

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)

TESTIMONY OF ROBERT A. CAPRA ON
IMPLEMENTATION OF LONG-TERM MODIFICATIONS
ESTABLISHED IN THE COMMISSION ORDER OF
MAY 7, 1979

(FOE Contention III(c))

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

A. My name is Robert A. Capra. I am an employee of the U.S. Nuclear Regulatory Commission assigned to the Standardization Branch, Division of Project Management, Office of Nuclear Reactor Regulation. However, from June through December 1979, I was assigned as the Babcock & Wilcox (B&W) Project Manager on the Bulletins & Orders Task Force, Office of Nuclear Reactor Regulation.

Q. Have you prepared a statement of professional qualifications?

A. Yes. A copy of this statement is attached to this testimony.

Q. Please state the nature of the responsibilities that you have had with respect to the Rancho Seco Nuclear Generating Station.

A. The accident at Three Mile Island Unit 2 (TMI-2) on March 28, 1979 involved a feedwater transient coupled with a small break in the reactor coolant system. Because of the resulting severity of the ensuing events and the potential generic

aspects of the accident on other reactors, the NRC staff initiated prompt action to: (1) assure that other reactor licensees, particularly those plants such as Rancho Seco which have a similar design to TMI-2, took the necessary actions to substantially reduce the likelihood of future TMI-2-type events from occurring, and (2) start comprehensive investigations into the potential generic implications of this accident on other operating plants. To accomplish some of this work, the Bulletins and Orders Task Force (B&OTF) was established within the Office of Nuclear Reactor Regulation (NRR) in early May 1979. The B&OTF was responsible for reviewing and directing the TMI-2-related staff activities associated with loss of feedwater transients and small break loss-of-coolant accidents (LOCAs) for all operating plants to assure their continued safe operation.

The initial priority of the B&OTF was placed on evaluating the actions taken by the B&W operating plant licensees in response to the Confirmatory Shutdown Orders issued in May 1979. I was assigned to the Task Force in mid-June 1979. Upon assuming that position, I participated in the final preparation of the Staff Safety Evaluation which documented our evaluation of SMUD's compliance with the immediate requirements of the May 7, 1979 Order. It was on the basis of this report, issued on June 27, 1979, that the Rancho Seco facility was authorized to return to power operations. Subsequently, I worked closely with SMUD and the other B&W licensees in resolving the long-term actions required by the Commission Order. During that time period I served as the liaison between the NRC and SMUD for coordinating and establishing priorities for completing the long-term requirements of the Order and other work which was under the charter of the B&OTF.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to respond to Friends of the Earth Contention III(c) which reads:

"The NRC orders in issue do not reasonably assure adequate safety because there is no reasonable time for implementation of the long-term modifications established in the Commission orders."

Q. Would you please identify each of the long-term requirements established in the Commission Order of May 7, 1979?

- A. The Commission Order of May 7, 1979 requires that SMUD perform four long-term modifications to further enhance the capability and reliability of the reactor to respond to various transient events. These modifications were proposed by the licensee in its letter of April 27, 1979 and were subsequently incorporated into the confirmatory Order. The four specific items are:
1. "The licensee will provide to the NRC staff a proposed schedule for implementation of identified design modifications which specifically relate to items 1 through 9 of Enclosure 1 to the licensee's letter of April 27, 1979, and would significantly improve safety." (NOTE: Items 1 through 9 of Enclosure 1 to the licensee's letter of April 27, 1979 specifically relate to actions SMUD committed to do in order to upgrade the timeliness and reliability of delivery of the auxiliary feedwater system.)
 2. "The licensee will submit a failure mode and effects analysis of the Integrated Control System to the NRC staff as soon as practicable."
 3. "The reactor trip following loss of main feedwater and/or trip of the turbine to be installed promptly pursuant to this Order will thereafter be upgraded so that the components are safety-grade. The licensee will submit this design to the NRC staff for review."
 4. "The licensee will continue operator training and have a minimum of two licensed operators per shift with TMI-2 simulator training at B&W by June 1, 1979. Thereafter, at least one licensed operator with TMI-2 simulator training at B&W will be assigned to the control room. All training will be completed by June 28, 1979."
- Q. For each of the long-term items of the Order, has a schedule for implementing these items been established and if a schedule has been established, please specify the schedule.
- A. A schedule for completing the long-term items of the Order (hereafter referred to as items 1 through 4 as identified above) has been established for the Rancho Seco Nuclear Generating Station. Provided below is a discussion of the status and schedule associated with each of the four items.

