UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

July 29, 1992

NRC INFORMATION NOTICE 92-53: POTENTIAL FAILURE OF EMERGENCY DIESEL GENERATORS DUE TO EXCESSIVE RATE OF LOADING

Addressees

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees of the possibility that emergency diesel generators (EDGs) could fail during a loss of offsite power (LOOP) if certain electrical loads are automatically started (i.e., after breaker close permissive interlocks have been met) at the same time as other loads that are sequenced onto the emergency buses. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

On March 17, 1992, during an NRC electrical distribution system functional inspection (EDSFI) of the Calvert Cliffs Nuclear Power Plant, Units 1 and 2, the EDSFI team found that loads which are required to be supplied by the EDGs in a specific sequence, could be started at an inappropriate time because of the design of the load sequencer logic. Specifically, the load sequencer sends a close permissive signal to the breakers for certain loads. Additional process signals are needed to close the breakers and start these loads. At Calvert Cliffs, Units 1 and 2, the NRC determined that under certain accident conditions, such as a small break loss-of-coolant accident (LOCA) in a pipe with a diameter in the range of 4 inches, concurrent with a loss of offsite power, certain loads such as containment spray pump and some heating, ventilation, and air conditioning (HVAC) loads could be started at the same time as other loads that are automatically sequenced onto the emergency buses. Loading the EDG more rapidly than its designed capability could cause it to degrade in voltage or stall. This condition could also occur during a loss of offsite power without a concurrent LOCA.

The above problem was also found at the Salem Nuclear Generating Station, the Kewaunee Nuclear Power Plant, and the Palisades Nuclear Plant.

IDR-11C

Discussion

Most EDG installations require that the loads be sequenced or connected to the EDG in a way that allows the engine and voltage regulator to recover nominal speed and voltage after each large motor load is started and before the next load is connected. Normal design practice is to use a timing device that starts the loads on a predetermined schedule based on the required accident loading sequence and the EDG's loading capabilities. Some safety features actuation system (SFAS) loads will not start until obtaining both a signal from the load sequencer and a process signal. Examples of this type of load are (1) chiller units for HVAC systems, which only start the centrifugal compressor when the chilled water output reaches a temperature setpoint; (2) containment spray pumps that are actuated by a pressure setpoint; and (3) emergency service water pumps that start from a temperature setpoint. The simultaneous addition of significant loads onto the EDG could fail the EDG. Sequencer time drift or errors in timing could also cause this problem. Either situation could result in an inoperable EDG.

The Baltimore Gas and Electric Company, licensee for the Calvert Cliffs Nuclear Power Plant, Units 1 and 2, solved the problem for the containment spray pumps by modifying the design to start the spray pumps at a predetermined sequence step. However, the associated containment spray valves will open only when the containment pressure setpoint is reached.

In summary, the ability of the EDG to supply the required voltage and current could be degraded or lost if the rate of loading on the EDG exceeds its design capability.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

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(215) 337-5194

Eugene Lazarowitz, RI
(215) 337-5392

Thomas Koshy, NRR
(301) 504-1176

Attachment: List of Recently Issued Information Notices.

LIST OF RECENTLY ISSUED NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
91-52, Supp. 1	Nonconservative Errors in Overtemperature Delta-Temperature (OTΔT) Set-point Caused by Improper Gain Settings	07/16/92	All holders of OLs or CPs for Westinghouse (W)-designed nuclear power reactors.
92-52	Barriers and Seals Between Mild and Harsh Environments	07/15/92	All holders of OLs or CPs for nuclear power reactors.
92-51	Misapplication and Inadequate Testing of Molded-Case Circuit Breakers	07/09/92	All holders of OLs or CPs for nuclear power reactors.
92-50	Cracking of Valves in the Condensate Return Lines of A BWR Emer-gency Condenser System	07/02/92	All holders of OLs or CPs for BWRs.
92-49	Recent Loss or Severe Degradation of Service Water Systems	07/02/92	All holders of OLs or CPs for nuclear power reactors.
92-48	Failure of Exide Batteries	07/02/92	All holders of OLs or CPs for nuclear power reactors.
92-47	Intentional Bypassing of Automatic Actuation of Plant Protective Features	06/29/92	All holders of OLs or CPs for nuclear power reactors.
92-46	Thermo-Lag Fire Barrier Material Special Review Team Final Report Findings, Current Fire Endurance Tests, and Ampacity Cal-culation Errors	06/23/92	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit

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DOCUMENT NAME: 92-53.IN
The technical editor's comments are incorporated
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OEAB:DOEA	SC/OEAB:DOEA	C/SELB:DST	RI
TKoshy*	DFischer*	FRosa*	CAnderson*
04/24/92	05/19/92	05/14/92	05/26/92
C/OEAB:DOEA	C/OGCB:DOEA	D/DOEA	
AChaffee*	CBerlinger*	CRossi	
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C/OEAB:DOEA	C/OGCB:DOEA	D/DOEA	
AChaffee	CBerlinger	CRossi	
6/4/92	/92	/92	

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as the emergency pump. This prevented the addition of one more pump to the bus. In this scenario, all loads that are tripped only from bus undervoltage could also remain on the bus and cause EDG overload. The rate at which EDGs are loaded and the total loads on the EDG should remain within the demonstrated capability for ensuring the safety function.

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