

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

August 3, 1989

NRC INFORMATION NOTICE NO. 89-58:   DISABLEMENT OF TURBINE-DRIVEN AUXILIARY  
FEEDWATER PUMP DUE TO CLOSURE OF ONE OF  
THE PARALLEL STEAM SUPPLY VALVES

Addressees:

All holders of operating licenses or construction permits for pressurized water reactors.

Purpose:

This information notice is being provided to alert addressees to the potential for causing the turbine-driven auxiliary feedwater pump to be incapable of completely performing its intended safety function by closing one of the turbine's two parallel steam supply valves. 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 January 17, 1989, Diablo Canyon plant personnel closed one of the two parallel steam supply valves to the turbine-driven auxiliary feedwater pump without realizing that this would make the auxiliary feedwater system incapable of meeting the condition assumed in the plant's accident analysis; that is, that the auxiliary feedwater system would supply water to at least two steam generators.

Steam to the turbine-driven auxiliary feedwater pump is normally provided from two of the unit's four steam generators, as illustrated in the enclosed figure of the auxiliary feedwater system. The operators considered operation with one steam supply available to the auxiliary feedwater pump turbine acceptable because the technical specification covering the turbine-driven auxiliary feedwater pump does not specify two sources of steam. It refers only to "an operable steam supply system" for the auxiliary feedwater pump turbine. The operators believed that the flow path through one steam supply system satisfied this requirement.

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Discussion:

The assumption that the auxiliary feedwater system supplies water to at least two steam generators in the event of a main feedwater line break was not made in the original Diablo Canyon main feedwater line break analysis. However, the results of this analysis indicated that the pressurizer would fill and vent liquid coolant for a significant period of time. After the TMI accident in which liquid coolant venting from the pressurizer was believed to have contributed to the accident, the Diablo Canyon main feedwater line break analysis was redone. Among the major assumptions made in the new analysis was the assumption that auxiliary feedwater would be supplied to two steam generators. As a consequence, the new analysis predicted that the reactor coolant system would sustain the transient without filling the pressurizer.

As shown in the figure, the auxiliary feedwater system has one turbine-driven pump, which supplies water to all four steam generators, and two motor-driven pumps, each of which supplies water to a pair of steam generators. In keeping with the single-failure criterion, the main feedwater line break analysis assumes that, in addition to the line break, one of the motor-driven pumps fails. The unacceptability of operation with one of the auxiliary feedwater pump turbine steam supplies isolated becomes apparent when the broken line is assumed to be the line feeding the steam generator that provides the remaining steam supply to the turbine, and the failed pump is assumed to be the one feeding the remaining pair of unaffected steam generators. Since the steam generator with the broken feed line rapidly vents all of its coolant, it cannot supply steam to the pump turbine; with the other steam supply isolated, the turbine-driven auxiliary feedwater pump is lost also. The one remaining auxiliary feedwater pump feeds the pair of steam generators that includes the one with the broken feed line. This pump's output will be vented through the broken line until this line is isolated. After this, the pump can supply water to only one steam generator. Thus, the assumption in the analysis that two steam generators will be supplied by auxiliary feedwater cannot be satisfied.

Pacific Gas and Electric Company has revised the procedures at Diablo Canyon to make it clear to the operators that isolation of one of the auxiliary feedwater pump turbine steam supplies does cause the turbine-driven pump to be inoperable with respect to the emergency requirements. It should be noted, however, that auxiliary feedwater systems having turbine-driven pumps vary significantly from plant to plant, even among Westinghouse-supplied plants. Therefore, isolation of one of the auxiliary feedwater pump turbine steam supplies at a particular plant might not be contrary to the assumptions in the safety analyses for that particular plant. Nevertheless, the second steam supply is an important enhancement in regard to the reliability of the turbine-driven pump. Regardless of the effect on the safety analysis, it is not likely that one of the steam supplies can be isolated without significantly reducing the margin of safety for any plant.