1 Design modifications to upgrade the timeliness and reliability of the auxiliary feedwater system (AFWS)

As documented in our "Evaluation of Licensee's Compliance With The NRC Order Dated May 7, 1979 - Sacramento Municipal Utility District - Rancho Seco Nuclear Generating Station - Docket No. 50-312," dated June 27, 1979,

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the licensee completed items 1 through 9 of Enclosure 1 of its April 27, 1979 letter prior to restart of the unit. In its letter of July 26, 1979, the licensee stated that it had reviewed the AFW operating procedures and verified that the AFW system design requirements were satisfied as a result of the actions it had taken under the short-term requirements of the Order. However, SMUD further stated that it would continue to review the design of the AFW system and if additional analysis or system enhancements were necessary, they would be made.

In order that this continued review be a thorough and systematic review, the licensee contracted B&W to perform an auxiliary feedwater reliability study for the Rancho Seco facility. The purpose of the study would be to examine the entire AFW system through the construction and analysis of fault trees. The results of this type of study would point out any dominant failure contributors associated with the system which may not have been identified using this probabilistic approach. On December 17, 1979, the licensee provided the staff with the results of its study. In addition, it provided a summary of additional planned modifications to the Rancho Seco AFW system and a schedule for completing these modifications. The reliability analysis as well as the schedule for implementing these modifications are presently under staff review. It is anticipated that the staff's review of this material will be completed in mid-to-late February 1980. At that time SMUD will either be given approval to implement the proposed modifications in whole or in part or be directed to perform additional modifications beyond those identified by the licensee.

2. Failure Mode and Effect Analysis of the Integrated Control System (ICS)

By letter from J.H. Taylor (B&W) to H.R. Denton (NRC) dated April 28, 1979, the B&W Company committed to perform a reliability analysis of the ICS including a failure mode and effects analysis (FMEA). This report was prepared by B&W as a generic report applicable to all the B&W operating plants. It was pointed out that certain differences do occur in the ICS from plant to plant; however, the analysis was performed on a representative operating facility. The facility used for the study was Rancho Seco. On August 17, 1979, B&W submitted the report entitled

"Integrated Control System Reliability Analysis," (BAW-1564). Following a review of the report, the licensee endorsed the report as applicable to Rancho Seco including its conclusions and recommendations. This endorsement was received in a letter from J.J. Mattimoe (SMUD) to D.F. Ross (NRC) dated August 31, 1979.

Oak Ridge National Laboratory (ORNL) was contracted by the NRC to review the report. A preliminary review of the report indicated that the recommendations made by B&W in the report were reasonable and should be addressed by the licensees. On November 7, 1979, we directed the licensee to address these recommendations and discuss any followup actions which were underway or proposed to investigate or implement these recommendations. On January 21, 1980, the licensee responded to this request. The final evaluation performed by ORNL on BAW-1564 was completed on January 21, 1980. Both the ORNL report and the licensee's response to the B&W recommendations are presently undergoing staff review. It is anticipated that we will complete our review by late February 1980. At that time we will inform the licensee what additional work or modifications, if any, will need to be done to improve the reliability and performance of the ICS or its interfacing systems.

