UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
SACRAMENTO MUNICIPAL UTILITY DISTRICT	)	Docket No. 50-312 (SP)
	)	
(Rancho Seco Nuclear Generating Station)	)	

TESTIMONY OF PAUL E. NORIAN ON
ADEQUACY OF PRESSURIZER INSTRUMENTATION
(Board Question 22)

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 Board Question 22 which reads:

> Rancho Seco, being a Babcock and Wilcox designed reactor, does not provide control room operators with sufficient data on the water level in the pressurizer and vessel because the operators must interpret information on temperature and pressure in the primary loop and extrapolate water level, and therefore is unsafe and endangers the health and safety of Petitioners, constituents of Petitioners and the public.

Q4. Describe the function of the pressurizer.

A. A pressurizer is a tank that maintains the proper reactor coolant pressure in a pressurized water reactor. The function of the Rancho Seco pressurizer is described in detail in the staff response to Castro-Hursh Contention 21.

Q5. What instrumentation exists to measure water level in the pressurizer?

A. Three level indication systems exist to measure water level in the pressurizer. Each system contains a differential-pressure transmitter which is connnected to impulse lines located near the top and bottom of the pressurizer.

Q6. Is there any instrumentation in the Rancho Seco pressurizer to measure pressure?

A. No. The primary system pressure is monitored by pressure transmitters located on the hot legs.

Q7. Did the TMI-2 accident identify any problem associated with the adequacy of pressurizer instrumentation?

A. No. The pressurizer level instrumentation provided a reliable indication of pressurizer level during the TMI-2 accident. However, under the specific accident conditions, the pressurizer level did not accurately indicate the status of the primary system inventory.

Q8. Under what conditions does pressurizer level indication not provide an accurate indication of primary system inventory or reactor vessel level?

A. The pressurizer level provides an accurate indication of primary system inventory and reactor vessel level when the primary system fluid is

subcooled. Under these conditions, the primary system is essentially full and the only steam (void) is in the pressurizer steam space. If the primary system fluid is not subcooled, boiling in the core and flashing to steam would be expected. These conditions could produce significant voids in the system which may not be indicated by the pressurizer level indication.

During the TMI-2 accident, the pressurizer PORV was stuck open and provided a leakage path for the primary system fluid. Subcooling was lost within a few minutes and the coolant began to flash. Since the leakage path was at the top of the pressurizer, there was an insurge of fluid from the hot leg which maintained a large inventory in the pressurizer. Consequently, the pressurizer level was maintained even though the primary system inventory was continuously depleted until the PORV block valve was closed.

Q9. Have any steps been undertaken at Rancho Seco to improve procedures for identifying inadequate core cooling (ICC)?

A. NUREG-0578, "TMI-2 Lessons Learned Task Force Status Report and Short-Term Recommendations", July 1979, recognizes that existing procedures and instrumentation may not be sufficient to provide an unambiguous indication of inadequate core cooling. Consequently, Rancho Seco was requested to perform evaluations of various modes of inadequate core

cooling to provide the basis for improved guidelines and operator training. The analyses for ICC with loss of inventory and ICC during the decay heat removal system mode of operation have been completed; the ICC analyses during power operation are scheduled to be completed later in 1980. The implementation of the revised emergency procedures and operator training for ICC analyses that have been completed is expected by the end of the January 1980 shutdown.

Q10. What steps are being required (and by what date) to improve instrumentation for detecting ICC?

A. The following two steps are required:

a) A subcooling indicator is being installed during the January 1980 shutdown to provide a continuous display in the control room of the primary system subcooling. This system monitors the primary system pressure and temperature, and calculates the degree of subcooling (hot leg temperature minus saturation temperature) for each loop.

b) The existing instrumentation will be reviewed as part of the ICC studies to determine if any additional instrumentation is needed, such as reactor vessel water level, to supplement existing devices. It is required that any new instrumentation be installed by January 1, 1981.

Q11. In the event of an ICC event, can Rancho Seco be safely operated in the interim period until improved instrumentation is installed.

A. Rancho Seco can be operated safely in the interim period until any improved instrumentation is installed. This is based on the additional instrumentation being installed, and the improved emergency procedures and operator training which resulted from the small break LOCA and ICC studies. The existing instrumentation is sufficient for the operators to evaluate the state of the primary coolant system and initiate corrective action as needed. Any additional instrumentation to be installed would provide backup to the existing systems and provide further assurance that the core is adequately cooled.