October 30, 1981 SECY-81-623

ADJUDICATORY ISSUE

(Information)

For: The Commissioners

From: James A. Fitzgerald
Assistant General Counsel

Subject: REVIEW OF ALAB-655 -- IN THE MATTER OF SACRAMENTO MUNICIPAL UTILITY DISTRICT 1/

Facility: Rancho Seco Nuclear Generating Station 50-312

Purpose: To inform the Commission of an Appeal Board decision which, in the General Counsel's opinion,

Review Time Expires: November 17, 1981

Discussion: The Licensing Board found that changes completed and undertaken at Rancho Seco were necessary and sufficient to reasonably assure a

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1/ This paper has been issued as an adjudicatory information item because the General Counsel considers this to be a matter of minor significance. As noted below, the time for Commission review expires on November 17, 1981.

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safe response to feedwater transients. The Appeal Board, however, decided that additional analyses and information were necessary before it could finally decide on the correctness of the Licensing Board's decision. It is recommended that

1. Background

The Commission, in response to the accident at Three Mile Island, ordered Rancho Seco shut down until the satisfactory completion of various short-term actions to enhance the reactor's ability to respond safely to feedwater transients. The Commission also ordered four long-term modifications to be implemented "as promptly as practicable." At the Commission's invitation, several parties requested a hearing. The Commission instructed the hearing board to consider whether the short-term actions were "necessary and sufficient" to reasonably ensure a safe response to feedwater transients, whether the licensee should be required to accomplish the long-term modifications as promptly as practicable, and whether the long-term modifications were sufficient to provide continued reasonable assurance of a safe response to feedwater transients.

The Director of the Office of Nuclear Reactor Regulation, after determining that Sacramento

Municipal Utility District (SMUD) had completed the short-term items, authorized the resumption of operations at Rancho Seco. Meanwhile, the Licensing Board had commenced prehearing activities. Before the hearing, however, all the intervenors except the California Energy Commission withdrew. The Board adopted the previously admitted contentions as its own and proceeded with the hearing.

In its decision, the Licensing Board found that the short-term actions were "necessary and sufficient," that the long-term modifications should be performed "as promptly as practicable," and that these actions, together with additional changes completed and undertaken, were sufficient to provide continued reasonable assurance of safe response.

None of the parties appealed from the Board's decision. The Appeal Board conducted its usual sua sponte review as the Licensing Board's decision constituted a final decision "founded upon substantive determinations of significant safety or environmental issues." In ALAB-655, the Appeal Board ordered "SMUD and the staff to submit additional information that has developed since the close of the record and to undertake certain analyses . . . necessary for . . . ultimate disposition of this proceeding."

2. Licensing Board and Appeal Board decisions.

Since no petition for review has been filed, this paper will discuss only those aspects of the decisions where the Licensing Board and Appeal Board differed.

(a) Auxiliary Feedwater (AFW) System Reliability.

One of the long-term modifications ordered by the Commission was a "failure mode and effects analysis" (FMEA) of the Integrated Control System (ICS). This analysis was completed and critiqued, and the Licensing Board noted that SMUD was considering and acting upon a number of recommendations in that analysis. The Appeal Board requested a status report on these recommendations as the record contained no information on SMUD's final response to these recommendations.

The Licensing Board also noted seven additional long-term modifications which will further enhance AFS reliability and to which SMUD is "committed." The staff recommended even further actions, to which SMUD agreed. The Appeal Board, noting that reliability of the AFW system is the essence of this proceeding, requested information on implementation of these actions.

(b) Anticipatory Reactor Trips.

The Commission in its order directed SMUD to "[i]mplement a hard-wired control-grade reactor trip that would be actuated on loss of main feedwater and/or turbine trip," with its components to thereafter be upgraded to safety grade. Although the record indicates that the safety grade trip was to have been installed by June 1980, there is no indication that it has been installed. The Appeal Board requested information on its status.

(c) Small-Break LOCA Analysis.

The Commission in its order directed SMUD to "[c]omplete analyses for potential small breaks and develop and implement operating instructions to define operator action." Although the staff concluded that SMUD had complied with this directive, it identified several additional studies needed for long-term operation. Since it was unclear from the record what the outcome of these studies was, the Appeal Board requested a status report on them.

Additionally, the Appeal Board requested comments on a letter from Babcock & Wilcox received while this matter was pending before the Board. That letter discussed and discounted a potential inaccuracy in the small-break LOCA analysis

with regard to the "worst case" assumption.

(d) High-Pressure Injection (HPI).

The Licensing Board, after noting its concern that the permissible number of HPI initiation cycles for each injection nozzle is being approached, concluded without elaboration that there are ways to deal with the matter should a real safety limit be approached.

The Appeal Board noted that one consequence of the Commission's order will be an increase in reactor trips, thereby likely increasing high-pressure injections and creating a substantial chance that the permitted lifetime number of HPI cycles for each nozzle will soon be reached. The Board also could find no tangible basis for the lifetime limit on each nozzle. The Board therefore ordered that the record be supplemented with analyses of (1) the maximum allowable number of thermal cycles on the HPI nozzles, (2) methods of detecting effects on the nozzles, (3) means to prolong the useful life of the nozzles, and (4) technical specifications or operating procedures to reduce HPI use without endangering the core.

(e) Operator Training and Competence.

Both the Licensing Board and the Appeal Board found that the overall operator training and competence

were sufficient. The Appeal Board critiqued the Licensing Board for concentrating on the general adequacy of the overall program and for devoting little of its opinion to special post-TMI-2 training. The Board also criticized the Licensing Board's review of a question involving the knowledge and training of three particular operators. Based on its own review of the record, the Appeal Board concluded that the evidence established that their knowledge and training was adequate.

(f) Instrumentation.

In response to the Commission's order, SMUD made various instrumentation modifications. The Licensing Board noted that staff found that additional instrumentation or study was needed (1) in extended pressurizer level indication and (2) in reactor vessel water level indication. The Licensing Board found that steps should be taken to assure that pressurizer level indication is not lost, but that vessel level indication instrumentation at Rancho Seco is "state-of-the-art" and adequate.

