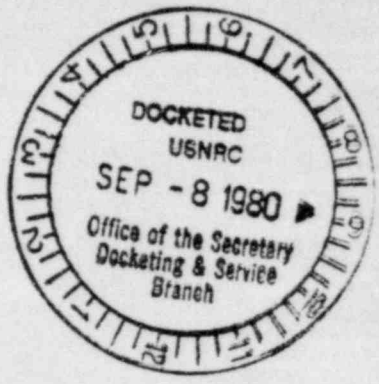


UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

LICENSEE'S REPLY TO THE PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW OF THE CALIFORNIA ENERGY COMMISSION AND THE NRC STAFF

SHAW, PITTMAN, POTTS & TROWBRIDGE

Thomas A. Baxter
Matias F. Travieso-Diaz

Counsel for Licensee

September 5, 1980

TABLE OF CONTENTS

September 5, 1980

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
	)	
(Rancho Seco Nuclear Generating Station)	)	
	)	

LICENSEE'S REPLY TO THE PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW OF THE CALIFORNIA ENERGY COMMISSION AND THE NRC STAFF

I. INTRODUCTION

1. Licensee herein submits its reply to the "California Energy Commission's Proposed Findings of Fact and Conclusions of Law in the Form of an Initial Decision," dated August 4, 1980,[1] and to the "NRC Staff's Proposed Findings of Fact and Conclusions of Law in the Form of an Initial Decision," dated August 22, 1980. Licensee has not attempted to

---

1 The accompanying "Statement of the California Energy Commission in Support of its Proposed Findings of Fact and Conclusions of Law," does not meet the requirements of 10 C.F.R. § 2.754 and, accordingly, Licensee will not reply to the "statement."

respond here to each proposed finding and conclusion with which Licensee disagrees or to note where there is substantial agreement among the parties. Where the disagreements are plain and the positions are accompanied by accurate citations to the record, we have not repeated, but rely upon "Licensee's Proposed Findings of Fact and Conclusions of Law in the Form of an Initial Decision," dated July 11, 1980.

2. Licensee's reply is set forth in the form of a section of a proposed initial decision in which the Board addresses the proposed findings of fact and conclusions of law filed by the parties. Proposed findings of fact are cited as "PF [paragraph number]."[2]

3. Licensee's reply includes a separate memorandum of law which addresses the procedure to be followed by the Board if it should wish to recommend adoption of any of CEC's proposed modifications to the Commission's Order of May 7, 1979.

II. PROPOSED BACKGROUND STATEMENTS

4. The proposed background statements filed by the parties are generally consistent, although CEC's discussion (CEC PF 4-7) ignores the undisputed facts that this hearing was

---

2 The paragraphs in CEC's proposed conclusions of law are separately numbered and will be cited as "CL [paragraph number]."

discretionary, that the Commission's Order of May 7, 1979, did not direct that a hearing be held, and that the hearing was held only because it was requested by petitioners who met the requirements of 10 C.F.R. § 2.714. See Licensee PF 8-14; Staff PF 1-4.

5. CEC's proposed initial decision is unique among those filed in that it characterizes all of the issues in this proceeding as "contested." See CEC Table of Contents, PF 25, and headings throughout. It is fundamental, however, that a "controversy" requires a dispute between two or more parties. Yet CEC has not identified the proponent(s) of the issues which it labels "contested." Certainly Licensee and the NRC Staff did not endorse the merits of any contested issue, and CEC scrupulously declined to do so. It is equally clear that in posing questions prior to the hearing the Board cannot be viewed, as CEC apparently would have it, to be taking a position on the matters before it. Indeed, a question, by its very form and nature, does not assert a position. The Board, then, without hesitation endorses the description of the issues by Licensee and the NRC Staff. See Licensee PF 26, 27; Staff PF 10.

