September 24, 1982

Docket No. 50-237
LS05-82-09-077

Mr. L. DelGeorge
Director of Nuclear Licensing
Commonwealth Edison Company
Post Office Box 767
Chicago, Illinois 60690

Dear Mr. DelGeorge:

SUBJECT: SEP TOPIC VI-10.B, ELECTRICAL, INSTRUMENTATION AND CONTROL PORTIONS OF SHARED SYSTEMS - SAFETY EVALUATION REPORT FOR DRESDEN NUCLEAR POWER STATION, UNIT 2

The enclosed staff safety evaluation is a revision of a report forwarded by D. M. Crutchfield's letter of April 22, 1982. The report has been revised to reflect additional information developed during our review and the additional information contained in a letter from Thomas J. Rausch to Paul O'Connor dated August 30, 1982.

We continue to recommend modifications to the Technical Specifications to prevent parallelling the 125V dc systems during reactor operation. The need to actually implement these changes will be determined during the Integrated Safety Assessment. This safety evaluation may be revised in the future if your facility design is changed or if NRC criteria relating to this topic are modified before the Integrated Assessment is completed.

Sincerely,

Original signed by

Paul O'Connor, Project Manager
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Enclosure:
As stated

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SYSTEMATIC EVALUATION PROGRAM

TOPIC VI-10.B

DRESDEN NUCLEAR POWER STATION, UNIT 2

I. INTRODUCTION

The sharing of engineered safety features (ESF) systems, including on-site emergency power systems, and service systems for a multiple unit facility can result in a reduction of the number and of the capacity of on-site systems to below that which normally is provided for the same number of units located at separate sites.

II. REVIEW CRITERIA

The review criteria are presented in Section 2 of EG&G Report 0117J, "Electrical Instrumentation and Control Portions of Shared Systems."

III. RELATED SAFETY TOPICS AND INTERFACES

The scope of review for this topic was limited to avoid duplication of effort since some aspects of review were performed under related topics. Related topics and the subject matter are identified below. Each of the related topic reports contain the acceptance criteria and review guidance for its subject matter.

VI-7.A.3	ECCS Actuation
VI-7.C.1	Independence of Onsite Power
VI-7.C.2	Single Failures
VII-2	Isolation of ECCS and Control Systems
VII-3	Safe Shutdown
VIII-2	Diesel Generators

Topics VI-7.C.1, VI-7.C.2 and VII-3 are dependent in the present topic information for their completion.

IV. REVIEW GUIDELINES

The review guidelines are presented in Section 2 of Report 0117J.

V. EVALUATION

As noted in EG&G Report 0117J, the Dresden Nuclear Power Station, Unit 2 is not in compliance with current licensing requirements with regard to some of the EI&C features of shared systems. They include:

1. Single failure that, because of the way loads are assigned to electrical supplies and because of the way that electrical supplies are shared between Dresden Unit 2 and 3, could result in the inability to provide power to the required safe shutdown loads in one unit upon a loss of offsite power coincident with an accident in the other unit.

   Specific examples are given in the EG&G report. Evaluations of these examples are presented in the following paragraphs.

   A. There are no physical or electrical interlocks or LCO preventing parallel operation of the shared 125V and 250V dc battery systems. Such operation, combined with a single failure, would result in a loss of capability to supply accident or safe shutdown loads following a loss of offsite power.

      The staff's audit of operating procedures (e.g., DOP 6900-4) indicates that there are no procedures requiring paralleling of the 250V dc systems during reactor operation.

      However, DOP 6900-6 requires that the 125V batteries be paralled as a part of the ground detection procedures. Furthermore, there are no requirements to prevent the paralleling of the 250V batteries.

      NUREG-0666 and Regulatory Guide 1.81 establish the basis for the staff's position that dc systems in multi-unit nuclear power plants should not be shared. In the case of parallel operation, a single failure could result in a loss of engineered safety features in both plants and, simultaneously, initiate plant transients.

      Given that a ground fault exists, the wisdom of paralleling a second battery (and doubling the available fault current) is questionable. The added possibility of a major upset occuring simultaneously is neither acceptable nor necessary given the availability of other ground fault detection systems using different techniques.

   B. There are no LCO requirements or interlocks preventing the normal/bypass switches for the DG2/3 from being in "bypass" during operation of either unit. Such operation, combined with a single failure could render the required accident and safe shutdown loads inoperable following a loss of offsite power.

      In a letter from J. Rausch to P. O'Connor dated August 30, 1982, the licensee stated that the operating procedures had been changed to require a "normal-normal" alignment of these switches.

C. Complete information of the status of the shared dc batteries, chargers and buses is not available to operators of each unit. Battery status indication will be addressed under SEP Topic VIII-3.B.

D. The 125V and 250V dc systems are shared, which is not in compliance with current licensing requirements. However, the staff's review of the present dc designs shows that they satisfy the single failure criterion (when they are not parallelled) if credit can be given to the electrical circuit protection devices. These devices are to be re-evaluated as a part of the resolution of Topic VI-7.C.1.

E. Stored energy for DG operation does not meet the seven day minimum or time to replenish, whichever is longer, required by current licensing criteria. However, sufficient oil is available on site to operate one diesel generator for seven days. Only one diesel is required for the shutdown cooling of a unit and the post-accident cooling of a second unit. The licensee has stated that administrative controls require the monitoring of the fuel storage tank levels on each shift and specify a minimum operating level corresponding to approximately a three and one-half day supply per diesel. Additionally, the tanks are equipped with a low-level alarm which will annunciate at a level corresponding to approximately a two day supply for each diesel. An oil refinery is located within about one-half hour of the plant and the metropolitan Chicago area is only about one hour away.