The Appeal Board found both the staff's position and the Licensing Board's directive to be unclear as to the distinction between loss of pressurizer level and pressurizer level indication. The Appeal Board therefore requested staff to clarify its position on this matter. As to reactor vessel water

level indication, the Appeal Board felt that the Licensing Board had mischaracterized staff testimony. Contrary to the Licensing Board's belief, staff did not indicate that any such instrumentation was necessary.

(g) Hydrogen Control.

The Licensing Board found that the Rancho Seco facility could withstand the generation and combustion of amounts of hydrogen equivalent to those generated at TMI-2. As to the possibility of generating larger amounts of hydrogen, the Board noted that the Commission has initiated a rulemaking to explore ways to mitigate the consequences of hydrogen within the containment, and the Board felt that it could rely on the Commission's implied judgment that interim operation will not present an undue hazard to health and safety. The Appeal Board concluded that the matter of hydrogen control at Rancho Seco should be left to the Commission's consideration in the ongoing rulemaking.

3. OGC Analysis.

Recommendation:

James A. Fitzgerald
Assistant General Counsel

Attachment: ALAB-655

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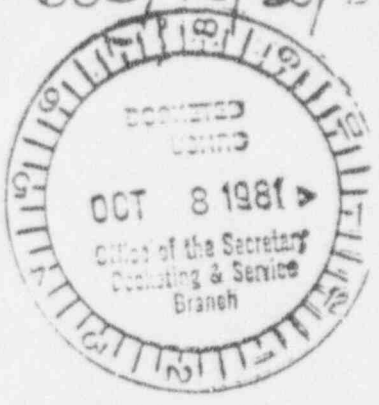

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

Administrative Judges:

Alan S. Rosenthal, Chairman
Dr. John H. Buck
Christine N. Kohl

SERVED OCT 8 1981

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

MEMORANDUM AND ORDER

October 7 , 1981

(ALAB-655)

I.

The Rancho Seco Nuclear Generating Station, licensed in 1974, utilizes a Babcock and Wilcox (B&W) pressurized water reactor (PWR). As a result of the March 1979 accident at Three Mile Island (TMI) -- another B&W facility -- the Commission ordered Rancho Seco to remain shut down[1/] until the satisfactory completion of the following five short-term actions, intended to enhance the reactor's ability to respond safely to feedwater transients:

1/ Anticipating the order, licensee Sacramento Municipal Utility District (SMUD) had already shut down Rancho Seco on April 28, 1979.

> (a) Upgrade the timeliness and reliability of delivery from the Auxiliary Feedwater System by carrying out actions as identified in Enclosure 1 of the licensee's letter of April 27, 1979.
>
> (b) Develop and implement operating procedures for initiating and controlling auxiliary feedwater independent of Integrated Control System control.
>
> (c) Implement a hard-wired control-grade reactor trip that would be actuated on loss of main feedwater and/or turbine trip.
>
> (d) Complete analyses for potential small breaks and develop and implement operating instructions to define operator action.
>
> (e) Provide for one Senior Licensed Operator assigned to the control room who has had Three Mile Island Unit No. 2 (TMI-2) training on the B&W simulator.

44 Fed. Reg. 27779-27780 (May 11, 1979). The Commission also ordered the licensee to implement "as promptly as practicable" these four "long-term" modifications (ibid.):

> 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.
>
> The licensee will submit a failure mode and effects analysis of the Integrated Control System to the NRC staff as soon as practicable. The licensee stated that this analysis is now underway with high priority by B&W.
>
> 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.
>
> 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 of licensed personnel will be completed by June 28, 1979.

In response to a Commission invitation, several parties requested a hearing.[2/] On June 21, 1979, the Commission directed a licensing board to be constituted to determine whether these parties had standing to participate in this matter and to convene a hearing if necessary. The Commission further instructed the board to consider at any such hearing: (1) whether the five short-term actions "are necessary and sufficient to provide reasonable assurance that the facility will respond safely to feedwater transients, pending completion of the long-term modifications;" (2) "[w]hether the licensee should be required to accomplish, as promptly as practicable, the long-term modifications;" and (3) "[w]hether these long-term modifications are sufficient to provide continued reasonable assurance that the

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2/ Two joint requests were made, one by Gary Hursh and Richard D. Castro (directors of SMUD), and the other by Friends of the Earth, Environmental Council of Sacramento, and Original SMUD Rate Payers Association (collectively FOE).

facility will respond safely to feedwater transients." CLI-79-7, 9 NRC 680, 681. Subsequently at a public meeting, the Commission, while not amending its prior order, expressed its intent not to preclude the board from also considering whether the management competence and control at Rancho Seco are adequate. Comm. Tr. 12 (July 11, 1979).

On July 27, 1979, the Director of the Office of Nuclear Reactor Regulation (NRR) determined that SMUD had satisfactorily completed the five short-term items, and he authorized the facility to resume operation. In the meantime, the Licensing Board below was constituted and commenced prehearing activities. The Board admitted FOE and Messrs. Hursh and Castro as intervenors[3/] and the California Energy Commission (CEC) as an "interested State" under 10 C.F.R. 2.715(c). All of these parties advanced contentions, and licensee SMUD moved for summary disposition of many. In a series of orders, the Licensing Board admitted numerous contentions, granted summary disposition of some, and posed three of its own "Additional Board Questions" for pursuit at hearing. Not long before the evidentiary hearing was to begin, intervenors Hursh and Castro and FOE withdrew from the proceeding. The Board, however, essentially adopted as its own the previously admitted

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3/ See note 2, supra.

contentions of these erstwhile parties. The hearing thus proceeded as technically "uncontested," but with CEC participating more actively than an interested state does ordinarily.

