

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

April 30, 1990

NRC INFORMATION NOTICE NO. 90-28: POTENTIAL ERROR IN HIGH STEAMLINE  
FLOW SETPOINT

Addressees:

All holders of operating licenses or construction permits for boiling water reactors (BWRs).

Purpose:

This information notice is intended to alert addressees to possible errors in the method used to determine the proper setpoints for the steamline flow differential pressure instruments that initiate isolation of the High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) systems at a limit corresponding to a specific percentage of the rated steam flow. 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 November 30, 1989, during a surveillance test of the HPCI system at the FitzPatrick Nuclear Power Plant, automatic isolation of the steam admission valves on high steamline flow occurred (Docket No. 50-333; LER No. 89-025-00). An intensive series of tests was initiated to identify the root cause of this event. To perform these tests, additional instrumentation was connected to the steamline flow instruments to determine the differential pressure detected by the instrumentation. This testing led to the determination that the signal that resulted from startup of the turbine was close to the isolation setpoint and, in some cases, was greater than the setpoint. Because the isolation setpoint was in accordance with the value specified in the technical specifications, and because no leakage or reason for a high-flow condition could be found, a possible problem either with the value specified for the setpoint or with the amount of steam needed to start the turbine, or both, was identified.

Discussion:

At FitzPatrick, the HPCI system is a steam turbine driven Emergency Core Cooling System designed to supply makeup water to the reactor vessel in

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the event of a loss-of-coolant accident. The high steam flow isolation of the HPCI turbine is designed to shut the steamline isolation valves to the turbine if the steam supply piping ruptures. At FitzPatrick, this flow signal is derived by sensing the differential pressure that results from flow through the steam supply piping at an elbow in the piping. If this differential pressure, expressed in inches of water, reaches the value given in the technical specifications, the isolation valves close.

The accepted value of steam flow that indicates that a break in the steamline has occurred is typically 300 percent of the rated steam flow. The determination of the differential pressure that corresponds to this flow, and hence the indication that a steamline break has occurred, is the subject of General Electric Nuclear Services Information Letter (SIL) No. 475.\* The analytic method described in the SIL applies to HPCI and RCIC systems and uses measured data from the as-built system operating under rated conditions in the surveillance test mode, rather than using purely theoretical analysis, to calculate the differential pressure that would exist at 300-percent flow. This differential pressure then becomes the setpoint for the switch that initiates isolation of the system. However, other methods based on sound engineering principles may also be appropriate.

At FitzPatrick, as part of the root cause determination, the intensive series of tests found that the actual differential pressure setpoint that caused the isolations corresponded to approximately 200-percent flow, and that the startup of the HPCI system occasionally caused the flow to reach this value. Such a setpoint is conservative from the viewpoint of the safety function of the high steamline flow trip, but it adversely affects the reliability of the HPCI system. Performing the calculations in accordance with SIL No. 475 resulted in the removal of this conservatism from the setpoint and in the restoration of the reliability of the HPCI system.

The HPCI system had operated with the setpoint conservatism for 14 years until several recent changes were made to the system. These changes included test methodology improvements, hydraulic actuator replacement (which resulted in the need for additional steam for turbine startup), and turbine stop valve rewiring. Setting the setpoint according to Revision 2 of SIL No. 475 provides the proper value for initiation of the isolation function.

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\*Revision 2 of SIL No. 475 was issued November 28, 1988, by the General Electric Company, San Jose, California. As noted in Revision 2, errors in the original and in Revision 1 have been corrected in Revision 2.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact the technical contact listed below or the appropriate NRR project manager.

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

Technical Contact: D. LaBarge, NRR  
(301) 492-1421

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED  
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
90-27	Clarification of the Recent Revisions to the Regulatory Requirements for Packaging of Uranium Hexafluoride (UF <sub>6</sub> ) for Transportation	4/30/90	All uranium fuel fabrication and conversion facilities.
89-70, Supp. 1	Possible Indications of Misrepresented Vendor Products	4/26/90	All holders of OLs or CPs for nuclear power reactors.
90-26	Inadequate Flow of Essential Service Water to Room Coolers and Heat Exchangers for Engineered Safety-Feature Systems	4/24/90	All holders of OLs or CPs for nuclear power reactors.
90-25	Loss of Vital AC Power with Subsequent Reactor Coolant System Heat-Up	4/16/90	All holders of OLs or CPs for nuclear power reactors.
90-24	Transportation of Model Spec 2-T Radiographic Exposure Device	4/10/90	All NRC licensees authorized to use, transport, or operate radiographic exposure devices and source changers.
90-23	Improper Installation of Patel Conduit Seals	4/4/90	All holders of OLs or CPs for nuclear power reactors.
90-22	Unanticipated Equipment Actuations Following Restoration of Power to Rosemount Transmitter Trip Units	3/23/90	All holders of OLs or CPs for nuclear power reactors.
90-21	Potential Failure of Motor-Operated Butterfly Valves to Operate Because Valve Seat Friction was Underestimated	3/22/90	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License  
CP = Construction Permit

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Document Name: INFO NOTICE - LABARGE, KADAMBI

\*SEE PREVIOUS CONCURRENCES

\*OGCB:DOEA:NRR\*PD11:DRP:NRR  
NPKadambi DLaBarge  
03/28/90 04/03/90

\*RPB:ADM  
TechEd  
04/17/90

\*C/OGCB:DOEA:NRR  
CHBerlinger  
04/20/90

D/DOEA:NRR  
CERossT  
04/24/90

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*With noted change*  
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*This IN was transmitted to EGCB by  
an undated memo from R. Capra after  
it was concurred in by S. Newberry.  
Only relatively minor editorial  
changes were made to it.*

*NPK*  
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