

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

July 26, 1993

NRC INFORMATION NOTICE 93-58: NONCONSERVATISM IN LOW-TEMPERATURE OVERPRESSURE PROTECTION FOR PRESSURIZED-WATER REACTORS

Addressees

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

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to a nonconservatism in the low-temperature overpressure protection (LTOP) setpoint calculation for Westinghouse facilities. 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 Circumstance

On October 29, 1992, the Texas Utilities Electric Company, the licensee for Comanche Peak Steam Electric Station, reported that its existing low temperature overpressure protection may not have provided the required margins of safety against reactor vessel brittle fracture under certain overpressure transients.

The same concern was later reported by the licensees for Byron, Zion, Diablo Canyon, Kewaunee, Sequoyah and Point Beach nuclear stations.

Discussion

In reactor units designed by Westinghouse, overpressure protection of the reactor vessel at low temperature conditions is provided by a cold overpressure mitigation system (COMS). This system compares pressure and temperature inputs against a preset setpoint curve and relieves the pressure when the setpoint is reached. This protection is necessary because, while at low temperatures during plant startup and shutdown conditions, certain transients could cause the reactor coolant system pressure to exceed the reactor vessel pressure-temperature (P-T) limitations established for protection against brittle fracture. A spurious start of a safety injection pump, reactor coolant pump, or other operational errors could activate this system. During such events, the P-T limitations are maintained by opening the pressurizer power-operated relief valves (PORVs) or safety relief valves in the residual heat removal (RHR) suction lines to relieve system pressure.

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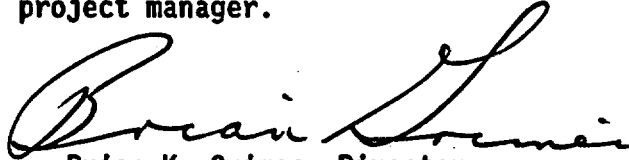
The transmitters that provide pressure signals to the COMS are located at the primary system hot leg piping of the reactor vessel. During low temperature operation of the reactor coolant pumps, dynamic pressure in the reactor vessel would be higher (by the amount of flow loss in the core and vessel outlet) than that sensed in the hot leg. Additionally, the static head correction for the difference in elevation of the sensor to the core region was not considered. The resulting pressure difference between the sensor and the vulnerable location in the reactor vessel could be as high as 790 kPa (100 psig), depending on the number of reactor coolant pumps in operation and the location of the pressure-sensing taps. The LTOP setpoint curve that was originally developed by Westinghouse did not take these factors into consideration.

Westinghouse has sent a letter to licensees recommending one of the following methods to compensate for this pressure increase: 1) reduce the maximum allowable relief valve setpoint by an amount equivalent to the plant-specific calculated difference in pressure, 2) maintain RCS pressure below the heatup/cooldown curves by a value equal to the plant specific difference in pressure from both flow loss and elevation difference when the reactor coolant pumps are in operation, 3) restrict the number of reactor coolant pumps and, therefore, the flow loss error that can be operated below a defined RCS temperature without drawing a steam bubble in the pressurizer, or 4) demonstrate that the available margin in the LTOP calculation, taking into account instrumentation uncertainty, is sufficient to offset the plant-specific pressure difference.

The Westinghouse letter describes interim administrative controls as well as calculational methods to verify setpoint adequacy for addressing the LTOP concern. The staff notes that the administrative restrictions described in approaches (2) and (3) are intended by Westinghouse to provide interim actions to address the concern only until LTOP setpoints are verified to be adequate or are revised appropriately in technical specifications.

Although the information in this notice addresses the cold overpressure mitigation system at Westinghouse designed plants, aspects of this issue may also be applicable to other PWRs.