In a decision served on May 18, 1981, the Licensing Board set forth its findings on the 29 contentions and issues it explored during the hearing. The Board concluded that the five short-term actions ordered by the Commission "are necessary and sufficient to provide reasonable assurance . that the facility will respond safely to feedwater transients, pending completion of the long-term modifications." It also concluded that the licensee should perform the long-term modifications "as promptly as practicable," and that these actions, "coupled with the additional changes completed and being undertaken at the facility, including management and operator competency[,] are sufficient to provide continued reasonable assurance that the facility will respond safely to feedwater transients." LBP-81-12, 13 NRC __, __ (I.D., ¶¶245-247).[4/]

None of the parties has appealed from the Board's decision. It is our practice, however, to review sua sponte "any final disposition of a licensing proceeding that either

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4/ For ease of reference, we shall cite to the initial decision's numbered paragraphs, as well as to the NRC Reports.

was or had to be founded upon substantive determinations of significant safety or environmental issues." Washington Public Power System (WPPSS Nuclear Project No. 2), ALAB-571, 10 NRC 687, 692 (1979). Our standard of review in such instance

> is similar to that required in a contested proceeding. We may "reject or modify findings of the Licensing Board if, after giving its decision the probative force it intrinsically commands, we are convinced that the record compels a different result."

Northern States Power Co. (Monticello Plant, Unit 1), ALAB-611, 12 NRC 301, 304 (1980), and cases cited.

We have therefore reviewed, sua sponte, the record and Licensing Board's decision, as well as the Commission's orders that led to the institution of this special proceeding. While our tentative conclusions are essentially in accord with those of the Board below, we find it necessary and advisable to address a number of issues before bringing this chapter of Rancho Seco to a close.[5/] In some instances, we attempt to resolve apparent inconsistencies in the evidence or the decision itself.

5/ Inasmuch as this is a sua sponte review and we are without the benefit of briefs from the parties, we address only the most significant points requiring our attention. Those portions of the Licensing Board's decision not discussed here, in our view, do not require corrective action. On the other hand, the inherent limitations on our review necessarily preclude construing our silence on these matters as blanket approval of the Board's treatment of them.

In others, we supplement the Licensing Board's discussion with further references to the record. Finally, we order SMUD and the staff to submit additional information that has developed since the close of the record and to undertake certain analyses that we believe are necessary for our ultimate disposition of this proceeding. 6/

II.

It is apparent that the Licensing Board diligently pursued the many complex and highly technical issues raised in this proceeding. In particular, we appreciate its effort to see that serious questions raised by parties who later withdrew were addressed at the hearing. Nonetheless, our review has been somewhat hampered by the Board's failure to relate the contentions and issues it addressed more specifically to both the long and short-term modifications and the subjects for consideration at hearing set forth by the Commission

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6/ The Licensing Board refrained from actually "ordering" any actions other than those originally specified by the Commission, even though it commented favorably throughout its decision on a number of such actions. 13 NRC at __, __ (I.D., ¶¶243, 247). The Board apparently believed that, under the terms of the Commission's June 1979 order, it could only recommend that the Commission issue a show cause order concerning the need for additional measures. Id. at __ (I.D., ¶15). We do not read the Commission's order so narrowly. The Commission limited the general scope of the hearing to the facility's ability to respond safely to feedwater transients and specified three subjects for the Board's consideration at the hearing. The order did not, however, describe what the Board should do if it were to find a need for additional
(FOOTNOTE CONTINUED ON NEXT PAGE)

in its orders. See 44 Fed. Reg. 27779 and 9 NRC 680, supra.[7] Because of the special nature of this proceeding, we believe the Board should have reframed the proffered contentions and structured the course of the hearing in a manner more closely tied to the scheme suggested by the Commission's initiating orders.

6/ (FOOTNOTE CONTINUED FROM PREVIOUS PAGE) modifications. The Commission merely stated: "[i]n the event that a need for further enforcement action becomes apparent, either in the course of the hearing or at any other time, appropriate action can be taken at that time." 9 NRC at 681 (emphasis added). The Commission did not specify or limit who could take "appropriate action." In these circumstances, we believe it proper to formalize through an order, if necessary, any ultimate findings that SMUD should accomplish certain additional modifications. See Part III, infra.

7/ Our scrutiny of the record and initial decision reveals that the Board did, in fact, cover all the items directed by the Commission. Although the Board does not so characterize them, most of the matters discussed, however, appear to fall within consideration of whether the Commission-ordered modifications (short and long-term) are "sufficient" to assure a reasonably safe response to feedwater transients.

Insofar as it appears to raise issues beyond the scope of the Commission's order, the Board also attempted (principally in its prehearing conference orders of October 5, 1979, and February 14, 1980) to link the more attenuated issues to the general subject of this proceeding -- response to feedwater transients.

Having made these general observations, we now turn to the specific portions of the initial decision that warrant further comment or amplification.

A. Auxiliary Feedwater System Reliability

An important concern of the Commission, as reflected in its May 1979 order, was the reliability of Rancho Seco's auxiliary feedwater (AFW) system and its independence from the integrated control system (ICS). See 44 Fed. Reg. 27779. Hence, short-term item (a), for example, required SMUD to upgrade the timeliness and reliability of the AFW system by accomplishing nine actions described in an April 27, 1979, letter from SMUD to the NRC staff.[8/] In addition to these, a

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8/ Those actions, which the Director of NRR determined had been satisfactorily completed, are found in CEC Exhibit 25 (Enclosure 1), as follows:

1. Review procedures, revise as necessary and conduct training to ensure timely and proper starting of motor driven auxiliary feedwater (AFW) pump(s) from vital AC buses upon loss of offsite power.

2. To assure that AFW will be aligned in a timely manner to inject on all AFW demand events when in the surveillance test mode, procedures will be implemented and training conducted to provide an operator at the necessary valves in phone communications with the control room during the surveillance mode to carry out the valve alignment changes upon AFW demand events.