6. CEC, in its proposed findings 22-24, falsely accuses Licensee of suggesting a change in the Board's earlier rulings allocating the burden of proof, and then proceeds itself to suggest a new standard. Licensee and the Staff accurately recited the Board's holding, in its Prehearing

Conference Order of August 3, 1979, that the burden of proof on all contentions would be placed upon Licensee and the burden of going forward on contentions would be placed upon the party making the contention. See Licensee PF 24; Staff PF 4. Licensee has not suggested a reallocation of these burdens, but has merely observed the obvious change in the posture of the proceeding which developed shortly before the start of the evidentiary hearing -- namely, the withdrawal of all of the proponents of the contentions. It is CEC, and not Licensee, which now proposes to expand the Board's holding of August 3, 1979, which explicitly applied to contentions. CEC proposes, at PF 24, that ". . . the ultimate burden of proof rests on the Licensee on all issues in this proceeding." For the reasons so forcefully argued by CEC, the Board declines to entertain CEC's untimely and unwarranted post-hearing reconsideration of our previous ruling.

7. The proposed findings tendered by CEC include that party's account of conversations, discussions and so-called "negotiations" which preceded the Commission's Order of May 7, 1979. See, e.g., CEC PF 11-13, 50, 61, 67, 68, 328, 329, 331. These statements apparently are designed to support the following observations in CEC proposed finding 30:

> The short- and long-term requirements of the May 7 Order were not decided upon after careful analysis of necessary steps to improve Rancho Seco's safety. Rather, they were devised virtually overnight with a premium on actions that could be completed rapidly and thus ensure prompt restart of the facility . . .. It therefore is evident that the public interest was

> poorly served by . . . the May 7 Order -- the public health and safety took second place to expeditious restart.

These reckless accusations that the Commission ignored its statutory responsibilities are not supported by the record. Given these apparently long-held beliefs, it is difficult to understand why the California Energy Commission took no action to challenge the Commission's Order, why CEC did not even request this hearing (which was instituted by private parties), or why CEC declined to take a position on the issues throughout the course of the hearing. It is not this Board's role, however, to pass judgment on the process by which the Commission formulated its decisions, nor do we consider it necessary to do so. Our mandate is to determine whether the modifications at Rancho Seco are sufficient to provide reasonable assurance that the facility will respond safely to feedwater transients. The adequacy of the modifications can be established without examining, as CEC inappropriately suggests, the motives of the parties in proposing them, or the circumstances leading to their selection.

8. The Board also observes a fundamental inconsistency in CEC's criticism of the quality of the Commission's decisionmaking which led to the May 7 Order. While CEC describes this process as hasty and not based upon careful analysis, CEC uses repeatedly, as the almost exclusive benchmark for its proposed initial decision, the "NRR Status Report on Feedwater Transients in B&W Plants," dated April 25,

1979 (CEC Ex. 26), which CEC states was the basis for the Commission's Order of May 7, 1979. See CEC PF 10. If this report reflects the hasty and inadequate analysis described by CEC, then there is no reason why the Board should perpetuate purported error and rely heavily upon a report issued less than one month after the TMI-2 accident and which was not sponsored here by a witness, when we now have the benefit in this record of Staff testimony reflecting an additional year of study of that accident.

III. PROPOSED FINDINGS OF FACT

A. Integrated Control System

9. CEC's proposed findings on Board Question HC-16 begin with an historical listing of the Staff's concerns that led to the requirement to perform a failure mode and effects analysis ("FMEA") of the Rancho Seco ICS.[3] CEC PF 44-50. These concerns were expressed by the Staff, shortly after the TMI-2 accident, in the "NRR Status Report on Feedwater Transients in B&W Plants", issued on April 25, 1979 (CEC. Ex.

---

3 CEC's proposed findings portray Licensee as resisting the FMEA requirement because it might delay the restart of the Rancho Seco facility, and would have the Board hold that it was improper of the Commission and the Staff to allow the FMEA to become a long-term item. CEC PF 50, 61. Staff witnesses testified, however, that performance of the FMEA was always regarded as a long-term item. Tr. 1381-1383 (Thatcher, Capra). In any case, the ICS reliability analysis was completed within four months of being ordered.

