review of the safe shutdown analysis.

TABLE 1

ADEQUACY OF DOCUMENTATION  
(June 5, 1978 Submittal)

Fire Zone	Alternate Shut-down Method Given in Submittal	Tables Satisfactory	Referenced Drawing	Drawings Satisfactory
1.1.1.3A	Yes	Yes	2/3.2-1-3 & M-3	See Note 1
1.1.1.4A	Yes	Yes	2/3.2-1-4 & M-2	See Note 1
1.1.2.3A	Yes	Yes	2/3.2-1-3 & M-3	See Note 1
1.1.2.4A	Yes	Yes	2/3.2-1-4 & M-2	See Note 1
2.0	Yes	Yes	2/3.2-2-1 & M-3	See Note 1
6.2	Yes	Yes	2/3.2-2-1 & M-4	See Note 1
8.2.4	Yes	Yes	2/3.2-2-1 & M-4	See Note 1
8.2.5A	Yes	Yes	2/3.2-2-1, 2.2-8-2 & M-4	See Note 1
8.2.5B	Yes	Yes	3.2-8-2 & M-4	See Note 1
8.2.6A	Yes	Yes	2/3.2-2-1 & M-3	See Note 1
8.2.6B	Yes	Yes	3.2-8-4 & M-3	See Note 1
1.1.1.2A	Yes	Yes	2/3.2-1-2 & M-4	See Note 1
1.1.2.2A	Yes	Yes	2/3.2-1-2 & M-4	See Note 1
1.1.1.5A	Yes	Yes	2/3.2-1-5, 2/3.2-8-5 & M-6	See Note 1
1.1.2.5A	Yes	Yes	2/3.2-1-5, 2/3.2-8-5 & M-6	See Note 1
8.2.2	Yes	Yes	2/3.2-8-1 & M-5	See Note 1
8.2.3	Yes	Yes	2/3.2-8-1 & M-5	See Note 1

\*Note 1: Referenced drawings are satisfactory in that they are easily read. However, they do not provide sufficient detail in all cases to determine if the licensee's safe shutdown analysis is satisfactory. See paragraphs 1.1 and 1.2 of this report for additional comments.

TABLE 1A

ADEQUACY OF DOCUMENTATION  
(January 24, 1980 Submittal)

Fire Zone	Alternate Shut-down Method Given in Submittal	Tables Satisfactory	Referenced Drawing	Drawings Satisfactory
1.1.1.1	Yes	Yes	2/3.2-1-1 & M-5	See Note 1
1.1.2.1	Yes	Yes	2/3.2-1-1 & M-5	See Note 1
1.1.1.2	Yes	Yes	2/3.2-1-2 & M-4	See Note 1
1.1.2.2	Yes	Yes	2/3.2-1-2 & M-4	See Note 1
1.1.1.3	Yes	Yes	2/3.2-1-3 & M-3	See Note 1
1.1.2.3	Yes	Yes	2/3.2-1-3 & M-3	See Note 1
1.2.1	Yes	Yes	2/3.2-1-1 to 2/3.2-1-5 M-2 to M-6	See Note 1
1.2.2	Yes	Yes	2/3.2-1-1 to 2/3.2-1-5 M-2 to M-6	See Note 1
2.0	Yes	Yes	2/3.2-2-1 & M-3	See Note 1
6.1	Yes	Yes	3.2-8-4 & M-3	See Note 1
6.2	Yes	Yes	2/3.2-2-1 & M-4	See Note 1
7	Yes	Yes	2/3.2-2-1, 3.2-8-4 & M-3	See Note 1
8.2.6	Yes	Yes	2.2-8-4 & M-3	See Note 1
11.3	Yes	Yes	2/3.2-11-1&M-10	See Note 1

\*Note 1: Referenced drawings are satisfactory in that they are easily read. However, they do not provide sufficient detail in all cases to determine if the licensee's safe shutdown analysis is satisfactory. See paragraphs 1.1 and 1.2 of this report for additional comments.

## 2. Comparison of the Licensee's Submittal to the SER

Each section of the SER (ref. a) that contained a reference to safe shutdown or alternate shutdown due to a postulated fire was compared to the licensee's submittal (ref. d and e). This comparison was not made to determine if full compliance was achieved but rather as a documentation completeness check. Table 2 shows the results of this comparison.

2.1 Each section of the SER requiring an evaluation of safe shutdown capability in a given fire area has been addressed in the licensee's submittal of June 5, 1978. Additional information was supplied in the cold shutdown submittal (ref. e). See Table 3.