3. Procedures will be developed and implemented and training conducted to provide for control of steam generator level by use of safety grade AFW bypass valves in the event that ICS steam generator level control fails.

(FOOTNOTE CONTINUED ON NEXT PAGE)

number of other actions were suggested during the course of this proceeding. In many instances, the Licensing Board noted SMUD's "commitment" to undertake them or the staff's request for SMUD to do so. In view of the significant weight assigned to AFW reliability, we believe it is useful to explore

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8/ (FOOTNOTE CONTINUED FROM PREVIOUS PAGE)

4. Verification that Technical Specification requirements of AFW capacity are in accordance with the accident analysis will be conducted. Pump capacity with mini flow in service will also be verified.

5. Modifications will be made to provide verification in the control room of AFW flow to each steam generator.

6. Review and revise, as necessary, the procedures and training for providing alternate sources of water to the suction of the AFW pumps.

7. Design review and modification, as necessary, will be conducted to provide control room annunciation for all auto start conditions of the AFW system.

8. Procedures will be developed and implemented and training conducted to provide guidance for timely operator verification of any automatic initiation of AFW.

9. Verification will be made that the air operated level control valves (a) Fail to the 50% open position upon loss of electrical power to the electrical to pressure converter, and (b) Fail to the 100% open position upon loss of service air. The AFW bypass valves are safety grade.

some of those suggestions or commitments for additional analyses and modifications to the AFW and related systems.

1. The Commission ordered SMUD to submit a "failure mode and effects analysis" (FMEA) of the ICS. B&W performed this study and recommended a number of areas for further review "for possible changes to enhance reliability and safety." CEC Exhibit 3, "Integrated Control System Reliability Analysis" (BAW-1564, August 1979) at 3-1.[9/] Both the staff and the Oak Ridge National Laboratory (ORNL) -- which critically appraised the B&W report for the NRC -- agreed that these recommendations warranted some follow-up action. Staff Exhibit 5, "Assessment of B&W Report BAW-1564," passim; Board Exhibit 1, ORNL Report Review at 16-17. At the hearing, NRC witness Capra indicated that SMUD had already made changes in several of the recommended areas and was con-

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9/ Specifically, these areas were (CEC Exhibit 3 at 3-1):

a. Non-nuclear instrumentation/ICS power supply reliability.
b. Reliability of input signals from the nuclear instrumentation/reactor protection system to the ICS -- specifically, the reactor coolant flow signal.
c. ICS/balance of plant system tuning, particularly feedwater condensate systems and the ICS controls.
d. Main feedwater pump turbine drive minimum speed control -- to prevent loss of main feedwater or indication of main feedwater.
e. A means to prevent or mitigate the consequences of a stuck-open main feedwater startup valve.
f. A means to prevent or mitigate the consequences of a stuck-open turbine bypass valve.

sidering still others. Tr. 3703-3711.[10/] Mr. Capra's testimony also suggested that the staff would continue to oversee SMUD's response to the B&W recommendations. Tr. 3707.

The Licensing Board's initial decision discussed at length the B&W recommendations, along with the ORNL and staff evaluations, and noted simply that SMUD is considering and acting upon a number of items. 13 NRC at __ - __ (I.D., ¶¶26-35). The record, however, contains no information concerning SMUD's final response to BAW-1564 and the staff's final evaluation. Because we would find this information useful, we request SMUD and the staff to provide us with a status report on the six B&W recommendations.

2. The Licensing Board concluded that the AFW system "provide[s] reasonable assurance that the plant can be safely shut down in the event of a loss of main feedwater." 13 NRC at __ (I.D., ¶119). It noted, however, seven additional long-term modifications to which SMUD is "committed" and which, in the Board's view, will enhance AFW reliability even further

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10/ For example, SMUD made changes relating to power supply reliability and ICS procedures. It also was said to be considering changes relating to hard-wiring the reactor coolant flow signal to the ICS and the purchase of a new main feed pump control system.

by reducing operator action and thus error. Id. at __ (I.D., ¶¶119-120). The Board set forth these actions as follows (id. at __ (I.D., ¶119); see also id. at __ (I.D., ¶24)):

(a) Provide a safety grade AFW automatic initiation and control system design that is independent of the ICS.

(b) Provide for the automatic loading of the motor driven AFW pump onto the diesel generator buses upon loss of all offsite power.

(c) Revise the AFW system piping and provide a remotely operated valve operated from the control room instead of the local manually operated full flow recirculation valve (FWS 055).

(d) Incorporate into the Technical Specifications a requirement to operationally verify AFW flow capability from the condensate storage tank to the steam generators following extended cold shutdown.

(e) Upgrade the existing condensate storage tank level indication and low level alarm to safety grade requirements.

(f) Upgrade the existing control room indication of AFW flow to each steam generator to safety grade.

(g) Establish procedures on how to obtain water for the AFW system from sources other than the condensate storage tank.

See fol. Tr. 1163, Matthews Testimony on Board Question CEC 1-6 at 17-19; CEC Exhibit 21 (Enclosure 1) at 3-7. The staff, in fact, identified these and still other actions it expected from SMUD[11/]

11/ Other actions included, for example, revision of AFW system procedures with regard to AFW pump suction and discharge pressure instrumentation and revision of proposed technical specification for AFW Limiting Condition for Operation.

and proposed a schedule for their completion in CEC Exhibit 21 (Enclosure 2). SMUD responded favorably to each of the items listed, indicating that it would take the specified action within the time set by the staff. CEC Exhibit 22. Again, because these modifications all relate to AFW system reliability -- the very essence of this special proceeding -- we believe a status report on SMUD's fulfillment of its commitments is in order. We therefore request SMUD and the staff to advise us as to the progress SMUD has made on each action identified in CEC Exhibit 21 (Enclosure 2).[12/]

B. Anticipatory Reactor Trips

The Commission's May 1979 order directed SMUD to "[i]mplement a hard-wired control-grade reactor trip that would be actuated on loss of main feedwater and/or turbine trip." 44 Fed. Reg. 27780. The Licensing Board concluded, and the evidence shows, that control-grade reactor trips are "acceptable in the short-term," because they do not perform a direct safety function but merely serve as an additional backup. 13 NRC at __ (I.D., ¶57). See also fol. Tr. 1163, Thatcher Testimony on Board Question 9, etc., at 6-7.[13/] For the long term, however, the Commission ordered

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12/ We note, in this regard, that most items were to have been completed by May 1, 1980, or January 1, 1981.

