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IN 86-16

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, DC 20555

March 11, 1986

IE INFORMATION NOTICE NO. 86-16: FAILURES TO IDENTIFY CONTAINMENT LEAKAGE DUE TO INADEQUATE LOCAL TESTING OF BWR VACUUM RELIEF SYSTEM VALVES

Addressees:

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

Purpose:

This notice is to alert recipients to a potentially significant problem involving the failure to conduct adequate local leak rate tests of containment isolation valves. It is expected that recipients will review this 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 notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Past Related Correspondence:

IE Circular 77-11, "Leakage of Containment Isolation Valves with Resilient Seals" September 6, 1977. Information Notice 79-26, "Break of Containment Integrity", November 5, 1977. Information Notice 85-71, "Containment Integrated Leak Rate Tests", August 22, 1985.

Description of Circumstances:

During containment integrated leak rate testing, three plants had excessive leakage associated with the torus-to-reactor-building vacuum breaker valves. In all of these cases, the leakage was not detected by the local leak rate test procedure because the valves were not tested with pressure applied in the direction assumed for an accident.

Browns Ferry 2

Browns Ferry Unit 2 conducted a containment integrated leak rate test in February 1983 that failed because of an excessive leak rate of about twice the allowable limit of 1.5 percent per day (0.75La). The leakage path was found to be through a flange seal on a valve in the torus-to-reactor-building vacuum breaker system. This valve (designated FCV 64-20) is a butterfly valve bolted

into an 18-inch line connecting directly to the torus. The leakage through the flange seal was reduced to an acceptable rate by tightening flange bolts. Local leak rate testing, which is required to be performed every 2 years, is done by applying pressure between FCV 64-20 and a flapper-type check valve that is located on the reactor building side of the butterfly valve. However, the leaking flange was on the torus side of FCV 64-20. Consequently, the valve flange was not included in the local testing, but was tested only during the integrated testing which is done every 3 to 4 years.

Peach Bottom 2

Peach Bottom Unit 2 conducted a containment integrated leak rate test in June 1985 that produced an excessive leak rate of about three times the allowable limit of 0.375 percent per day. Most of the leakage was found to be going through the stem seal of valve AO-2502B, an air-operated butterfly valve located adjacent to the torus in the vacuum breaker line. An apparently successful local leak rate test performed on this valve prior to the integrated test had failed to detect the leakage. Local leak rate testing is done by applying pressure between valve AO-2502B and the check valve located between the reactor building and this valve. However, the valve stem for AO-2502B is located on the torus side of the valve and, as in the Browns Ferry case, this leak path was not subject to the local leak rate test pressure.

Duane Arnold

During a containment integrated leak rate test at Duane Arnold in July 1985, difficulty was experienced in establishing the test pressure. The problem was found to be caused by leakage through a hole left by a plug that was missing from the body of isolation valve CV4305. This valve was part of the torus-to-reactor-building vacuum breaker system and was located on the torus side of the vacuum breaker line. The plug had evidently been removed during maintenance conducted on the valve during the same outage as the integrated test. An apparently successful local leak rate test, conducted on the valve after the maintenance, had failed to detect the hole. This failure was due to the fact that the hole was located on the torus side of the valve disc, and the test pressure had been applied to the other side of the valve.

Discussion:

NRC regulations (10 CFR 50, Appendix J, Section III.C.1) require that local leak rate test pressure be applied in the same direction as that which would exist when the valve would be required to perform its safety function, unless it can be determined that the results from tests for a pressure applied in a different direction will provide equivalent or more conservative results. Many facilities experience problems in applying this rule because of the difficulty of applying a local test pressure for large isolation valves connected directly to primary containments. After the Browns Ferry test failure, TVA identified 14 containment isolation valve flanges on each of the Browns Ferry units that were not being tested under the local leak rate test procedures then in use. After the Peach Bottom test, two valves on Unit 2 and five valves on Unit 3 were found to be oriented so that the valve stems were not being subjected to local leak rate test pressure.

There are modifications and test techniques that can be applied to cause the local leak rate test to produce "equivalent or more conservative results." For example, at Browns Ferry, TVA is committed to solving the valve flange problem by installing double seals (gaskets) on the problem flanges. Local leak rate test pressure can be applied between the seals to produce a local test that can be considered equivalent to or more conservative than internal pressurization. This technique may also be used on valve stems that are designed to permit double seals. In some situations valve stem seals may be included in the normally pressurized boundary by turning the valve around without reducing the effectiveness of the valve. In some cases special test devices such as a blank flange may be used to seal the line inboard of the inner isolation valve.

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.

Edward L. Jordan, Director
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and Engineering Response
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Attachment: List of Recently Issued IE Information Notices

LIST OF RECENTLY ISSUED IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
86-15	Loss Of Offsite Power Caused By Problems In Fiber Optics Systems	3/10/86	All power reactor facilities holding an OL or CP
86-14	PWR Auxiliary Feedwater Pump Turbine Control Problems	3/10/86	All power reactor facilities holding an OL or CP
86-13	Standby Liquid Control System Squib Valves Failure To Fire	2/21/86	All BWR facilities holding an OL or CP
86-12	Target Rock Two-Stage SRV Setpoint Drift	2/25/86	All power reactor facilities holding an OL or CP
86-11	Inadequate Service Water Protection Against Core Melt Frequency	2/25/86	All power reactor facilities holding an OL or CP
84-69 Sup. 1	Operation Of Emergency Diesel Generators	2/24/86	All power reactor facilities holding an OL or CP
86-10	Safety Parameter Display System Malfunctions	2/13/86	All power reactor facilities holding an OL or CP
86-09	Failure Of Check And Stop Check Valves Subjected To Low Flow Conditions	2/3/86	All power reactor facilities holding an OL or CP
86-08	Licensee Event Report (LER) Format Modification	2/3/86	All power reactor facilities holding an OL or CP
86-07	Lack Of Detailed Instruction And Inadequate Observance Of Precautions During Maintenance And Testing Of Diesel Generator Woodward Governors	2/3/86	All power reactor facilities holding an OL or CP

OL = Operating License
CP = Construction Permit