TABLE 2  
COMPARISON OF THE SUBMITTAL TO THE SER\*

SER Section	Fire Area/Zone	Area	Submittal Section 6/5/78
3.2.4	All	Shutdown Capability	-----
4.1	All	Safe Shutdown Systems	-----
4.10	All	Separation Criteria	-----
5.1.2	1.1.1.2A	Reactor Bldg. - Ground Floor (Elev. 517)	3.2.1
5.1.2	1.1.2.2A	Reactor Bldg. - Ground Floor (Elev. 517)	3.2.2
5.1.3	1.1.1.3A	Reactor Bldg. - Mezz. Floor (Elev. 545)	3.1.1
5.1.3	1.1.2.3A	Reactor Bldg. - Mezz. Floor (Elev. 545)	3.1.3
5.1.4	1.1.1.4A	Reactor Bldg. - Main Floor (Elev. 570)	3.1.2
5.1.4	1.1.2.4A	Reactor Bldg. - Main Floor (Elev. 570)	3.1.4
5.3	2.0	Control Room	3.1.5
5.4	6.2	Auxiliary Electrical Equipment Room	3.1.6
5.9.3	8.2.4	Turbine Bldg. - Unit 3 Cable Tunnel	3.1.7
5.9.4	8.2.5A	Turbine Bldg. - Ground Floor (Elev. 517)	3.1.8
5.9.4	8.2.5B	Turbine Bldg. - Ground Floor (Elev. 517)	3.1.9
5.9.5	8.2.6A	Turbine Bldg. - Mezz. Floor (Elev. 534)	3.1.10
5.9.5	8.2.6B	Turbine Bldg. - Mezz. Floor (Elev. 538)	3.1.11

TABLE 3  
ADDITIONAL AREAS REQUIRED FOR SAFE SHUTDOWN IN SUBMITTAL

SER Section	Fire Area/Zone	Area	Submittal Section 6/5/78
-----	1.1.1.5A	Unit 3 - Reactor Bldg. (Elev. 589)	3.2.3
-----	1.1.1.5B	Unit 2 - Reactor Bldg. (Elev. 589)	3.2.4
-----	8.2.2	Unit 2 - Turbine Bldg. (Elev. 495)	3.2.5
-----	8.2.3	Unit 3 - Turbine Bldg. (Elev. 495)	3.2.6

3. Comparison of the Submittal to Appendices A and R

A detailed comparison of the licensee's submittals (ref. d and e) to Appendix A and Appendix R was not made at this time. However, some exceptions to Appendix R were noted in this mini-review and are as follows:

- 3.1 Section II, B, Loss of Offsite Power; states that "Fire detection and suppression system protecting systems necessary to achieve and maintain safe shutdown shall be capable of functioning with or without off-site power." Section III, L.3, and Section III, L.4 both state that "...They shall also be capable of being powered by on-site and off-site electric power systems or by on-site power systems that are independent of the on-site and off-site electric power system."

The licensee's submittals (ref. d) page 1-5, item 1.4 Assumptions #1 precludes the loss of offsite power, and ref. (e) page 3, item A.14 refers back to item 1.4 of ref. (d).

- 3.2 Section III, J, Emergency Lighting, calls for eight-hour rated emergency sealed beam on fluorescent units.

This SER Section 4.6 does not address the eight-hour rated requirements.

- 3.3 Section III, M, Fire Barriers, calls for three-hour barriers (or justification by analysis) between fire areas.

The licensee's submittals do not show three-hour barriers between all fire areas. The detailed review will determine whether or not the justification submitted is adequate.

- 3.4 Section III, N, Fire Barrier Penetration Seal Qualification, states "The fire barrier shall be tested with a pressure differential across it (higher pressure on the exposed side) that is equivalent to the maximum pressure differential a fire barrier in the plant is expected to experience unless such pressure differentials are shown to have no effect on the performance of the penetration seal."

The submittals do not meet the method of testing for "delta" p, and will require further study during the detailed review.

- 3.5 Section III, G, Protection of Safe Shutdown Capability, 1.m, states "The design of the protective features shall consider... the failure of automatic fire suppression systems."

The submittals do not specifically address the failure of automatic fire suppression systems.

#### 4. Conclusions

An evaluation of the safe shutdown and alternate shutdown systems cannot be made at this time because of the following reasons:

##### 4.1 Inadequate Documentation

- a. Insufficient documentation was provided to assure adequate cable separation for redundant circuits exposed to a common fire. See section 1.1 of this report.
- b. Insufficient documentation was provided to define safety related valve location and safety related instruments whose loss could be sustained in a fire.

##### 4.2 Nonconformance to Appendix R

- a. Loss of off-site power (see item 3.1 of this report).
- b. Fire barriers and separation (see item 3.3 of this report).
- c. Emergency lighting (see item 3.2 of this report).
- d. Fire barrier penetration seal qualification (see item 3.4 of this report).
- e. Protection of safe shutdown capability (see item 3.5 of this report).

We conclude that at this time there is no reasonable assurance that the licensee's fire protection will allow a safe shutdown of the Dresden 2/3 plant. Therefore, as a minimum, we recommend that the NRC require an alternate shutdown system independent of those fire areas addressed in Tables 1 and 1A of this report. If these modifications are too extensive and therefore not practicable, a dedicated system should be considered by the licensee.

#### 5. References

- a. Safety Evaluation Report, Dresden Nuclear Power Station, Units 2 and 3, Nuclear Regulatory Commission, March 1978.
- b. Draft Appendix R to 10 CFR Part 50, May 2, 1980.
- c. Appendix A to Branch Technical Position APCSB 9.5-1, USNRC, August 23, 1976.
- d. Fire Protection Safe Shutdown Analysis, Dresden Station Units 2 and 3, Commonwealth Edison Company, June 1978.
- e. Fire Protection Safe Shutdown Analysis, Supplement 1, Cold Shutdown Analysis, Dresden Station Units 2 and 3, Commonwealth Edison Company, January 1980.

- f. SEP Review of Safe Shutdown Systems for the Dresden Unit 2 Nuclear Power Plant, Nuclear Regulatory Commission, cover letter dated February 9, 1979.

Respectfully yours,

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