13/ The Licensing Board explored at the hearing a claim that control-grade anticipatory reactor trips at B&W reactors had failed to respond on one out of four occasions during the first few months after the accident at TMI-2. Testimony showed that this one failure was attributed to initial "break-in" problems at an Arkansas reactor. Tr. 1712-

(FOOTNOTE CONTINUED ON NEXT PAGE)

SMUD to upgrade this component to "safety-grade" and submit the design to the NRC staff for review "as promptly as practicable." 44 Fed. Reg. 27779-27780. "Safety-grade" describes circuitry that is more reliable than "control-grade" and that meets the design requirements of the protective safety system, such as "single failure, testability, qualification, independence and automatic removal of operating bypasses." Fol. Tr. 1163, Thatcher Testimony on Board Question 9, etc., at 6. The Board thus noted SMUD's commitment to install safety-grade trips "in the next few months." 13 NRC at __ (I.D., ¶57).

The record shows that the NRC staff approved SMUD's preliminary design for the safety-grade anticipatory trip on December 20, 1979, and that the trips would be installed and operational within about six months of that date -- i.e., by June 1980. Fol. Tr. 1163, Thatcher Testimony on Board Question 9, etc., at 6; fol. Tr. 1163, Capra Testimony on FOE contention III(c) at 5; fol. Tr. 1988, Dieterich Testimony on Board Question CEC 1-6, etc., at 26, 27. The Board issued its decision approximately one year later, but there is no indication there or otherwise in the record that SMUD has yet

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13/ (FOOTNOTE CONTINUED FROM PREVIOUS PAGE)
1713. In seven or eight additional anticipatory trip requests over approximately the next six months, however, no failures occurred. Fol. Tr. 1988, Dieterich Testimony on Board Question CEC 1-6, etc., at 16; fol. Tr. 1163, Thatcher Testimony on Board Question 9, etc., at 8-9. The Board found, and we agree, that control-grade trips are therefore sufficiently reliable for short-term operation.

fulfilled its commitment in response to the Commission's May 1979 order. We therefore request the staff and SMUD to inform us whether the safety-grade trip has, in fact, been installed, and, if it has not, to explain the delay and provide a projected completion date.

C. Small-break LOCA Analyses

The Commission's May 1979 order directed SMUD to "[c]omplete analyses for potential small breaks and develop and implement operating instructions to define operator action." 44 Fed. Reg. 27779. The staff reviewed SMUD's actions with regard to this "short-term" item and, although it concluded that the licensee had complied with this aspect of the Commission's order, it identified several additional studies assertedly needed for long-term operation: (1) the more detailed small-break loss-of-coolant accident (LOCA) analyses discussed in Sections 8.4.1 and 8.4.2 of NUREG-0560, "Staff Report of the Generic Assessment of Feedwater Transients in Pressurized Water Reactors Designed by the Babcock and Wilcox Company," and (2) analyses to (a) confirm that AFW, if lost, can be restored within a reasonable period of time and (b) describe the thermal-mechanical behavior of vessel materials under these conditions. Fol. Tr. 362, Staff Evaluation at 19, 23. The Licensing Board also discussed SMUD's small-break LOCA

analyses (performed by B&W), eventually finding them "adequate to demonstrate that core cooling will be sufficient" so as to assure Rancho Seco's safe response to such events. See 13 NRC at __ - __ (I.D., ¶¶70-101). It is not readily apparent from either the record or the Board's decision, however, whether the specific analyses identified by the staff as necessary for long-term operation have been performed, and, if so, what the results were. Consequently, we request the staff and SMUD to submit a status report on these further analyses.

Otherwise, the Licensing Board's decision accurately and fully reflects the evidence adduced on this important issue, and we tentatively agree with the Board's general conclusions. While this matter was pending our sua sponte review, however, counsel for SMUD directed our attention to another matter related to the small-break LOCA analyses.[14/] A March 25, 1981, letter from B&W to SMUD on "Reactor Coolant Pump Suction Small Break LOCA" points out that the small-break LOCA analyses discussed in this proceeding assumed, as a "worst case," a small break at the reactor coolant pump discharge line. In normal circumstances, this type of break

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14/ June 10, 1981, letter from Thomas A. Baxter, Esq., served on all parties. We commend SMUD counsel for alerting us and the parties to this matter.

would be more severe than a pump suction line break, since, in the latter case, a greater degree of high pressure injection (HPI) penetration is achieved. But where HPI is not automatically initiated and AFW flow is delayed, a pump suction break can result in a greater loss of fluid inventory. Thus, the B&W LOCA analyses could be characterized as incomplete, insofar as they did not consider a "pump suction break/delayed AFW" scenario.

The B&W letter suggests further analysis is unnecessary, however, because the post-TMI-2 small-break LOCA guidelines for operator action and upgrading of the AFW control system are equally relevant to a pump suction break, and this scenario is, in any event, highly unlikely. In his cover letter, counsel indicates that SMUD's witnesses have reviewed this information and would not alter their testimony before the Licensing Board. See, e.g., fol. Tr. 535, Karrasch and Jones Testimony on Board Questions CEC 1-2, etc., at 50-63; fol. Tr. 2948, Rodriguez Testimony on Board Questions CEC 1-2, etc., at 25-31. Nevertheless, we believe it would be useful to have the staff's (and any other party's) comments on the B&W letter and the "resolution paths" proposed in it.

