

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)

SACRAMENTO MUNICIPAL UTILITY DISTRICT)

(Rancho Seco Nuclear Generating
Station))

Docket No. 50-312 (SP)

NRC STAFF TESTIMONY OF PAUL E. NORIAN ON
ADEQUACY OF SAFETY AND RELIEF VALVES
(CEC Contention 1-4)

Q1. Please state your name and position with the NRC.

A. My name is Paul E. Norian. I am Section Leader of the Systems Analysis Section, Analysis Branch, Division of Systems Safety. I have held this position since 1975 and am responsible for supervising the review of reactor vendor transient and LOCA analysis methods, the improvement of NRC analysis methods used in related accident analyses, and the performance of staff audit calculations for transients and LOCAs. From June through December 1979, I was assigned to the Bulletins and Orders Task Force as a member of the Analysis Group. I served as Alternate Group Leader and coordinated the reviews of small break loss-of-coolant accidents (LOCA) and transient analyses submitted by the vendor owner's groups since the Three Mile Island accident.

Q2. Have you prepared a statement of professional qualifications?

A. Yes. A copy of the statement has been presented with other testimony in this proceeding.

Q3. Please state the purpose of this testimony.

A. The purpose of this testimony is to respond to California Energy Commission's Contention 1-4 which reads as follows:

CEC 1-4 Will the failure of the safety and/or relief valves in the Rancho Seco primary steam result in an unsafe condition despite the modifications and actions of Subparagraphs A-E of Section IV of the Commission's Order of May 7?

Q4. Where are the safety and relief valves located on the Rancho Seco primary system?

A. The safety and relief valves are located at the top of the pressurizer.

Q5. Describe the function of the safety and relief valves in the Rancho Seco primary system.

A. The function of the safety valves is described in response to Board Question No. 21. In summary, the two ASME code safety valves are provided so that the maximum pressure of the reactor coolant system does not exceed 110 percent of design pressure during various postulated

events. The pilot-operated relief valve (PORV) is provided to actuate at a pressure setting less than the safety valves. This valve is intended to limit system overpressure so that the safety valves are not actuated. If a safety valve were to leak following actuation, a reactor shutdown would be required to repair the valve. If the PORV failed, a block valve upstream of the valve could be remotely closed by the operators thereby avoiding the need for an immediate shutdown. Since operation with the PORV block valve closed is permitted, no credit is taken for the operation of the PORV in safety evaluations.

Q6. Describe any problem associated with the operation of the PORV at TMI-2 during the March 28, 1979 accident.

A. The initial pressure rise at TMI-2 following the loss of feedwater resulted in the opening of the PORV. During the subsequent pressure decrease following the reactor scram on high pressure, the PORV did not close. Thus, the sticking open of the PORV changed the loss of feedwater transient into a small break loss of coolant accident. The cause of the PORV failure at TMI-2 will not be known until the containment can be entered and an examination made of the valve.

Q7. Did any other safety or relief valves malfunction at TMI-2?

A. No. TMI-2 contains only one PORV; the pressure rise did not reach the safety valve actuation pressure.

Q8. What steps have been taken by the Licensee to prevent the PORV (and/or safety valves) from being challenged in the event of a loss of main feedwater and/or turbine trip transient?

A. The following modifications have been made to the Rancho Seco system:

- a) Anticipatory reactor trips have been added for loss of feedwater and/or turbine trip. Before this change, the reactor would not trip until the high pressure trip setting was reached.
- b) The high pressure trip setting was reduced from 2355 psig to 2300 psig.
- c) The PORV actuation pressure was raised from 2255 psig to 2450 psig. Therefore, the PORV will not actuate before a reactor trip.

With the above changes, it is very likely that the PORV and/or safety valves will not be challenged for a loss of main feedwater and/or turbine trip transient. Before these modifications were made, the PORV would be challenged for all such transients initiated during power operation.

Q9. What step can be taken to isolate a small break if the PORV sticks open?

A. If the PORV sticks open, the operator can close the block valve upstream of the PORV and isolate the source of leakage. Modifications made at Rancho Seco to provide the position status of the PORV in the control room are discussed in response to Board Question No. 21.

Q10. Assuming a small break LOCA from an open PORV or safety valve, can the core be kept covered and adequately cooled?

A. Yes.

Q11. By what means?

A. Analysis of a potential small break LOCA resulting from an open PORV or safety valve are presented in Section 6 of the report transmitted by letter from J. H. Taylor, B&W, to R. J. Mattson, NRC, "Evaluation of Transient Behavior and Small Reactor Coolant System Breaks in the 177 Fuel Assembly Plants," Volumes I and II, May 7, 1979. These analyses show that the core will remain covered and adequately cooled by the operation of the high pressure injection (HPI) system and no assumed main or auxiliary feedwater flow. At the TMI-2 accident, the HPI flow was throttled for an extended time period based on the indication of adequate level in the pressurizer. Since that accident, the Rancho Seco emergency procedures for LOCAs have been revised and the operator training improved to assure that the operators will respond properly to this event. These items are discussed in other testimony.