

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

July 6, 1993

**NRC INFORMATION NOTICE 93-48: FAILURE OF TURBINE-DRIVEN MAIN FEEDWATER PUMP TO TRIP BECAUSE OF CONTAMINATED OIL**

Addressees

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

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to potential problems resulting from suspended particles in the control oil in the trip system for turbine-driven main feedwater pumps. 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.

Description of Circumstances

On August 27, 1992, while at 80-percent power, LaSalle County Station, Unit 2, experienced a reactor scram when the main turbine tripped. Several unexpected control system responses occurred. The focus of this information notice is on the failure of both turbine-driven main feedwater pumps to trip on both automatic and manual signals. This failure resulted in uncontrollable filling of the reactor vessel above the coolant level setpoint (Level 8) for trips of the motor-driven main feedwater pump, the reactor core isolation cooling system, and the high-pressure core spray system. When the reactor coolant level reached the administrative limit for coolant level (above Level 8), operators manually closed the outboard main steam isolation valves to prevent the downstream main steamlines from being filled with water. This action also terminated steam flow to the turbine-driven main feedwater pump. Closure of the turbine stop valves by local mechanical trip actions for both turbine-driven main feedwater pumps was successful only after repeated attempts.

Discussion

At LaSalle, a control oil system is used to trip closed the turbine stop valve to shut down the turbine for each of the two turbine-driven main feedwater pumps. Control oil, as well as bearing lubrication oil, for both pumps is supplied from the main turbine lubrication oil system reservoir. The main turbine lubrication oil system does not contain an oil filter in the

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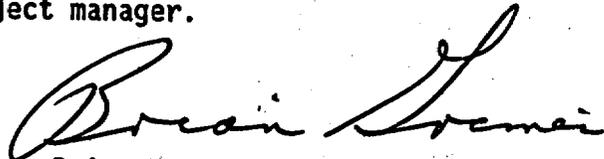
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control oil line to the turbine-driven feedwater pump stop valves. The licensee determined that the root cause of the failure of the turbine-driven main feedwater pumps to trip was suspended particles in the main turbine oil system. Suspended particles in the oil created flow blockages in the control oil dump valves. This prevented proper drainage of the trip system. Most of the accumulated particles were small, but some were up to 6 mm (1/4 in.) long. The licensee believes this condition resulted from an accumulation of crud in the low flow areas of the control oil ports over a period of time. The maintenance program had not included flushing of these ports in previous refueling outages. Operators flushed the control oil system, replaced several parts, and tested the system before returning it to service. The licensee plans to include flushing these ports in preventive maintenance of these trip mechanisms.

In Generic Letter 89-19, "Request for Action Related to Resolution of Unresolved Safety Issue A-47, 'Safety Implication of Control Systems in LWR Nuclear Power Plants' Pursuant to 10 CFR 50.54(f)," the NRC identified a number of safety concerns resulting from coolant overfill events. In boiling water reactors, reactor vessel overfill events can affect the safety of the plant in several ways. In pressurized water reactors, steam generator overfill events produce similar concerns. The safety concerns arise from potential increased loads on steamline supports from increased deadweight or seismic forces, potential water hammer loads, potential release of coolant or excessive cooling caused by stuck-open secondary safety valves, potential inoperability of important valves in the secondary system, and potential weakening of steam generator tubes from thermally induced tensile loads (mainly applicable to once-through steam generator designs).

This information notice requires no specific action or written response. 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.



Brian K. Grimes, Director  
Division of Operating Reactor Support  
Office of Nuclear Reactor Regulation

Technical contacts: T. Greene, NRR  
(301) 504-1175

V. Hodge, NRR  
(301) 504-1861

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 NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
92-06, Supp. 1	Reliability of ATWS Mitigation Systems and Other NRC-Required Equipment not Controlled by Plant Technical Specification	07/01/93	All holders of OLs or CPs for nuclear power reactors.
93-47	Unrecognized Loss of Control Room Annunciators	06/18/93	All holders of OLs or CPs for nuclear power reactors.
93-46	Potential Problem with Westinghouse Rod Control System and Inadvertent Withdrawal of A Single Rod Control Cluster Assembly	6/10/93	All holders of OLs or CPs for Westinghouse (W)-designed nuclear power reactors.
93-45	Degradation of Shutdown Cooling System Performance	06/16/93	All holders of OLs or CPs for nuclear power reactors.
93-44	Operational Challenges During A Dual-Unit Transient	06/15/93	All holders of OLs or CPs for nuclear power reactors.
93-43	Use of Inappropriate Lubrication Oils in Safety-Related Applications	06/10/93	All holders of OLs or CPs for nuclear power reactors.
93-42	Failure of Anti-Rotation Keys in Motor-Operated Valves Manufactured by Velan	06/09/93	All holders of OLs or CPs for nuclear power reactors.
93-41	One Hour Fire Endurance Test Results for Thermal Ceramics Kaowool, 3M Company FS-195 and 3M Company Interam E-50 Barrier Systems	05/28/93	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License  
 CP = Construction Permit

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governor standard ports over a period of time. The feedwater oil systems, including these ports, will be flushed during refueling outages to prevent the accumulation of particulates in low flow areas of the system.

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from a buildup and accumulation of crud in the low flow areas of the standard ports over a period of time. These ports will be flushed in the normal preventive maintenance of the trip mechanisms during refueling outages.

In Unresolved Safety Issue (USI) A-47, "Safety Implication of Control System in LWR Nuclear Power Plants," one of the issues was reactor vessel overfill. The resolution of USI A-47, as outlined in Generic Letter (GL) 89-19, concluded that all plants' procedures and technical specifications should include provisions to verify periodically the operability of overfill protection and ensure automatic overfill protection. This resolution rests on the tripping of the feedwater pumps which did not occur in the LaSalle event. The operators did follow procedures and closed the MSIVs. This prevented the filling of the main steam lines past the MSIVs, but the operability of the reactor core isolation cooling (RCIC) system was impacted.

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