D. High Pressure Injection

In paragraph 125, the Licensing Board properly noted its "concern" that the number of high pressure injection (HPI)

initiation cycles permitted (under the design basis of Rancho Seco) on each injection nozzle for the life of the plant is being approached. The Board, however, concluded -- without elaboration -- that the limit imposed on these cycles "may be overly conservative, and that there are several ways to cope with the matter should it become evident that a real safety limit is being approached." 13 NRC at __ (I.D., ¶125). But the record, in our view, does not support the Board's somewhat optimistic appraisal of the effect of the Commission's May 1979 order on the HPI system.

The number of HPI cycles projected for the 40-year life of the plant is 40, or one a year for each nozzle. Tr. 994-995, 997. Another 40 "test" cycles (at low pressure) are projected, which roughly convert to 30 cycles of high pressure injection. Tr. 2014-2015. A staff witness acknowledged that "one of the high pressure injection nozzles, has been subjected to 31 thermal cycles to this date," and a SMUD witness later stated that all three of the HPI nozzles are already in the "ballpark" of 30 thermal cycles. Tr. 1159, 2018. Because one of the consequences of the Commission's May 1979 order is an increase in the number of

reactor trips, and, according to the staff, this leads to a "likely" increase in high pressure injections,[15/] there is a substantial chance that the permitted lifetime number of HPI cycles for each nozzle will soon be reached.

Reaching this limit carries with it the implication that the nozzles will begin to experience some degradation and diminished effectiveness thereafter. Unfortunately, neither the record nor the Board's opinion deals satisfactorily with the impact that this matter may have on safety. In the first place, the record should, but does not, establish the maximum allowable number of thermal cycles for each HPI nozzle. SMUD's testimony reflects no tangible basis for the original lifetime limit of 40 HPI cycles plus 40 test cycles for each nozzle. See, e.g., Tr. 2015. Further, licensee witness Dieterich stated that recalculations based on different usage factors may or may not show that the HPI nozzles can withstand more cycles. Ibid. Thus, while the permitted number of cycles may well be "overly conservative," as the Board found, there is no real evidence to justify that characterization or upon which to rely in setting a new limit

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15/ See fol. Tr. 1163, Rubin and Novak Testimony on CEC Contentions 1-1 and 1-12 at 3. But compare the views of SMUD's witnesses that a resulting increase in high pressure injections is not anticipated. Fol. Tr. 535, Karrasch and Jones Testimony on Board Questions CEC 1-2, etc., at 41; Tr. 997. See also 13 NRC at __ (I.D., ¶124).

on thermal cycles. Moreover, although the record does show "several ways to cope with the matter,"[16/] it does not reflect any consideration of means to detect thermal cycle effects or to prolong the life of the HPI nozzles.

The record gives no cause to doubt that the existing design basis total of 70 cycles per nozzle (40 plus 30 converted from test cycles) is safe. But in view of the facts that (1) this limit is being approached more quickly than anticipated, and (2) an increase in high pressure injections and thus added stress on the HPI nozzles is likely, we conclude that further analysis by SMUD and the staff is warranted. Accordingly, we shall retain jurisdiction of this case to enable supplementation of the record with analyses of (1) the maximum allowable number of thermal cycles on the HPI nozzles; (2) methods of detecting thermal cycle effects on the nozzles; (3) possible means of prolonging the useful life of the nozzles; and (4) technical specifications or operating procedures that might reduce the use of the HPI without endangering the core. SMUD and the staff should submit a proposed schedule for supplying this information.

16/ At least three methods were noted: (1) cutting out the old nozzle and welding in a new one -- a "very costly" procedure; (2) adding a mini-flow line that bypasses the HPI valve and permits cold water to trickle through the nozzle continuously to eliminate thermal shock; and (3) limiting HPI initiation. Tr. 2016, 2019. See also Tr. 3358.

E. Operator Training and Competence

Short-term items (d) and (e) required SMUD to "implement operating instructions to define operator action" for potential small breaks and to assign to the Rancho Seco control room one senior licensed operator who has had TMI-2 training on the B&W simulator. For the long term, the Commission's order required at least two licensed operators per shift with TMI-2 training on the simulator, one of whom is to be assigned to the control room. 44 Fed. Reg. 27779. Because the Commission directed the Licensing Board to explore whether these measures were "necessary and sufficient" for the safe response to feedwater transients, the matter of operator training and competence arose in this proceeding.

Although the principal focus of the Commission's order (insofar as operator training is concerned) was on TMI-2 simulator and other training, the Licensing Board devoted a relatively substantial portion of its decision to contentions that challenged the general adequacy of the overall Rancho Seco training program. See 13 NRC at __ - __ (I.D., ¶¶130-165). Indeed, the Board affirmatively disclaimed any mandate to review the adequacy of the post-TMI-2 program, in particular. Id. at __ (I.D., ¶140). See also id. at __ (I.D., ¶137). We have no quarrel with either the relevance in this case of some

discussion of the overall training program at Rancho Seco, or the Board's favorable conclusions on this issue. We point out, however, that SMUD, like all licensees, is expected to comply with the NRC regulations that govern training and operator competence, obviating any lengthy discussion to the effect that SMUD is doing what it is supposed to do. More importantly, as noted, the emphasis in this special proceeding was to be on the training undertaken in the wake of the events at TMI-2. Thus, we find it somewhat disconcerting that the Board devoted comparatively little of its decision to the special post-TMI-2 training given Rancho Seco's operators.

We are nonetheless convinced by the underlying record that SMUD personnel adequately understand the TMI-2 sequence of events and the proper responsive action.[17/] Where the NRC staff identified weaknesses in the program, SMUD undertook additional training and corrective measures that the staff audited and later found to be acceptable.