3. Upgrade of the Anticipatory Reactor Trip to Safety-Grade

The staff has completed its review of the licensee's submittals of May 21 and October 5, 1979, in which SMUD forwarded a preliminary design for upgrading the present control-grade anticipatory reactor trip to safety-grade. By our letter from R.W. Reid (NRC) to J.J. Mattimoe (SMUD), dated December 20, 1979, we gave the licensee preliminary design approval for the proposed upgrade. The staff safety evaluation, which documents the basis for this approval, was attached as an enclosure to the letter. It is expected that the final design, procurement of equipment, and installation will take approximately 6 months from the date of our preliminary design approval.

4. Operator Training

As documented in the licensee's letter from W.S. Bossenmaier (SMUD) to H.R. Denton (NRC), dated July 26, 1979, all Rancho Seco licensed operators (5 reactor operators and 17 senior reactor operators) completed TMI-2

simulator training at the B&W facilities in Lynchburg, Va. on June 21, 1979. Satisfactory completion of this long-term portion of the Order was indicated in the staff's "Evaluation of Licensee's Compliance with the NRC Order Dated May 7, 1979 - Sacramento Municipal Utility District - Rancho Seco Nuclear Generating Station - Docket No. 50-312," dated June 27, 1979.

By letter dated September 21, 1979 from J.J. Mattimoe (SMUD) to D.F. Ross (NRC), the licensee documented that it had modified Administrative Procedure No. AP 25 ("Licensee NRC Operator Retraining") to incorporate the requirement that TMI-2 type accident training would become part of the licensee's regular operator training program. The criteria used to determine the sufficiency of both the Requalification Training Program and the Hot License Training Program at Rancho Seco was to insure that both training programs incorporated the following items:

a. The following lecture subjects were to be included or expanded, as applicable, in each of the training programs:

- (1) Thermodynamics;
- (2) Hydraulics;
- (3) Fluid Flow;
- (4) Heat Transfer;
- (5) Small Break LOCA Phenomenon;
- (6) Inadequate Core Cooling; and
- (7) Transient Training including loss of feedwater.

In addition, the TMI-2 sequence of events is to be included in at least the first year's requalification program and all hot license programs.

b. All programs are to include simulator training which the operators or applicants are to be provided with hands-on-experience in handling small breaks and other transients that could lead to loss of heat removal, inadequate core cooling and natural circulation.

The licensee has modified its training programs to reflect these requirements, as indicated in a letter from J.J. Mattimoe (SMUD) to R.W. Reid (NRC), dated December 19, 1979.

Based on the operator training which has been completed and the licensee's commitments to continue to upgrade operator training and drilling, the licensee has completed the requirements of this portion of the Order.

Q. Can you provide the reasons which establish the implementation schedule for the long-term items?

A. Each of the first three items (AFW reliability analysis, ICS FMEA, and Safety-Grade Anticipatory Reactor Trip) are items which require several steps to accomplish prior to completing the requirements. Each of these three items requires: (1) detailed engineering analysis and assessment by the licensee; (2) a complete review by the NRC staff, culminating in staff approval to perform the modifications; (3) procurement of components and equipment by the licensee, some of which may require extensive lead time; and (4) time for installation of equipment and retraining of the reactor operators.

With regard to upgrading the reliability of the AFW system, in order to determine which areas or components of the system require upgrading or modification, the staff and the licensee agreed that a complete reevaluation of the entire system using probabilistic and fault free analysis was the best method to gauge the reliability of the system. This analysis took B&W and the licensee five months to complete. It is expected that our review of the additional system modifications will take six to eight weeks. Should we approve the modifications, it will take additional time to procure equipment and complete the required modifications. However, the end result will be a more reliable AFW system.

In order to determine if improvements are necessary in the ICS system or any of the systems which interface with the ICS, a complex reliability analysis was required. It took about five months for B&W to complete. The NRC staff contracted with ORNL to perform the review of this report. The final report from ORNL has just been received by the staff (January 21, 1980). We will require about four weeks to review the ORNL evaluation to determine if we agree with its conclusions. We will then require that the licensee either perform additional work in this area or possibly identify specific items which must be modified. Once these items are identified, a schedule for completing the additional work and/or modifications will be agreed upon by the licensee and the staff.

