

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

August 29, 1988

NRC INFORMATION NOTICE NO. 88-70: CHECK VALVE INSERVICE TESTING PROGRAM
DEFICIENCIES

Addressees:

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

Purpose:

This information notice is being provided to alert addressees to potential problems uncovered by recent inspections of the check valve inservice testing (IST) programs at Wm. B. McGuire Nuclear Station, Units 1 and 2 (McGuire), Zion Nuclear Plant, Units 1 and 2 (Zion), and R. E. Ginna Nuclear Power Plant (Ginna). 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 do not constitute NRC requirements; therefore, no specific action or written response is required.

Background:

During November 30 to December 11, 1987, and January 4 to 8, 1988, a diagnostic inspection was performed at McGuire by a team led by personnel from the Office for Analysis and Evaluation of Operational Data. The major inspection findings pertaining to check valves were as follows:

- (1) Check valves located in the steam supply line to the turbine-driven auxiliary feedwater (AFW) pump were not included in the McGuire IST program.
- (2) AFW system valves, which include both isolation and check valves used to isolate the three sources of non-safety-related water to the AFW system, were not included in the McGuire IST program. The non-safety-related water sources include the hot well, the AFW condensate storage tank, and the upper surge tanks.
- (3) No reverse-flow operability tests were being performed on check valves other than those valves used for containment isolation and reactor coolant system pressure boundary isolation. This omission

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disregards Section XI of the ASME Boiler and Pressure Vessel Code (ASME code), which requires testing in the open or closed position (or both), as necessary, to verify the valve's safety function. Consequently, undetected check valve failures could have existed because of the lack of testing.

From September 14 to 18, 1987, an inspection team performed a special check valve inspection at Zion. Many check valves in the AFW system, the component cooling water system, the chemical and volume control system, the diesel cooling water system, and the feedwater system were found to be not included in the IST program. Other major inspection findings were as follows:

- (1) Pressure isolation valves (PIVs) were not being adequately tested individually as required by an NRC confirmatory order issued February 29, 1980.
- (2) Valve testing did not ensure that all safety functions could be accomplished.
- (3) Test procedures did not result in valid tests of all valves listed as having been tested in accordance with the ASME code.
- (4) Valves failing leak-rate testing were not being repaired before re-start, contrary to commitments made in a June 11, 1987, response to Generic Letter 87-06, "Periodic Verification of Leak-Tight Integrity of Pressure Isolation Valves (PIVs)."

This inspection was followed by a special safety inspection on PIVs at Zion, which was performed between September 21 and October 26, 1987. Major inspection findings were as follows:

- (1) Zion procedures did not provide adequate leak tests for certain check valves in the safety injection system.
- (2) Test procedures failed, in some cases, to provide a viable means to determine the actual leak rate. In other cases, a viable means existed, but the licensee failed to calibrate the measuring instruments.
- (3) Leaking valves had been left unrepaired since mid-1986.

As a result of this inspection, the NRC issued a Level III violation to the Commonwealth Edison Company on January 4, 1988.

From May 16 to 20, 1988, an inspection team performed a special announced inspection on the IST activities at Ginna. The major inspection findings pertaining to check valves were as follows:

- (1) Certain check valves in the main feedwater (MFW) system and in the turbine-driven AFW pump steam supply lines were not included in the Ginna IST program.
- (2) A check valve in the steam supply line to the turbine-driven AFW pump was found by the inspection team to have serious binding and to be in need of repair. If this valve had been undergoing full-stroke exercising and reverse-flow closure testing, this failure would not have gone undetected.
- (3) Numerous check valves in the service water system, the containment spray line, the residual heat removal system, the safety injection (SI) system, and the SI accumulator discharge line were not being full-stroke exercised.
- (4) Certain check valves in these systems were not being tested for reverse-flow closure capability in accordance with the ASME code requirements.

As a result of this inspection, the NRC issued a Level III violation to the Rochester Gas and Electric Company on July 27, 1988.

