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

August 11, 1994

NRC INFORMATION NOTICE 94-56: INACCURACY OF SAFETY VALVE SET PRESSURE DETERMINATIONS USING ASSIST DEVICES

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 a possible source of inaccuracy when adjusting the set pressure of various safety valves using assist devices. 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

In August 1993, while testing the set pressure of main steam safety valves (MSSVs) at the Palo Verde Nuclear Generating Station, the licensee noted that the set pressure test results for eight of the first nine valves tested were lower than expected. The set pressures ranged between 1.8 and 5.4 percent below the nominal values, whereas the range allowed by the plant Technical Specifications is ±1 percent. The licensee considered these results to be unusual because, historically, MSSV test results at Palo Verde tended to be higher than the nominal setpoint. The MSSVs were tested in place on the main steam header using operating steam pressure and a Trevitest assist device which is manufactured by Furmanite America, Inc (Furmanite). The licensee postulated that, since the set pressure values were all lower than expected, and since the valves had been previously set at the Westinghouse Western Service Center laboratory with full-pressure steam, the set pressures measured using the Trevitest device could have been wrong.

Following the Trevitest testing of the MSSVs, the licensee arranged for Furmanite to perform comparative testing to determine the difference between the assist device testing and full-pressure testing. A total of 37 valves were tested, and Furmanite found that in order to account for the offset experienced between the two test methods, the equation used to determine the Trevitest set pressure required modification. Specifically, the disk area over which steam pressure acts was adjusted for the Palo Verde valves (Dresser model 3707R).

Discussion

The Trevitest device is one device which is used for measuring set pressures of safety valves installed in place at system fluid operating pressure conditions. The device is installed on the safety valve stem where the device can provide the additional force necessary to balance the pressure and spring forces on the valve disk. Thus, by measuring the system pressure and the additional stem force provided by the assist device, the valve set pressure may be computed, converting the assisting force into equivalent pressure by dividing the assisting force by the disk area over which system pressure acts. Therefore, the equation for determining the set pressure when using an assist device can be written as:

$$Set\ Pressure = System\ Pressure + \frac{Assisting\ Force}{Disk\ Area}$$

This equation can include other factors to account for the weight of the device or calibration factors to compute the stem assisting force. Furmanite has stated that the only parameter in this basic equation that is not directly measured is the disk area. This parameter should be the area of the disk surface which steam pressure acts against. For the purposes of this equation, Furmanite computed and used the mean seat diameter.

On the basis of the results of the comparative testing performed at the request of the Palo Verde licensee, Furmanite adjusted the seat area to be used for computing the set pressure. The adjusted disk area, based on the comparative testing, was less than the area previously determined. The specific amount of the resulting error in the set pressure measurement is dependent on the relative magnitudes of the operating pressure when conducting the testing and on the assisting force. In the comparative testing for the Palo Verde MSSVs, the offset error was found to be between one and two percent of the nominal set pressure. The magnitude of the error will vary for different valve models.

Furmanite has recently sent this information to the eight other licensees that have used the Trevitest device to test this specific MSSV model, as indicated in its letter to the NRC, dated March 16, 1994. There are other Dresser and Crosby MSSV and pressurizer safety valve (PSV) models that have been tested using the Trevitest device at nuclear power facilities. Since the magnitude of the adjustment described in this information notice applies only to the Dresser 3707R model MSSV, the possible offset which could be experienced by other Dresser or Crosby MSSV or PSV models is unknown at this time. An offset error which is not properly accounted for can result in premature safety valve actuation or result in subjecting the system to higher pressures than calculated under transient conditions.

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: Charles G. Hammer, NRR
(301) 504-2791

Howard J. Wong, RIV
(510) 975-0296

Robert A. Benedict, NRR
(301) 504-1157

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List of Recently Issued NRC Information Notices

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LIST OF RECENTLY ISSUED NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
94-55	Problems with Copes-Vulcan Pressurizer Power-Operated Relief Valves	08/04/94	All holders of OLs or CPs for nuclear power reactors.
91-79, Supp. 1	Deficiencies Found in Thermo-Lag Fire Barrier Installation	08/04/94	All holders of OLs or CPs for nuclear power reactors.
94-54	Failures of General Electric Magne-Blast Circuit Breakers to Latch Closed	08/01/94	All holders of OLs or CPs for nuclear power reactors.
91-45, Supp. 1	Possible Malfunction of Westinghouse ARD, BFD, and NBFD Relays, and A200 DC and DPC 250 Magnetic Contactors	07/29/94	All holders of OLs or CPs for nuclear power reactors.
94-42, Supp. 1	Cracking in the Lower Region of the Core Shroud in Boiling-Water Reactors	07/19/94	All holders of OLs or CPs for boiling water reactors (BWRs).
94-53	Hydrogen Gas Burn Inside Pressurizer During Welding	07/18/94	All holders of OLs or CPs for nuclear power reactors.
94-52	Inadvertent Containment Spray and Reactor Vessel Draindown at Millstone Unit 1	07/15/94	All holders of OLs or CPs for nuclear power reactors.
94-51	Inappropriate Greasing of Double Shielded Motor Bearings	07/15/94	All holders of OLs or CPs for nuclear power reactors.
94-50	Failure of General Electric Contactors to Pull in at the Required Voltage	07/14/94	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit

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Original signed by
Brian K. Grimes

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OFFICE	ADM:RPB*	OGCB:DORS*	RIV*	OEAB:DORS*	EMEB:DE*
NAME	TechEd	AJKugler	HJWong	RABenedict	CGHammer
DATE	06/08/94	06/21/94	06/22/94	06/21/94	06/21/94
OFFICE	C/EMEB:DE*	D/DE*	AC/OGCB:DORS*	D/DORS	
NAME	RHWessman	BWSheron	ELDoolittle	BKGrimes	
DATE	07/06/94	07/11/94	07/13/94	08/ /94	

DOCUMENT NAME: 94-56.in

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