

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT  
WASHINGTON, D.C. 20555

November 27, 1985

IE INFORMATION NOTICE NO. 85-91: LOAD SEQUENCERS FOR EMERGENCY DIESEL GENERATORS

Addressees:

All nuclear power reactor facilities holding an operating license (OL) or a construction permit (CP).

Purpose:

This information notice is provided to advise licensees and applicants of potential design deficiencies that could bypass load sequencers, thereby causing loss of redundant emergency diesel generators (EDGs). Recipients are expected to review the information for applicability to their facilities and consider actions, if appropriate, to preclude similar problems occurring at their facilities. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

On August 22, 1985, the licensee for the Duane Arnold nuclear plant discovered that an accident signal and the loss of the standby transformer (a source of offsite electric power) would cause engineered safety feature (ESF) loads to be applied as a single block load onto the EDGs (the sources of onsite electric power), which would likely cause loss of both EDGs.

Pending replacement of the unit auxiliary transformer (lost in a transformer fire in October 1984), the licensee was operating the plant with the non-safety-related loads on the station startup transformer and the safety-related loads on the station standby transformer. The plant design objective was to sequence the ESF loads onto the EDGs if offsite power to the ESF buses should be lost and an accident signal was present. The licensee's training staff realized that the logic and sensors used to determine the availability of off-site power were such that the offsite power feeder breakers to the ESF buses could be tripped, but offsite power would be indicated as being still available. Under these conditions the design would cause the ESF diesel generator load sequencers to be bypassed.

To justify continued safe operation, the licensee has temporarily placed certain sequencer test switches in the test position, which forces the sequencers to function even though offsite power is sensed as being available.


For the longer term, the licensee is developing a permanent design change which is to be reviewed by the NRC.

Discussion:

The design of the electric power system at the Duane Arnold nuclear plant includes features to sequence ESF loads onto the EDGs, but not to sequence loads onto offsite power. In a sense, these design objectives are in conflict; that is, one is for sequencing and the other is for not sequencing. When design objectives are potentially conflicting, careful analysis is necessary to ensure that failures of various types do not result in implementation of the improper objective. In this case, the logic was designed so that if any source of offsite power is "available" (such as at either the standby transformer or the startup transformer) the ESF load sequencers would be bypassed. Thus, if the standby transformer were lost, causing a loss of power to the safety-related loads, the logic would still indicate offsite power as available. This design was provided by Bechtel Corporation.

The result was the potential for an interaction between the offsite electric power system and the onsite electric power system that could have caused the loss of redundant sources of onsite power. Such an interaction is incompatible with the requirements of 10 CFR 50, Appendix A, General Design Criterion No. 17, "Electric Power Systems." The Duane Arnold original design was such that the availability of offsite electric power was determined indirectly; that is, by an upstream measurement rather than directly at the ESF buses. This deficiency existed in the original plant design and was not discovered when the design was reviewed again by the licensee after the loss of the unit auxiliary transformer in October 1984.

No specific action or written response is required by this information notice. If you have questions about this matter, please contact the Regional Administrator of the appropriate NRC regional office or this office.

  
Edward L. Jordan, Director  
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and Engineering Response  
Office of Inspection and Enforcement

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Attachment: List of Recently Issued IE Information Notices

Attachment 1  
IN 85-91  
November 27, 1985

LIST OF RECENTLY ISSUED  
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
85-58 Sup. 1	Failue Of A General Electric Type AK-2-25 Reactor Trip Breaker	11/19/85	All power reactor facilities designed by B&W and CE holding an OL or CP
85-90	Use Of Sealing Compounds In An Operating System	11/19/85	All power reactor facilities holding an OL or CP
85-89	Potential Loss Of Solid-State Instrumentation Following Failure Of Control Room Cooling	11/19/85	All power reactor facilities holding an OL or CP
85-88	Licensee Control Of Contracted Services Providing Training	11/18/85	All power reactor facilities holding an OL or CP
85-87	Hazards Of Inerting Atmospheres	11/18/85	All power reactor facilities holding an OL or CP; and fuel facilities
85-86	Lightning Strikes At Nuclear Power Generating Stations	11/5/85	All power reactor facilities holding an OL or CP
85-85	Systems Interaction Event Resulting In Reactor System Safety Relief Valve Opening Following A Fire-Protection Deluge System Malfunction	10/31/85	All power reactor facilities holding an OL or CP
85-84	Inadequate Inservice Testing Of Main Steam Isolation Valves	10/30/85	All power reactor facilities holding an OL or CP
85-83	Potential Failures Of General Electric PK-2 Test Blocks	10/30/85	All power reactor facilities holding an OL or CP

OL = Operating License  
CP = Construction Permit