F. The 250V dc battery chargers are not capable of restoring the battery to its fully-charged condition from minimum charge conditions during normal and post-accident steady state loads.

The 250V dc battery chargers have been replaced by units of sufficient capacity. The plant modification is M12-2-78-16.

G. The loss of Diesel Generator 2 or a loss of the Unit 2 125V dc Reserve Bus (which supplies the Division II Control power) and a loss of offsite power with an accident in Unit 3 results in a loss of ac for Unit 2.

Under these conditions, according to the licensee's August 30, 1982 letter, the Unit 2 shutdown will commence with the isolation condenser and HPCI System.

The swing diesel generator is required by Unit 3 only until the core has been reflooded. At that point, only one LPCI pump is required to maintain level, and two containment cooling service water pumps will remove the heat from the containment (see FSAR Section 6.2.4). This combination of pumps is within the rating of a single diesel generator. Once reflood has occurred in Unit 3, the operator can manually swing Diesel Generator 2/3 to Unit 2 to support long-term cooling.

This scenario is covered by Procedure DGA 12, "Partial or Complete Loss of AC Power," which instructs the operator upon loss of ac to cool down using the isolation condenser and/or HPCI, and also to restore power via Diesel Generator 2/3 using the normal bypass switches under emergency conditions.

The staff's audit of the cited procedure and drawings 12E-2328 and 12E-2346 supports this statement.

H. The Isolation Condenser System (ICS) is susceptable to single EI&C failures which would render the system inoperable. Failure of 250V dc Reactor Bus power or failure of the motor operator for valve 2-1301-3 results in inability of the system to automatically initiate.

This valve can be operated manually. Time is available to operate it, and it is located outside of containment.

2. In addition to the work done by EG&G, a second contractor (Franklin Research Center) has informed us that at least one shared engineered safety feature (ESF) is powered from diesel generator 2/3.

From Franklin's review of the ventilation systems (SEP Topic IX-5), it was determined that part of one Standby Gas Treatment System (SBGTS) is powered from Bus 28-2 (Unit 2) and diesel 2/3. The other SBGTS is powered from diesel 3 in Unit 3. If there is a LOCA in Unit 3 and offsite power is lost and diesel generator 3 fails, both SBGTS will fail (because diesel 2/3 will swing to Unit 3).

The staff was concerned that similar problems may exist with the shared cooling systems. The staff did not have sufficient, current drawings of Unit 2 and 3 shared systems to resolve this concern.

In addition, Franklin identified the battery room ventilation system as not being powered from an onsite source. The staff is concerned because a recharge from the diesel generator is the time of highest hydrogen concentration. The licensee's response was that manual methods could be used to load the vent fan onto diesel generator 2. A review of procedure DGA-12 does not include loading of any fans, although Bus 27 is re-energized.

Further telephone discussions, a site visit, additional drawings, and a letter from J. Rausch to P. O'Connor dated August 30, 1982, have served to resolve some of these concerns, as follows:

A. Alternate power sources via manual transfers can be made available to assure that sufficient engineered safety features such as the SBGTS are available in a sufficient period of time.

B. The licensee will attempt to demonstrate that battery ventilation is not required.

C. In the event of the LOCA in Unit 3, loss of offsite power, and failure of DG3, the operator can manually restore power to the SBGTS by use of the bus tie between 480V Bus 28 and 29. Such a transfer will have minimal effect on Diesel Generator 2, because many loads are shed from Bus 28 on undervoltage and safe shutdown loads for Unit 2 total only 1340 KW (see FSAR Table 8.2.3:2) far below the diesel output capacity. Use of the bus tie breakers is governed by procedure DOP 6700-2.

A review of loads fed by DG 2/3 indicates that other shared ESF Systems powered by this diesel are the diesel auxiliaries (cooling water pump, fuel transfer pump, room vent fan), 250V dc battery charger 2/3. The diesel auxiliaries all have redundant power feeds from Unit 3 which automatically close in upon loss of the Unit 2 feeds. Backup 250V dc batter charger 2/3 can be manually connected to the Unit 2 battery upon loss of charger 2. The 125V dc battery charger 2/3 is normally not connected to either battery; however, this charger has an alternate feed from Unit 3. Use of the battery chargers is discussed in procedures DOP 6900-1 and -2.

The staff's audit of the procedures and drawings referenced by the licensee supports this analysis.

VI. CONCLUSIONS

Although the present level of sharing of 125V and 250V dc systems is not in agreement with current criteria (and is prohibited by the recommendations of NUREG-0666), the staff has determined that the design satisfies the single failure criterion and is, therefore, acceptable provided that the Dresden 2 125V dc systems are modified to prevent parallel operation of dc sources during reactor operation and SEP Topic VI-7.C.1 is resolved in a manner acceptable to the staff.

The procedures for positioning the diesel generator bypass switches are acceptable.

The battery status indication should be modified as outlined in SEP VIII-3.B.

The existing fuel oil storage capacity, combined with the close proximity of replenishment sources, is sufficient, therefore, acceptable.

Sufficient 250V battery charging capacity is available.

The loss of power to valve 2-1303-3 is not a safety problem for safe shutdown because it can be operated manually.