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MEMORANDUM FOR: Carlyle Michelson, Director  
Office for Analysis and Evaluation  
of Operational Data

FROM: Eugene Imbro, Lead Reactor Systems Engineer  
Reactor Operations Analysis Branch

SUBJECT: AN OBSERVED DIFFERENCE IN LIFT SETPOINT FOR STEAM  
GENERATOR AND PRESSURIZER SAFETY VALVES

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On October 13, 1981, during our routine review of the IE Significant Event Reports, an entry for the Palisades Nuclear Plant was noted with the description, "valves out of tech spec." The resident inspector was contacted to determine the significance of this entry. Preliminary information indicated that during the setpoint verification performed during the refueling outage, twelve of the steam generator safety valves had lifted at values lower than the technical specification limit. The remaining steam generator safety valves (there are 24 safety valves at Palisades) relieved at lower than their prescribed setpoint pressures, but were within the technical specification limit. In addition, one of the three pressurizer pressure safety valves lifted at a pressure greater than the technical specification limit. The resident inspector also stated that the deviation in relieving pressure for the steam generator safety valves was caused by a change in the test procedure to allow a more accurate simulation of actual operating conditions.

LER's 81-40 and 81-42 address the S/G safety valve and the pressurizer safety valve setpoint variance, respectively. Attachments 1 and 2, "Pressurizer Safety Valve Testing," and "Main Steam Safety Valve Testing" present some of the background leading to these LER's.

Item II.D.1 in NUREG-0737, "Clarification of TMI Action Plan Requirements," requires that licensees demonstrate the functionality of as-installed primary relief and safety valves to expected operating and accident conditions as prescribed in the FSAR. The final result of this requirement will be primary relief and safety valves that are "qualified" to their intended service. Once the reactor coolant system safety valves are "qualified," it is important that the valve set pressure testing be performed in a manner which simulates, as closely as practicable, the in-situ valve environment and operating conditions. It is my understanding that this will be addressed by NRR when the qualification program is completed.

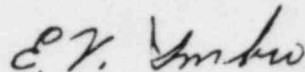
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Although NUREG-0737 is concerned only with reactor coolant system safety valves, it is recommended that any guidelines developed for reactor coolant system safety valve setpoint testing be applied also to the steam generator safety valves on PWRs.



Eugene Imbro, Lead Reactor Systems Engineer  
Reactor Operations Analysis Branch

Attachments: (2)

cc w/attachments:

T. Wambach, NRR

D. Verrelli, NRR

E. Brown, AEOD

B. Jurgenson, IE

## Attachment 1

### Pressurizer Safety Valve Testing

There are three code safety valves on the pressurizer at Palisades. They were manufactured by Dresser Industries, Inc. The technical specifications require that at least one of these valves be tested for its lift setting during each refueling outage. This testing had been done onsite with cold nitrogen gas as the test medium. However, information supplied by the valve vendor in August 1979 indicated that using cold nitrogen to test the lift settings of the valves in question was not acceptable. The vendor stated that: (1) comparison of the data from tests run with steam and then with cold nitrogen indicated differences of 8% to 10% in lift setting values; (2) correlation of data between steam tests and cold nitrogen tests was not achievable; and (3) this anomaly was applicable specifically to the Palisades pressurizer code safety valves.

During the 1979 refueling outage (October 1979), all three pressurizer code safety valves were removed from their operating location and sent to a test facility to have their lift setpoints checked with steam as the test fluid. Two of the three valves tested had lift settings which were outside of the technical specifications limits (LER 79-42). Specifically, RV-1039 had a lift setting of 2882 psig and RV-1040 had a lift setting of 2447 psig, technical specification 3.1.7A requires the lift settings for RV-1039 to be between 2539 and 2591 and valve RV-1040 to relieve between 2500 and 2550 psig.

Inspection of RV-1039 revealed that the alignment pin on the upper spring washer was out of its slot and bound on the land under the slot. It is probable that the mispositioning of the alignment pin occurred during a previous rebuilding of the valve in March 1976, after which the valve was tested. The valve tested satisfactorily again (the lift setting was checked four times with cold nitrogen gas) in a subsequent test in June 1978, prior to the misalignment discovery in the October 1979 test. Inspection of RV-1040 revealed no apparent mechanical problems to influence the lift settings.

During the subsequent refueling outage (October 1981), safety valve RV-1039 lifted at 2631 psig (LER 81-40). The test was performed at Wyle Laboratories using saturated steam at approximately 660 degrees F. The valve was repeatedly reset to relieve at successive lower pressures, but on the 8th adjustment the valve began to leak. By the tenth test, the valve had been adjusted to relieve at 2536 psig, but by then leakage had become excessive. Consumers Power directed that the valve be repaired and retested.

The other two pressurizer safety valves, RV-1040 and RV-1041, tested satisfactorily without leakage. RV-1040 lifted at 2511 psig (T/S acceptable range is from 2500 to 2550 psig), and RV-1041 relieved at 2507 psig (T/S acceptable range is from 2461 to 2509 psig).

## Attachment 2

### Main Steam Safety Valve Testing

There are 24 safety valves on the two steam generators at Palisades. The valves are Crosby Style HA-55, size 6xQx8. A minimum of five of the SG valves are required to be tested in each refueling outage; but if lift settings are out of the technical specification limit, an additional number of valves are required to be tested. If one of the valves tested falls outside the specified range, the original sample size must be doubled. If two or more valves fall outside the specified range on the initial test, all 24 valves must be tested. The valves are set to relieve at three successive nominal pressures: 985, 1005, and 1025 psig. Each safety valve has a nominal +/-10 psi tolerance. This accounts for the allowable T/S minimum pressure of 975 psig as stated in LER 81-42.

All 24 main steam safety valves were tested during the October 1979 refueling outage. The valves were tested in place with the plant in hot standby condition, corresponding to a main steam pressure of approximately 885 psig. The additional lift force was supplied by an air motor which provided a calibrated mechanical lifting force to the valve stem. The valves were tested until the set pressure was in tolerance.

During the October 1981 refueling outage, the main steam safety valve testing was done with steam to simulate actual operating conditions. The 24 valves were removed from their operating location and reinstalled on a high pressure header at a Consumers Power fossil fueled plant that was capable of supplying live saturated steam as the test medium.

Testing at these conditions, the "as found" set pressure for each of the 24 valves was outside the 1% allowable tolerance on the low side. Valves ranged from borderline to as much as 148 psig below minus tolerance. LER 81-42 states that the lift pressures for 12 of the 24 valves were below the minimum allowable pressure of 975 psig specified by T/S 3.1.7.c. The remaining 12 valves exhibited lower than desired setpoints, but fell within the required range of T/S 3.1.7.c.