Similar problems were also discovered at the San Onofre Nuclear Generating Station Unit 1 (SONGS 1) when a serious water hammer occurred on November 21, 1985 in the MFW system. This water hammer event occurred after a reactor trip because of injection of auxiliary feedwater into a main feedwater line that had partially drained through multiple inoperable check valves. Information Notice 86-01, "Failure of Main Feedwater Check Valves Causes Loss of Feedwater System Integrity and Water-Hammer Damage," was issued to call attention to this incident.

Discussion:

The common findings from these inspections are as follows:

- (1) Not all safety-related check valves have been identified and included in the IST programs.
- (2) When check valves are included in the program, the valves are not always tested in a way that verifies their ability to perform their safety-related functions.

These findings point out the importance of verifying the completeness of the list of components included in IST programs and of ensuring the adequacy of the actual testing being performed when developing an IST program. Not taking these two factors into account could result in undetected serious degradation of components, as happened at SONGS 1 and Ginna. The incident at SONGS 1 is an example of the possible consequences of such degradation.

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



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

Technical Contact: Horace K. Shaw, NRR
(301) 492-0906

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
88-69	Movable Contact Finger Binding in HFA Relays Manufactured by General Electric (GE)	8/19/88	All holders of OLs or CPs for nuclear power reactors.
88-48, Supplement 1	Licensee Report of Defective Refurbished Valves	8/24/88	All holders of OLs or CPs for nuclear power reactors.
88-68	Setpoint Testing of Pres- surizer Safety Valves with Filled Loop Seals Using Hydraulic Assist Devices	8/22/88	All holders of OLs or CPs for nuclear power reactors.
88-67	PWR Auxiliary Feedwater Pump Turbine Overspeed Trip Failure	8/22/88	All holders of OLs or CPs for nuclear power reactors.
88-66	Industrial Radiography Inspection and Enforcement	8/22/88	All NRC industrial radiography licensees.
88-65	Inadvertent Drainages of Spent Fuel Pools	8/18/88	All holders of OLs or CPs for nuclear power reactors and fuel storage facilities.
88-64	Reporting Fires in Nuclear Process Systems at Nuclear Power Plants	8/18/88	All holders of OLs or CPs for nuclear power reactors.
88-63	High Radiation Hazards from Irradiated Incore Detectors and Cables	8/15/88	All holders of OLs or CPs for nuclear power reactors, research reactors and test reactors.
88-62	Recent Findings Concerning Implementation of Quality Assurance Programs by Suppliers of Transport Packages	8/12/88	All holders of NRC quality assurance program approval for radioactive material packages.

OL = Operating License
CP = Construction Permit

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*Transmitted by memo to Carl Berlinger from Ledyard Marsh dated August 25, 1988 -

**SEE PREVIOUS CONCURRENCES

(date may be incorrect since it isn't legible on memo)

D/DOEA:NRR CER6551 08/24/88	*C/OGCB:DOEA:NRR CHBerlinger 08/18/88	*RPB:ARM TechEd 08/12/88
*OGCB:DOEA:NRR RJKiesel 08/11/88	*EMEB:DEST:NRR HShaw 08/02/88	*EMEB:DEST:NRR ESullivan 08/02/88
	*EMEB:DEST:NRR LBMarsh 08/25/88	*EAD/DEST:NRR JRichardson 08/18/88

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<i>AK</i>	D/DOEA:NRR	C/OGCB:DOEA:NRR	RPB:ARM <i>one</i>
	CERossi	CHBerlinger	TechEd <i>6 Culture</i>
	08/ /88	08/ /88	08/12/88
OGCB:DOEA:NRR	*EMEB:DEST:NRR	*EMEB:DEST:NRR	*EMEB:DEST:NRR
RJKiessel	HShaw	ESullivan	LBMarsh
08/11/88	08/02/88	08/02/88	08/25/88
			JRichardson
			08/ /88