26). CEC's proposed findings quote these concerns, yet fail to note that the concerns were based on a lack of understanding of the ICS by the Staff at the time the document was issued, and that they have subsequently dissipated. Tr. 1270-1272 (Thatcher); Tr. 3712-3713 (Capra). Staff witness Capra summarized the situation aptly:

> I think that at the point in time where this statement was made...we probably had not reviewed any operating experience. A lot of our concerns about the integrated control system were based on myth and folklore I think a little bit. We had not done any review of the integrated control system; we were concerned that it was possibly a contributor to the transients experienced in B&W plants, and it was logical that we wanted to investigate that.

Tr. 3713 (Capra). Thus, the Staff's concerns prior to completion of the ICS FMEA are of historical interest only and not relevant to the task at hand.[4]

---

4 The other source cited in CEC's proposed findings as expressing concerns about the ICS is CEC Ex. 5, which is a Staff report entitled "Primary System Perturbations Induced by Once Through Steam Generator". CEC PF 48 quotes from the first paragraph of Section IV of CEC Ex. 5, which reads: "...review of operating experience suggests that the ICS often is a contributor to feedwater transients. In some cases the ICS appeared inadequate to provide sufficient plant control and stability." CEC PF 48 also refers to Section II of CEC Ex. 5, which states that "in many cases the main feedwater control system does not react quickly enough or is not sufficiently stable to meet feedwater requirements. Rather, the system will often oscillate from underfeed to overfeed conditions, causing a reactor trip and sometimes a high pressure injection initiation."

CEC Ex. 5 was discussed by several witnesses at the hearing. One of its authors, Staff witness Rubin, explained that the concerns raised in that document "were preliminary in nature." Tr. 1187-1188 (Rubin). While CEC Ex. 5 was issued after the (continued next page)

10. One historical concern, however, deserves brief mention. CEC proposed findings 47, 56 and 59 suggest that an ICS malfunction at Rancho Seco could cause simultaneous loss of main and auxiliary feedwater. Whether such an event is theoretically possible at the present time is not revealed by the record; however, as a practical matter, even if an ICS malfunction took place that resulted in such a simultaneous loss, the operators would take manual control of AFW flow (as directed by the Rancho Seco emergency procedures) so that a loss of all feedwater, if experienced, would be short lived. See Licensee PF 43, 140. In the near future, of course, the AFW system will be upgraded to safety grade and completely divorced from the ICS. See Licensee PF 44, 61, 156.

11. CEC's proposed findings 53 to 56 enumerate Oak Ridge National Laboratory's ("ORNL") reservations about the

---

(continued)
ICS reliability analysis was prepared, the Staff was still reviewing the reliability analysis, and had not received Oak Ridge National Laboratory's evaluation of it.

Contrary to the concern expressed in Section IV of CEC Ex. 5, the operating experience shows that the ICS is not a contributor to feedwater transients and is in fact instrumental in offsetting their effects. Tr. 713-714 (Karrasch). Also, Staff witnesses explained that the main feedwater oscillation referred to in Section II of CEC Ex. 5 was not caused by any problem with the ICS but by improper action by the operator in transferring control from automatic to manual modes. Tr. 1308 (Capra); see generally, Tr. 1306-1312 (Thatcher, Capra, Rubin). Thus, the concerns expressed in CEC Ex. 5 are again based in the Staff's misunderstanding of the ICS prior to analysis of the B&W reliability study, and, like those expressed in CEC Ex. 26, dissipated when more information about the system became available.

adequacy of the ICS FMEA. These criticisms were answered at the hearing and are fully addressed in Licensee's proposed findings 53-57. See also, Staff PF 20, 21. More importantly, ORNL concluded that none of the shortcomings it perceived was serious enough to require redoing the analysis. With respect to the use of functional block diagrams, ORNL's evaluation was:

> We are satisfied that failures within the ICS itself do not constitute a significant threat to plant safety and that further analysis of this type may not be economically justifiable.

Bd. Ex. 1 at 14. With respect to expanding the scope of the FMEA to include other systems with which the ICS interacts, ORNL concluded that:

> It is not evident that redoing the analysis at this point to include this information would be worthwhile.

Id. at 16.

