

J. McKnight  
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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON, D.C. 20555-0001

November 20, 1998

**NRC INFORMATION NOTICE 98-41: SPURIOUS SHUTDOWN OF EMERGENCY DIESEL GENERATORS FROM DESIGN OVERSIGHT**

Addressees

All holders of operating licenses for nuclear power reactors, except for those who have ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to recent inspection findings related to a design deficiency that leads to an automatic shutdown of the emergency diesel generator (EDG) when the starting air supply pressure depletes. 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.

Background

The Riverbend Nuclear station has three emergency diesel generators. Two of these EDGs are built by Tansamerica Delaval, and are individually supported by non-safety related air compressors, powered by non-class 1E power supply, that maintain sufficient inventory of high pressure starting air in the safety related accumulators. This air provides the motive force for the engine starting system and also supplies a pneumatic control logic system that trips the EDG when certain non-emergency engine parameters are sensed to exceed its set limits. The air accumulators are maintained at 235-250 psig, and control air pressure for the logic system is maintained by a regulator at approximately 60 psig. The control air maintains a static air pressure on engine sensors during engine operation. Air pressure loss, following an engine start, may be due to system leakage or through a tripped engine protection sensor that reached an unacceptable level. When the EDG is operating in the emergency mode, the declining control air pressure first unbypasses the protective trips that were bypassed for the emergency mode, and further decrease in pressure results in an engine trip. The starting air system is equipped with a pressure switch that actuates an alarm in the main control room if the air accumulator pressure drops below 210 psig. The alarm response procedure requires that an operator investigate the problem at the engine control panel. The operating procedure requires a supplemental air source if EDG operation is required for more than 2 hours while the offsite power is unavailable to power the associated air compressor.

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### Description of Circumstances

On November 14, 1989, at River Bend Nuclear Station, the Division 1 EDG tripped within one minute after starting, as a result of a failed temperature sensor for the No. 7 main bearing. As designed, the sensor bled control air pressure down from 60 psig to 10 psig, and the diesel control logic card, sensing the low pressure, tripped the EDG. During a telephone conversation with the NRC on January 3, 1990, the NRC staff questioned long-term operability of the emergency diesels, since sufficient leakage from the control air system, with the compressors unavailable (in the absence of non-1E power), would eventually cause the non-emergency diesel trips to become unbypassed and could trip the EDG. The NRC staff questioned the availability of a long term supply of control air. In response, the licensee reviewed procedures and made changes to ensure availability of a long-term air supply.

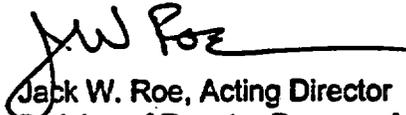
On June 24, 1998, as a result of questions from NRC inspectors, the licensee discovered that they had failed to complete necessary measures to ensure a long-term air supply for EDG control air. Although operations had written procedures for installing a backup air supply, plant staff had neither assembled and staged the materials nor demonstrated the ability to supply control air within 2 hours as stated in the procedure. On June 25, 1998, the licensee completed staging the materials, including charged air bottles, and demonstrated the ability to connect the backup air supplies within approximately 30 minutes. The licensee is evaluating the appropriate permanent resolution to ensure a long-term supply of control air.

### Discussion

The problems described emphasize the need for licensees to ensure reliability of systems that perform critical support functions for safety-related systems. Licensees are responsible for ensuring the capability of safety related systems to perform their functions during design events. In some EDG designs, the starting air system also performs a critical control function that may necessitate ensuring availability of the starting air system throughout the duration of certain analyzed events, such as station blackout. The same problem existed at Comanche Peak Nuclear station and it was resolved by improving the design with safety grade power supply and air compressor for continued supply of air when the EDG is operating. Other support systems may exist that perform critical support functions for long-term reliability of safety related systems. In addition, relying on operator action as a corrective measure for an inadequate design is inappropriate without training the personnel involved in procedures that implement the compensatory measures.

This information notice requires no specific action or written response. However, recipients are reminded that they are required to consider industry-wide operating experience (including NRC information notices) where practical, when setting goals and performing periodic evaluations

under Section 10 CFR 50.65, "Requirement for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." 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.

  
Jack W. Roe, Acting Director  
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Office of Nuclear Reactor Regulation

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98-38	Metal-Clad Circuit Breaker Maintenance Issued Identified By NRC Inspections	10/15/98	All holders of operating licenses for nuclear power reactors.
98-37	Eligibility of Operator License Applicants	10/01/98	All holders of operating licenses for nuclear power reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.
98-36	Inadequate or Poorly Controlled Non-Safety-Related Maintenance Activities Unnecessarily Challenged Safety Systems	9/18/98	All holders of operating licenses for nuclear power reactors
98-35	Threat Assessments and Consideration of Heightened Physical Protection Measures	9/4/98	All U.S. NRC fuel cycle facilities power and non-power reactor licensees (Safeguard issues, not for public disclosure.)

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OL = Operating License  
CP = Construction Permit

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staff had not assembled and staged the materials and demonstrated the ability to supply control air within 2 hours, as called for in the procedures. The licensee initiated a condition report to pressure decreased. In addition, the licensee discovered that the loss of control air pressure would cause the diesels to trip, perhaps in as little as fourteen hours. Early on June 25, plant staff completed staging the materials, including charged air bottles, and demonstrated the ability to connect the backup air supplies within approximately 30 minutes. The licensee is evaluating the appropriate permanent resolution to ensure a long-term supply of control air.

Discussion

The problems described emphasize the need for licensees to ensure reliability of systems that perform critical support functions for safety-related systems. Licensees are responsible for verifying the adequacy of the design of safety-related systems through performance of design reviews, use of alternate or simplified calculational methods, or by performance of a suitable testing program. In some EDG designs, the starting air system also performs a critical control function that may necessitate ensuring availability of the starting air system throughout the duration of certain analyzed events, such as station blackout. Other support systems may exist that perform critical support functions for long-term reliability of safety related systems. In addition, relying on operator action as a long-term corrective measure for an inadequate design is inappropriate without training the personnel involved in procedures that implement the compensatory measures.

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