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: Thomas Koshy
(301) 504-1176

Chu-Yu Liang
(301) 504-2878

Attachment: List of Recently Issued NRC Information Notices

Attachment
IN 93-58
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LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
93-57	Software Problems Involving Digital Control Console Systems at Non-Power Reactors	07/23/93	All holders of OLs or CPs for test and research reactors and nuclear power reactors
93-56	Weakness in Emergency Operating Procedures Found as Result of Steam Generator Tube Rupture	07/22/93	All holders of OLs or CPs for pressurized water reactors.
93-55	Potential Problem with Main Steamline Break Analysis for Main Steam Vaults/Tunnels	07/21/93	All holders of OLs or CPs for pressurized water reactors.
93-54	Motor-Operated Valve Actuator Thrust Variations Measured with A Torque Thrust Cell and A Strain Gage	07/20/93	All holders of OLs or CPs for nuclear power reactors.
93-53	Effect of Hurricane Andrew on Turkey Point Nuclear Generating Station and Lessons Learned	07/20/93	All holders of OLs or CPs for nuclear power reactors.
93-52	Draft NUREG-1477, "Voltage-Based Interim Plugging Criteria for Steam Generator Tubes"	07/14/93	All holders of OLs or CPs for pressurized water reactor (PWRs).
93-51	Repetitive Overspeed Tripping of Turbine-Driven Auxiliary Feed-water Pumps	07/09/93	All holders of OLs or CPs for nuclear power reactors.
93-50	Extended Storage of Sealed Sources	07/08/93	All licensees authorized to possess sealed sources.

OL = Operating License
CP = Construction Permit

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WASHINGTON, D.C. 20555-0001

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Original signed by
 Brian K. Grimes

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

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*See previous concurrence

OFC	OEAB:DORS	ADM:PUB	SC/OEAB:DORS	C/SRXB:DSSA
NAME	TKoshy*	Tech Editor*	EGoodwin*	RJones*
DATE	06/04/93	05/10/93	05/21/93	06/04/93

OFC	C/EMCB:DE	C/OEAB:DORS	OGCB:DORS	C/OGCB:DORS
NAME	JStrosnider*	AChaffee*	JLBirmingham*	GHMarcus*
DATE	05/24/93	06/08/93	06/17/93	06/17/93

OFC	D/DORS			
NAME	BKGrimes			
DATE	07/21/93			

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*consulted with Steve Ditemmaso
 of Westinghouse E & Tech. and
 agreed with intent of not
 relying on admin. controls as
 long term solutions for 7/21/93
 LTOP. Koshy*

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OFC	C/EMCB:DE	C/OEAB:DORS	OGCB:DORS <i>JLB</i>	C/OGCB:DORS
NAME	JStrosnider*	AChaffee*	JLBirmingham	GHMarcus <i>GHM</i>
DATE	05/24/93	06/08/93	06/16/93	06/17/93

OFC	D/:DORS			
NAME	BKGrimes			
DATE	06/ /93			

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*See previous concurrence

OFC	OEAB:DORS	ADM:PUB	SC/OEAB:DORS	C/SRXB:DSSA
NAME	TKoshy <i>JK</i>	Tech Editor*	EGoodwin*	RJones*
DATE	6/4/93	05/10/93	05/21/93	06/04/93

OFC	C/EMCB:DE	C/OEAB:DORS	C/OGCB:DORS	D/DORS
NAME	JStrosnider*	AChaffee*	GMarcus	BGrimes
DATE	05/24/93	06/08/93	/ /93	/ /93

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*See previous concurrence

OFC	OEAB:DORS	ADM:PUB	SC/OEAB:DORS	C/SRXB:DSSA
NAME	TKoshy <i>JK</i>	Tech Editor*	EGoodwin*	RJones <i>RJ</i>
DATE	6/2/93	05/10/93	05/21/93	6/7/93

OFC	C/EMCB:DE	C/OEAB:DORS	C/OGCB:DORS	D/DORS
NAME	JStrosnider*	AChaffee <i>AC</i>	GMarcus	BGrimes
DATE	05/24/93	6/8/93	1/93	1/93

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OFC	OEAB:DORS	ADM:PUB	SC/OEAB:DORS	C/SRXB:DSSA
NAME	TKoshy <i>JK</i>	Tech Editor*	EGoodwin	RJones <i>RJ</i>
DATE	05/10/93	05/10/93	05/27/93 <i>5</i>	06/4/93

OFC	C/EMCB:DE <i>JS</i>	C/OEAB:DORS	C/OGCB:DORS	D/DORS
NAME	JStrosnider	AChaffee	GMarcus	BGrimes
DATE	05/24/93	05/ /93	05/ /93	05/ /93

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