12. Finally, ORNL's complaint that the analysis in the FMEA was not carried out beyond the reactor trip is inaccurate, for the FMEA did in fact continue the analysis beyond the trip for those failures that caused the plant to respond in an "adverse fashion" after the trip (e.g., AFW initiation or SFAS actuation). CEC Ex. 3 at 4-22, 4-23; Tr. 639-645 (Karrasch). The FMEA did not continue the analysis beyond the reactor trip, however, for those failures for which the reactor trip terminated the transient. Id. Terminating the analysis at that point is not a shortcoming of the FMEA, since the ICS function after a trip is minimized; upon a

reactor trip, the ICS ceases its integrating function and limits itself to controlling steam pressure and steam generator level. Tr. 1105-1107, 1117-1119 (Karrasch, Jones).

13. CEC proposed finding 60 invites the Board to disregard the operating history of the ICS and restrict our review to determining whether the FMEA was adequate. CEC's other proposed findings, however, emphasize the importance of establishing ICS reliability since the system controls "all the important parameters of the plant's operation." CEC PF 44-48. We do not understand why the Board should investigate the reliability of the ICS solely in terms of a theoretical analysis and consciously ignore the system's actual performance record. Our inquiry is not an academic exercise, aimed at finding what further refinements could have been made in the analytical model utilized. Our goal is to assess whether the Rancho Seco ICS is a sufficiently reliable system to assure that the plant can be operated safely. The FMEA indicates that it is. The operating history confirms it. Both are useful tools to our review, and we rightfully rely on both.

14. Finally, CEC proposes, in PF 62, that the Board hold that the FMEA was inadequate and that Licensee should perform a "more detailed study of the Rancho Seco control systems." No witness at the proceeding, however, testified that the FMEA was inadequate. No testimony was offered questioning the reliability of the Rancho Seco ICS. To the contrary, the main document on which CEC relies for most of its

findings in this area, the ORNL Report, concludes that reliance on the ICS to regulate plant parameters "is not a shortcoming as might be inferred from current suspicion of the ICS; instead it is a significant asset to plant safety and availability." Bd. Ex. 1 at 14. The report goes on to find that "the control system itself has a low failure rate and...does not instigate a significant number of plant upsets... [T]he system prevents or mitigates many more upsets than it creates, and ...[it] is generally superior to manual or fragmented control schemes." Id. at 14, 15. The Board has been presented with no evidence to demonstrate that there are problems with the Rancho Seco ICS. Based on this record, to endorse CEC proposed finding 62 would require us to order studies for their own sake. This we cannot do. See, Gulf States Utilities Company (River Bend Station, Units 1 and 2), LBP-75-10, 1 N.R.C. 246, 250 (1975).

15. The Board concludes that, regardless of the validity of ORNL's criticism of the methodology of the ICS FMEA,[5] the study--together with the ICS operating experience --achieved its intended purpose of verifying the reliability of the ICS and determining which systems related to the ICS could be modified to improve plant safety.[6] The FMEA was, therefore, adequate.

---

5 While critical of the scope of the FMEA, ORNL did not question the validity of the results obtained in the study.

6 CEC PF 58 leaves the erroneous impression that Licensee has been less than forthcoming in implementing these recommendations. In fact, Licensee has satisfied the main item of concern by improving the reliability of the NNI/ICS power supplies. Tr. 3703 (Capra).

B. Feedwater Transients

16. CEC criticizes Licensee's comparison, for the year 1978, of the frequency of feedwater transients causing reactor trip at B&W plants with other PWRs, because B&W plants did not then have anticipatory reactor trips. CEC PF 84. Licensee, of course, was simply being responsive to the allegation made in FOE Contention III(a).

17. CEC states that the evidence supports a finding that there is genuine cause for concern over the number of feedwater transients at B&W plants, citing NRC Staff witness Capra, even though CEC notes that the numbers are "roughly comparable to other designs." CEC PF 86, 87. Asked whether there have been too many transients at B&W plants in recent history, Mr. Capra testified:

> I wouldn't say there have been too many. There have been a number which have gotten attention. We don't have a criteria for number.

Tr. 1267 (Capra).