With regard to upgrading the anticipatory reactor trip to safety-grade, we have given the licensee approval to proceed with final design and procurement of equipment necessary to complete this modification in approximately 6 months from the date of our preliminary design approval. As discussed previously, this approval was given to SMUD on December 20, 1979.

With regard to item 4, continued operator training, the staff is satisfied that the licensee has completed the requirements of the Order.

Q. Can you explain why continued operation of the Rancho Seco facility is acceptable when final implementation of the long-term items is not complete?

A. At the time the Commission Order on Rancho Seco was written, the Commission did not feel it had reasonable assurance that the B&W operating plants could continue to operate without undue risk to the health and safety of the public. However, the items identified in the Order as immediate actions, when completed in a satisfactory manner, reestablished that assurance for the period until the long-term actions could be completed. The long-term actions are intended to provide continued reasonable assurance of the capability and reliability of the reactor to respond safely to feedwater transients events.

ROBERT A. CAPRA
PROFESSIONAL QUALIFICATIONS
BABCOCK & WILCOX PROJECT MANAGER
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BULLETINS & ORDERS TASK FORCE

Since June 1979, I have served as the Babcock & Wilcox (B&W) Project Manager for the Bulletins & Orders Task Force (the Task Force), Office of Nuclear Reactor Regulation, U. S. Nuclear Regulatory Commission (NRC). In this capacity, I coordinate and establish priorities for the work being done by the Task Force which is associated with the B&W designed operating nuclear power plants (except Three Mile Island Nuclear Station, Units 1 and 2). I coordinate the scope and schedule of the work required of the B&W licensees by the Task Force. I also serve as the principal liaison between the Task Force, the licensees and the B&W Owners' Group.

I enlisted in the United States Navy in July 1964 and served in that capacity for three years. During that time my duties included attending the Enlisted Naval Nuclear Power School, Mare Island, California followed by subsequent study and qualification as a reactor operator and staff instructor on the Navy's "DIG" reactor located in West Milton, New York.

Following enlistment, I attended the United States Naval Academy where I graduated in June 1971 with a Bachelor of Science degree in Marine Engineering and was commissioned as a line officer in the United States Navy. Additional graduate level studies in nuclear reactor theory, thermodynamics, electrical engineering, health physics and other related engineering fields were completed in 1972 at the Officer Naval Nuclear Power School, Bainbridge, Maryland. I subsequently returned to West Milton, New York where I studied and qualified as a Senior Reactor Operator on the Navy's "DIG" reactor.

From 1973 to 1976, I served aboard an operating nuclear submarine, during which time my duties included standing watch as a Senior Reactor Operator and directing, training and supervising technicians in the operation, maintenance and repair of various equipment and systems primarily associated with the ship's nuclear reactor. During this period, my assignments included supervision of the Operations Department, Electrical Division, Reactor Controls Division, Main Propulsion Division, and the Chemistry and Radiological Control personnel. In addition, I qualified as Chief Engineer for the supervision of operation and maintenance of Naval Nuclear Propulsion Plants.

From 1976 to 1978, I was assigned as a Company Officer at the United States Naval Academy where my duties included supervising, directing and evaluating the training and activities of 130 officer candidates (midshipmen).

I joined the NRC staff in July 1978, where I served as a Licensing Project Manager in the Division of Project Management. In this capacity, I coordinated the safety review for two construction permit applications (New Haven, Units 1 and 2 and Haven, Unit 1) and served as the Project Manager for one plant under construction (North Anna, Units 3 and 4). In addition, I served as the Licensing Topical Report Manager for General Electric Topical Reports. I remained in that position until my assignment to the Bulletins & Orders Task Force.