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

June 13, 1989

NRC INFORMATION NOTICE NO. 89-53: RUPTURE OF EXTRACTION STEAM LINE ON HIGH PRESSURE TURBINE

Addressees:

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

Purpose:

This information notice is being provided to alert addressees to a potential generic problem involving erosion in carbon steel piping in secondary plant systems. 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.

Description of Circumstances:

On April 18, 1989, a reactor trip from 100 percent power on high pressurizer pressure occurred at Arkansas Nuclear One, Unit 2 (ANO-2) as a result of a main turbine trip. The turbine tripped when steam escaping from a ruptured high pressure steam extraction line caused a spurious actuation of the electrical hydraulic control system's solenoid operated trip valve. The pipe rupture occurred about 3 inches below the weld which joins a 12-foot section of straight 14-inch diameter pipe to a second-stage extraction nozzle on the high pressure turbine. The pipe wall at the rupture was worn to a thickness of about 1/32-inch (nominal wall thickness is about 3/8 inches). The 180 degree "fishmouth" rupture was about 3 inches wide. This straight run of 14-inch diameter pipe terminates at an elbow. This elbow was replaced during the last outage because of erosion induced wall thinning. The elbow degradation was discovered as a result of the licensee's secondary system surveillance program for wall thinning. However, the recently failed pipe and those of similar geometries were not included in the surveillance samples. In addition, the degraded condition of the pipe was not detected during replacement of the elbow.

IDHR-11C

Discussion:

The high pressure turbine at ANO-2 has two 14-inch second-stage extraction steam lines. Ultrasonic testing of the second 14-inch second-stage extraction steam line identified similar wall thinning conditions. The piping for both extraction steam lines has been replaced.

The root cause assessment of this erosion phenomenon has not been finalized. The licensee currently believes that the flow turbulence necessary to induce erosion was likely set up by the geometry of the nozzle-to-pipe connection. The outside diameters of the nozzle and pipe were essentially equal; however, the thickness of the nozzle wall was greater than the thickness of the pipe wall. This resulted in a mismatch between the inside diameter of the nozzle and the inside diameter of the pipe. The expansion of the steam as it exited the nozzle is postulated to have caused the accelerated erosion of the pipe.

NRC Information Notice 89-01 "Valve Body Erosion," dated January 4, 1989, and NRC Information Notice 88-17, "Summary of Responses to NRC Bulletin 87-01, 'Thinning of Pipe Walls in Nuclear Power Plants'," dated April 22, 1988, provide additional discussion on erosion of piping systems.

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.

José A. Calvo for

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

Technical Contact: L. Gilbert, Region IV
(817) 860-8156

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
88-46, Supp. 3	Licensee Report of Defective Refurbished Circuit Breakers	6/8/89	All holders of OLs or CPs for nuclear power reactors.
89-52	Potential Fire Damper Operational Problems	6/8/89	All holders of OLs or CPs for nuclear power reactors.
89-51	Potential Loss of Required Shutdown Margin During Refueling Operations	5/31/89	All holders of OLs or CPs for nuclear power reactors.
88-88, Supp. 1	Degradation of Westinghouse ARD Relays	5/31/89	All holders of OLs or CPs for nuclear power reactors.
89-50	Inadequate Emergency Diesel Generator Fuel Supply	5/30/89	All holders of OLs or CPs for nuclear power reactors.
89-49	Failure to Close Service Water Cross-Connect Isolation Valves	5/22/89	All holders of OLs or CPs for nuclear power reactors.
89-48	Design Deficiency in the Turbine-Driven Auxiliary Feedwater Pump Cooling Water System	5/22/89	All holders of OLs or CPs for nuclear power reactors.
89-47	Potential Problems With Worn or Distorted Hose Clamps on Self-Contained Breathing Apparatus	5/18/89	All holders of OLs or CPs for nuclear power reactors and fuel facilities.
89-46	Confidentiality of Exercise Scenarios	5/11/89	All holders of licenses for fuel cycle facilities and byproduct material licensees having an approved emergency response plan.

OL = Operating License
CP = Construction Permit

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The draft of this information notice was transmitted by a memorandum from J. L. Milhoan, RIV, to C. E. Rossi, NRR, dated May 2, 1989

*SEE PREVIOUS CONCURRENCES

			/RA/ D/DOEA:NRR for CERossi 06/7/89	*C/OGCB:DOEA:NRR CHBerlinger 06/05/89
*OGCB:DOEA:NRR JRamsey 05/26/89	*EAB:DOEA:NRR NFields 05/30/89	*C/CEB:DEST:NRR CMcCracken 05/31/89	*D/DEST:NRR LShao 06/02/89	*PPMB:ARM TechEd 05/22/89

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			D/DOEA:NRR	C/OGCB:DOEA:NRR
			CERossi	CHBerlinger
			05/ /89	05/5/89
OGCB:DOEA:NRR	EAB:DOEA:NRR	C/CEB:DEST:NRR	D/DEST:NRR	PPMB:ARM
JRamsey	NFields	CMcCracken	LShao	TechEd
05/26/89	05/30/89	05/31/89	06/2/89	05/22/89