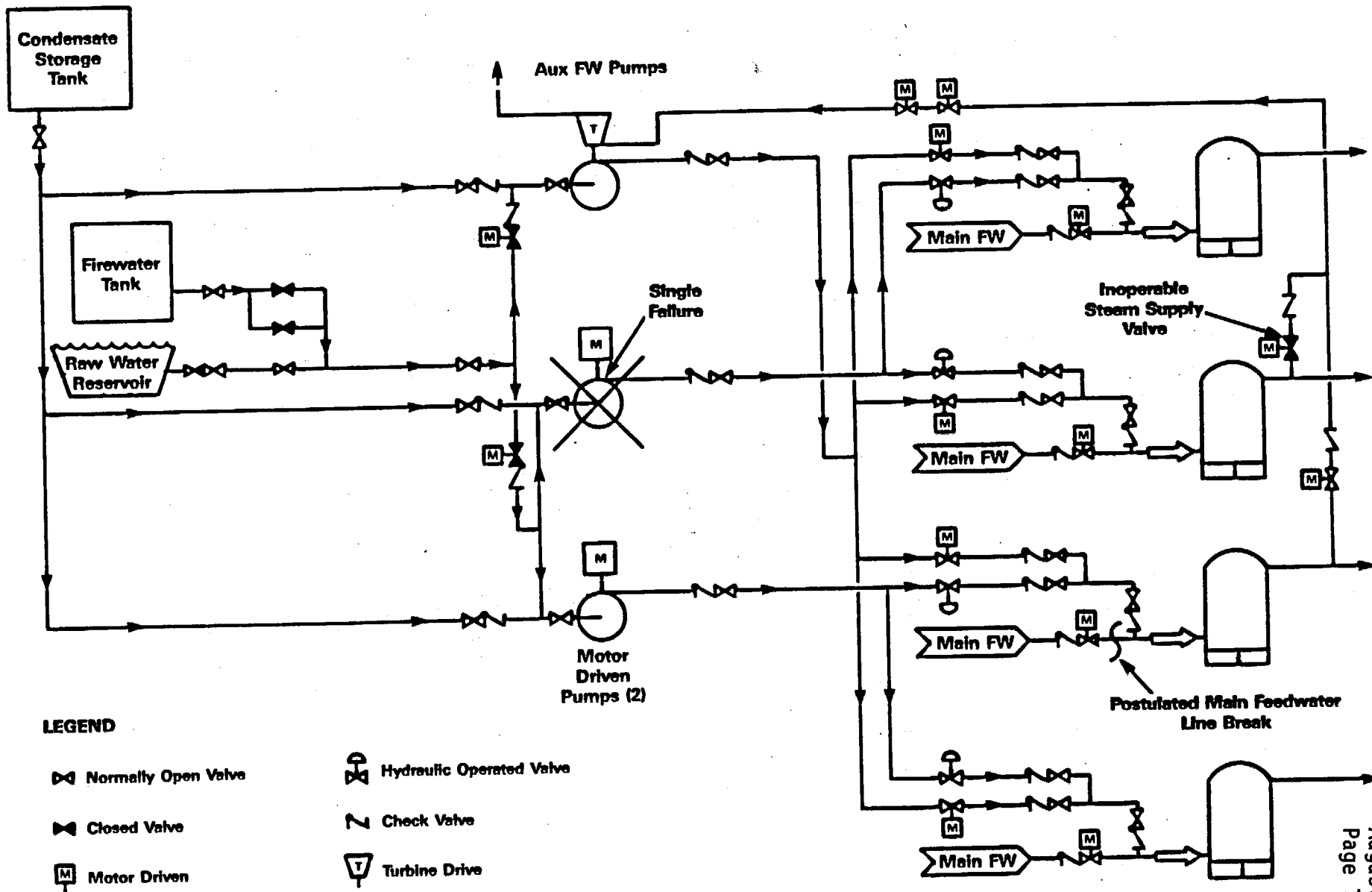
No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the technical contact listed below or the Regional Administrator of the appropriate NRC regional office.

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

Technical Contact: J. Wermiel, NRR  
(301) 492-0870

Attachments:

1. Figure 1, Diablo Canyon Auxiliary Feedwater System
2. List of Recently Issued NRC Information Notices



**FIGURE 1. DIABLO CANYON AUXILIARY FEEDWATER SYSTEM**

LIST OF RECENTLY ISSUED  
 NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
89-57	Unqualified Electrical Splices in Vendor-Supplied Environmentally Qualified Equipment	7/26/89	All holders of OLs or CPs for nuclear power reactors.
89-56	Questionable Certification of Material Supplied to the Defense Department by Nuclear Suppliers	7/20/89	All holders of OLs or CPs for nuclear power reactors.
89-45, Supp. 1	Metalclad, Low-Voltage Power Circuit Breakers Refurbished With Substandard Parts	7/6/89	All holders of OLs or CPs for nuclear power reactors.
89-55	Degradation of Containment Isolation Capability by a High-Energy Line Break	6/30/89	All holders of OLs or CPs for nuclear power reactors.
89-54	Potential Overpressurization of the Component Cooling Water System	6/23/89	All holders of OLs or CPs for nuclear power reactors.
89-53	Rupture of Extraction Steam Line on High Pressure Turbine	6/13/89	All holders of OLs or CPs for nuclear power reactors.
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.

OL = Operating License  
 CP = Construction Permit

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1. Figure 1, Diablo Canyon Auxiliary Feedwater System
2. List of Recently Issued NRC Information Notices

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