

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

April 7, 1987

IE INFORMATION NOTICE NO. 87-17: RESPONSE TIME OF SCRAM INSTRUMENT VOLUME
LEVEL DETECTORS

Addressees:

All General Electric boiling water reactor (BWR) facilities holding an operating license or a construction permit.

Purpose:

This notice is to alert addressees of the potential for long response times in level detection instruments used to measure the water volume in the scram discharge instrumented volume of BWRs. These instruments are intended to cause a timely scram prior to filling of the scram discharge volume (SDV). 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.

Background

On June 28, 1980 during a routine shutdown of the Browns Ferry Unit 3 reactor, a manual scram from about 36 percent power failed to insert approximately 40 percent of the control rods. The root cause was isolated to a problem with the SDV header. The followup to this event at other BWRs revealed a number of deficiencies that were discovered with the SDV headers.

The corrective measures to this problem are divided into a short-term program and a long-term program. The short-term actions were implemented by IE Bulletins 80-14 and 80-17 and their supplements. The long-term program was addressed by a Generic Safety Evaluation Report (SER) dated December 1, 1980. The objective of the long-term program was the improvement of the SDV design. (SDV design details vary from plant to plant.) One of areas of concern addressed by the long-term program was that the reliability of the float switches in the instrumented volumes needed to be improved. The recommended solution was the addition of redundant and diverse water level sensors.

Description of Circumstances:

More recently, the NRC reviewed the licensee's corrective actions taken at the Browns Ferry units as a result of the earlier event and identified a potentially generic concern with the response time of the level detectors for

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the instrumented volume. As an interim solution to issues raised by the 1980 event, the licensee installed a circuit to scram the reactor upon sensing low air header pressure. As a long-term fix, the licensee then installed differential pressure (DP) detectors as a diverse means of sensing a full instrumented volume and causing a scram. The DP detectors back up the float switches in the instrumented volume that also can cause a scram.

Testing by the licensee showed a response time of about 70 seconds for the installed DP detectors in the instrumented volume. This was unacceptable (see discussion). The licensee replaced the DP detectors with resistance-temperature detectors (RTDs). Comparison of the response time of the RTDs with the float switches showed that the float switches had a response time of about 20 seconds. This was also unacceptable. The licensee has consequently upgraded the scram on low air header pressure instrumentation to a permanent installation that is environmentally qualified and covered by technical specifications.

Discussion:

Although the SER did address the minimum capacity of the SDV, the potentially generic concern is that the SER did not address the response time of the level detection instruments in the instrumented volume. There is a direct correlation between the response time of these instruments and the capacity of the SDV.

Under degraded air conditions, the scram outlet valve for each control rod drive may leak as much as 5 gpm to the SDV without rapid rod motion. The extent and timing of water accumulation in the SDV can slow or stop rod insertion on scram. (GE has experimentally shown that if water has accumulated to about 85 percent or greater of the SDV header volume, scram is effectively stopped.) The instrumented volume level instrumentation are intended to generate a timely scram signal such that the reactor is scrammed before water leaking by the scram outlet valves fills the SDV.

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
Division of Emergency Preparedness
and Engineering Response
Office of Inspection and Enforcement

Technical Contacts: Eric Weiss, IE
(301) 492-9005

Charles Patterson, NRC Resident Inspector
Browns Ferry Nuclear Power Plant
(205) 729-6196

Attachment:
List of Recently Issued IE Information Notices

LIST OF RECENTLY ISSUED
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
87-16	Degradation of Static "0" Ring Pressure Switches	4/2/87	All LWR facilities holding an OL or CP
87-15	Compliance with the Posting Requirements of Subsection 223b of the Atomic Energy Act of 1954, as Amended	3/25/87	All power reactor facilities holding a CP and all firms supplying components or services to such facilities
87-14	Actuation of Fire Suppression System Causing Inoperability of Safety-Related Ventilation Equipment	3/23/87	All power reactor facilities holding an OL or CP
86-106 Sup. 2	Feedwater Line Break	3/18/87	All power reactor facilities holding an OL or CP
87-13	Potential for High Radiation Fields Following Loss of Water from Fuel Pool	2/24/87	All power reactor facilities holding an OL or CP except Fort St. Vrain.
86-106 Sup. 1	Feedwater Line Break	2/13/87	All power reactor facilities holding an OL or CP
87-12	Potential Problems With Metal Clad Circuit Breakers, General Electric Type AKF-2-25	2/13/87	All power reactor facilities holding an OL or CP
87-11	Enclosure of Vital Equipment Within Designated Vital Areas	2/13/87	All power reactor facilities holding an OL or CP
87-10	Potential for Water Hammer During Restart of Residual Heat Removal Pumps	2/11/87	All BWR facilities holding an OL or CP
87-09	Emergency Diesel Generator Room Cooling Design Deficiency	2/5/87	All power reactor facilities holding an OL or CP

OL = Operating License
CP = Construction Permit

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