

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

August 23, 1985

IE INFORMATION NOTICE NO. 85-73: EMERGENCY DIESEL GENERATOR CONTROL CIRCUIT
LOGIC DESIGN ERROR

Addressees:

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

Purpose:

This information notice is to alert recipients of a potentially significant emergency diesel generator (EDG) control logic error that could prevent transfer to the emergency bus while the EDG is in the "maintenance shutdown" mode. It is expected that recipients will review the information for applicability to their facilities and consider actions, if appropriate, to preclude a similar problem 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:

According to the design, the EDGs at Rancho Seco Nuclear Power Generating Station enter the maintenance shutdown control mode whenever they are normally shut down from the control room or the remote EDG control panel. On June 1, 1985, the plant was shut down for refueling, an EDG was in the maintenance shutdown control mode after being secured from an operational condition (idling at 600 rpm with the output breaker open), when an emergency bus was de-energized for planned work on a parallel bus. This created an undervoltage condition equivalent to a loss of offsite power (LOOP) on the emergency bus. The diesel generator sped up to the design speed but the EDG output breaker continuously cycled open and closed, thereby rendering the EDG set inoperable.

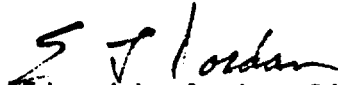
Investigation by the licensee indicates that the cycling of the EDG output breaker was the result of a design error in the EDG control circuit logic. According to the licensee, the design deficiency affects proper response of the EDG set when it is operating in the maintenance shutdown control mode. Normal surveillance testing would not discover the control circuit design error because surveillance is not done in the maintenance shutdown control mode. The June 1, 1985 event at Rancho Seco represents the first time in the life of the plant that an undervoltage signal occurred with an EDG in the maintenance shutdown control mode.

When an EDG is secured from operation, the control circuit logic places it in the maintenance shutdown control mode. In this mode, the control logic opens its output breaker and reduces its speed from 900 to 600 rpm. The EDG then idles at 600 rpm for 15 minutes before coasting down to rest.

If a LOOP should occur while an EDG is in the maintenance shutdown control mode, the undervoltage signal causes it to speed back up to 900 rpm and to close its output breaker. This would cause the undervoltage signal to drop out. However, the maintenance shutdown control mode does not drop out for 30 seconds after the receipt of the undervoltage signal because of the control circuit design error. Thus, the maintenance shutdown control logic senses that the EDG output breaker is closed, opens the breaker, and resets the 15-minute timer for the maintenance shutdown control mode. As soon as the EDG output breaker opens, the undervoltage signal recurs and the EDG output breaker closes in response to the LOOP. The EDG output breaker continues to cycle open and closed as this process repeats itself. At Rancho Seco, this control circuit logic design error has been corrected by installing a relay to de-energize the maintenance shutdown control logic immediately upon receipt of an undervoltage signal.

The Rancho Seco plant utilizes General Motors (GM) Model 20-465-E4 diesel generators with a 2750 kw nameplate rating. According to the licensee, the design error was in the interface provided by the Architect-Engineer (Bechtel) to the shutdown control logic provided by GM. Bechtel has advised the NRC that the Rancho Seco diesel generator control logic is unique and other plants designed by them are not affected.

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


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and Engineering Response
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Attachment: List of Recently Issued Information Notices

LIST OF RECENTLY ISSUED
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
85-72	Uncontrolled Leakage Of Reactor Coolant Outside Containment	8/22/85	All power reactor facilities holding an OL or CP
85-71	Containment Integrated Leak Rate Tests	8/22/85	All power reactor facilities holding an OL or CP
85-70	Teletherapy Unit Full Calibration And Qualified Expert Requirements (10 CFR 35.23 And 10 CFR 35.24)	8/15/85	All material licensees
85-69	Recent Felony Conviction For Cheating On Reactor Operator Requalification Tests	8/15/85	All power reactor facilities holding an OL or CP
85-68	Diesel Generator Failure At Calvert Cliffs Nuclear Station Unit 1	8/14/85	All power reactor facilities holding an OL or CP
85-42 Rev. 1	Loose Phosphor In Panasonic 800 Series Badge Thermo-luminescent Dosimeter (TLD) Elements	8/12/85	Materials and fuel cycle licensees
85-67	Valve-Shaft-To-Actuator Key May Fall Out Of Place When Mounted Below Horizontal Axis	8/8/85	All power reactor facilities holding an OL or CP
85-66	Discrepancies Between As-Built Construction Drawings And Equipment Installations	8/7/85	All power reactor facilities holding an OL or CP
85-65	Crack Growth In Steam Generator Girth Welds	7/31/85	All PWR facilities holding an OL or CP

OL = Operating License
CP = Construction Permit