One other aspect of the Licensing Board's discussion of operator training and competence warrants comment. CEC contended, on the basis of its depositions of three Rancho

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17/ Of particular value are the following portions of pre-filed testimony: fol. Tr. 1163, Capra Testimony on FOE Contention III(c) at 5-6; fol. Tr. 2948, Rodriguez Testimony on Board Questions CEC 1-2, etc., at 15-18, 23-24, Appendix III; fol. Tr. 3496, Bridenbaugh-Minor Testimony at 6-13; fol. Tr. 3788, Wilson Testimony on Board-CEC Question 1-7, etc., at 4-7, 11, 15, 17, 19-21; fol. Tr. 362, Staff Evaluation at 24-26.

Seco operators (CEC Exhibits 36, 37, and 38), that a senior operator did not display a complete understanding of plant operations and an operator had an inadequate understanding. The Board, however, concluded on the basis of the entire record that SMUD's operators have sufficient knowledge and understanding of the facility. 13 NRC at __ (I.D., ¶147). In reaching this conclusion, the Board discounted CEC's reliance on the three depositions by noting that "[a] considerable portion of each deposition was devoted to matters such as description of the facility, operator experiences with various transients, equipment availability, descriptions of the SMUD organization, and other matters not germane to the operators' training and knowledge." Ibid. We disagree with the Board's characterization of these matters as "not germane" and find them to be of obvious relevance to an inquiry of operator competence.

The Board also indicated its reluctance to give much weight to the depositions because of its inability to observe the witnesses' demeanor. It opined that the operators were unaccustomed to answering questions under oath and thus might not give their best answers. The Board further stated that this may have been the reason for an operator's incorrect answer regarding "feed and bleed" cooling. Ibid. n.15. But rather

than engaging in such speculation, in our view, the Board should have either focused on the totality of the depositions and the exact way the questions were phrased and answered, or -- if it still had serious concerns -- called the deponents as witnesses for additional questioning.

We have reviewed the depositions in question (ranging from approximately 80 to 150 pages) and find that, overall, they and the other evidence of record reflect adequate knowledge and training on the part of the three operators. The few instances cited by CEC to show a lack of operator understanding involved questioning that was confusing or vague and thus susceptible to responses in kind.[18/]

F. Instrumentation

In response to the Commission's May 1979 order and the accident at TMI, SMUD made various modifications to the instrumentation in the Rancho Seco control room and elsewhere.[19/]

18/ See, e.g., CEC Exhibit 38 at 18-19; CEC Exhibit 36 at 16.

19/ The hearing devoted significant attention to the configuration of the Rancho Seco control room itself, particularly the placement of the main feedwater and auxiliary feedwater controls. See 13 NRC at __ - __ (I.D., ¶¶188-192). Our review of the record convinces us that the control room design is a good one, provided two operators are present, as is now required (see p. 3, supra).

See 13 NRC at __ - __ (I.D., ¶¶179-181). The Licensing Board noted, however, two instances in which the NRC staff assertedly found that additional instrumentation or study was needed -- extended pressurizer level indication and reactor vessel water level indication. Id. at __, __ (I.D., ¶¶63, 185). As to the former, the Board agreed with the staff's alleged recommendation that "steps [should] be taken to assure that pressurizer level indication not be lost." Id. at __ (I.D., ¶63). See also id. at __ (I.D., ¶69). But as to vessel level indication in particular, and Rancho Seco's instrumentation in general, the Board concluded that the present instrumentation is "state-of-the-art" and adequate to cope with feedwater transients. Id. at __ - __ (I.D., ¶¶186, 187). We believe these matters merit further attention and clarification.

1. A contention raised by Hursh and Castro, and later adopted as a Board question, concerned whether the capacity of Rancho Seco's pressurizer is adequate to accommodate various feedwater transients. It was in this context that the related issue of maintenance of pressurizer liquid volume arose. While testimony referred to data showing that, in each instance of a reactor trip at a B&W PWR, the pressurizer did not actually empty, there was other evidence that level indication had occasionally been lost at the lower end of the scale. Id. at

__ (I.D., ¶¶62, 63). In its Exhibit 4, NUREG-0667, "Transient Reponse of Babcock & Wilcox-Designed Reactors," at 5-13, the staff stated that "the loss of pressurizer level, along with the need for operator actions of the kind described, places the plant in an undesirable condition and should be remedied." Relying on this staff document, the Licensing Board found that, although loss of pressurizer level indication may not pose a threat to safety, "the Staff recommendation should be complied with" so as to facilitate operator action. 13 NRC at __ (I.D., ¶63). Later, the Board directed SMUD and the staff "to proceed directly with plans for extended pressurizer level indication." Id. at __ (I.D., ¶69).

We find both the staff's position on this matter and the Licensing Board's direction to the staff and SMUD to be somewhat unclear. The pressurizer at Rancho Seco, as described in the licensee's testimony, has three separate, temperature-compensated water level indications, calibrated to cover "the normal operating level range of the pressurizer and provid-[ing] sufficient margin above and below that operating range to allow the operators additional time to take action and to restore a proper level within the pressurizer in the event of an off-normal condition." Fol. Tr. 2948, Rodriguez Testimony on Board Questions CEC 1-2, etc., at 46.

There are also alarms to alert the operator to off-normal conditions. Ibid. The staff's prefiled testimony stated that similar B&W pressurizer level indication was "reliable" during the TMI-2 accident, but described circumstances in which level indication might be lost. Fol. Tr. 1163, Norian Testimony on Board Question 22 at 3, 4. See also Tr. 774. The staff did not suggest there, however, that extended pressurizer level indication was necessary. Further, staff Exhibit 4 -- contrary to the Board's interpretation -- recommends study of ways to mitigate loss of pressurizer level, not pressurizer level indication. Staff Exhibit 4 at 5-13.[20] The staff's oral testimony seems to support this interpretation of Exhibit 4, though it is not entirely free of confusion. See Tr. 1460-1464.

While we agree with the Board that the loss of level indication downscale may not be a threat to safety, we nonetheless request the staff to clarify its position on this matter, particularly since the Board instructed SMUD and the staff to proceed "directly" with "plans" for extended level indication.[21]

20/ This document also assigns a relatively low priority to "System Response Modifications to Prevent Pressurizer Level Loss and ECCS Actuation." See Staff Exhibit 4 at 7-18, 7-21, 7-38 - 7-39.

21/ Specifically, the staff should address whether it intended in NUREG-0667 to recommend extended pressurizer level indication, and, if so, whether that is still its position.

Following receipt of the staff's statement, we will determine whether it is necessary to formalize the Licensing Board's direction in paragraphs 63 and 69.

2. The Licensing Board, in paragraph 185 (13 NRC at __), found a difference of opinion among the witnesses on the desirability of direct detection of reactor vessel water level. While SMUD concluded that no available designs for such instrumentation would give unambiguous indications,[22/] the staff -- according to the Board -- expressed a "need" for a reactor vessel water level indicator.[23/] The Board nonetheless concluded that existing instrumentation is sufficient, particularly in view of the pending rulemaking on "Interim Requirements Related to Hydrogen Control and Certain Degraded Core Considerations," in which the need for a reactor vessel water level indicator is under consideration. 13 NRC at __ (I.D., ¶186). See 45 Fed. Reg. 65466, 65471, 65473 (October 2, 1980).

Our concern is not with the Board's conclusions, but, again, with its somewhat misleading characterization of the staff's views. The relevant prefiled staff testimony stated that "[t]he existing instrumentation will be reviewed as part

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22/ SMUD also emphasized that the loss of subcooling, and not reactor vessel level, is the key to operator action, and that existing instrumentation enables the operators to monitor this condition. Fol. Tr. 2948, Rodriguez Testimony on Board Questions CEC 1-2, etc., at 46-48. See also fol. Tr. 1163, Norian Testimony on Board Question 22 at 5-6.

23/ CEC testified generally as to the desirability of such an indicator, but recognized the need for careful research on the best measurement system. Fol. Tr. 3496, Bridenbaugh-Minor Testimony at 15.

of the ICC [inadequate core cooling] studies to determine if any additional instrumentation is needed, such as reactor vessel water level, to supplement existing devices." Fol. Tr. 1163, Norian Testimony on Board Question 22 at 5 (emphasis added). The same testimony indicated that any such additional instrumentation would serve as a "backup" to the existing systems. Id. at 6. At no point did the staff aver that reactor vessel level indication was "needed." See also fol. Tr. 3788, Wilson Testimony on CEC Issue 5-3a at 5. Later at the hearing, a staff witness, in response to Board questioning, opined that this item is "not ... required." Tr. 3877. Finally, in our review of the record, we have discovered no evidence that the staff subsequently recommended this instrumentation for Rancho Seco after the ICC study and review to which the Norian testimony referred.

G. Hydrogen Control

One of the issues raised by former intervenors Hursh and Castro concerned Rancho Seco's ability to cope with the generation of hydrogen within the containment following an accident like that at TMI-2. Noting several reports on TMI-2, the Licensing Board found that it could not "accept without question the notion that, following a feedwater transient, no serious accumulation of hydrogen could occur before a recombiner

could be installed." Order of February 14, 1980, at 7. It therefore adopted the Hursh-Castro contention as a Board question and received evidence on it at the hearing.

In its initial decision, the Board found -- without much elaboration -- that, even though Rancho Seco is not protected by recombiners or purging of hydrogen in amounts like those produced at TMI-2, the facility could withstand the generation and combustion of such amounts of hydrogen. The Board also pointed out, however, that since the Commission has initiated a rulemaking to explore ways to mitigate the consequences of hydrogen within the containment,[24/] it could "rely upon the Commission's implied judgment that operation of Rancho Seco ... in the interim will not present an undue hazard to health and safety." 13 NRC at __ (I.D., ¶206).

Pretermitting the question of whether hydrogen control is even within the scope of this special proceeding, we would ordinarily expect a more substantial treatment of this matter than that set forth in the initial decision. But, as the Licensing Board observes, the Commission now has under consideration the consequences of the generation of large

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24/ See 45 Fed. Reg. at 65472, supra.

amounts of hydrogen within the containment following a TMI-2 event. In this circumstance, we rely on our prior holding that "licensing boards should not accept in individual license proceedings contentions which are (or are about to become) the subject of general rulemaking by the Commission." Potomac Electric Power Co. (Douglas Point Station, Units 1 and 2), ALAB-218, 8 AEC 79, 85 (1974). We thus leave the matter of hydrogen control at Rancho Seco to the Commission's consideration in the ongoing rulemaking and refrain from any explicit comment or judgment on this portion of the Board's decision.[25/]

III.

This memorandum has identified several areas that require additional analyses or information from SMUD and the staff before we are able to find that the actions ordered by the Commission in May 1979 are necessary and sufficient to assure Rancho Seco's safe response to feedwater transients. To summarize, we request the following information by November 20, 1981:[26/]

1. Status reports from SMUD and the staff on the six recommendations in BAW-1564 to enhance AFW safety and reliability;

25/ We note that the Board itself took this course with regard to the exclusion from this proceeding of contentions concerning emergency response plans. See Order of October 5, 1979, at 2-4.

26/ The parties may each submit this material in one document.

2. Status reports from SMUD and the staff on SMUD's commitments to improve AFW reliability, as described in CEC Exhibit 21 (Enclosure 2);

3. Status reports from SMUD and the staff on the installation of the safety-grade anticipatory reactor trip;

4. Status reports from the staff and SMUD on the need for the additional analyses identified in the Staff Evaluation at 19, 23 (see p. 16, supra);

5. Staff comments on the March 25, 1981, letter from B&W to SMUD concerning "Reactor Coolant Pump Suction Small Break LOCA";

6. SMUD and staff schedules for HPI analyses; and

7. Staff clarification of its position on the need vel non for extended pressurizer level indication.

Following the receipt and consideration of this material, we will determine whether it is necessary to order additional action.

It is so ORDERED.

FOR THE APPEAL BOARD

C. Jean Bishop
C. Jean Bishop
Secretary to the
Appeal Board