18. CEC concludes, on this issue, that ". . . Rancho Seco is somehwat more prone to feedwater transients than reactors of different designs." CEC PF 88. Not only is this finding unsupported by any record citation, but it is directly contradicted by evidence, also cited by CEC, that in the eight-month period following the TMI-2 accident, B&W plants did not experience a feedwater transient frequency rate greater than other PWRs. CEC PF 85; Licensee PF 63; Staff PF 28.

C. Once Through Steam Generator Sensitivity

19. CEC proposed finding 31 incorrectly attributes two conclusions to the Commission's Order of May 7, 1979, which do not appear in the Order. In its Order, the Commission did not find that the OTSG results in a NSSS which is "extremely" sensitive to secondary side feedwater perturbations. Neither did the Commission find that the alleged design sensitivities create an "unsafe condition."[7]

20. In proposed finding 32, CEC states that the close coupling of the primary and secondary systems "quickly translates into a gross disturbance of the primary system." No evidence is cited to support this proposed finding. CEC, assuming its position has now been established, proceeds to quote Rancho Seco operators on this "effect." CEC does not make it clear that Mr. Comstock was responding to questions on a transient involving excessive feedwater flow (CEC Ex. 37 at 13), and that immediately after the passage quoted by CEC, Mr. Comstock testified that "[i]t's very sensitive to that as is any reactor plant." CEC Ex. 37 at 14.

21. The citations to Staff Exhibit 4 in CEC proposed finding 35 are inaccurate. The Staff's B&W Transient Response Task Force states, at 2-3, that "the operators may be required

---

7 In proposed finding 32, CEC cites to Staff Ex. 4 at 2-2 for the proposition that B&W facilities are unusually sensitive to the effects of feedwater transients. The evidence cited, however, does not support the CEC proposed finding.

to take more rapid action and have a better understanding of instrument response than operators on plants having other designs." (Emphasis added.) The pages cited by CEC do not discuss the "precision" of operator and equipment response, and the quoted statement which concludes CEC proposed finding 35 cannot be found on the pages cited.

22. In proposed finding 37, CEC cites Rubin and Novak OTSG Testimony at 8 and Staff Exhibit 4 at 2-2 for a proposed finding that "there have been no design changes implemented at Rancho Seco that reduce this sensitivity with regard to the coupling of the primary and secondary systems." Once again, the evidence cited does not support this significant finding which CEC would have the Board make. Messrs. Rubin and Novak actually testified that "[n]o changes in systems and procedures have yet been taken to completely damp out the response of the primary system to secondary side transients . . . ." Rubin-Novak OTSG Testimony at 8 (emphasis added). The witnesses, then, were addressing complete elimination of, and not a reduction in, sensitivities. The citation to Staff Exhibit 4 at 2-2 is completely inapposite. Staff Exhibit 4, at 1-2, does state, however, that "[s]ome of the design changes already accomplished have helped to reduce the sensitivity of the B&W design to certain transients . . . ."

23. The Board finds that the modifications ordered by the Commission have served to improve the response of Rancho

Seco to feedwater transients. See Licensee PF 70-72; Staff PF 42. While we have endorsed continued study of this issue, there is no evidence to support the necessity for Board imposition and supervision of such a study by Licensee. See CEC CL 5(a).

24. None of the evidence cited by CEC in proposed finding 42 supports the "substantially better than other PWRs" standard suggested by CEC. CEC Exhibit 26, which was issued in April, 1979, discusses the need for substantial improvements at B&W plants, as does Mr. Bridenbaugh's testimony, but not in the context of a comparison with other PWRs. See CEC Ex. 26 at 1-8.

D. Natural Circulatfon, Void Formation, and Small-Break Loss-of-Coolant Accidents

25. We note at the outset that CEC has mislabelled Additional Board Question 2 as Board Question CEC 1-4 (see p. 67 and PF 150), and that CEC has not proposed findings on the actual Board Question CEC 1-4 or on Board Question CEC 1-7.

26. In footnote 19 to its proposed finding 105, CEC expresses its disagreement with Licensee's proposed finding 104 by proposing a contrary statement with no record citation. Suffice it to say that Licensee's finding is supported by clearly identified testimony and the Board's decision must be based upon record evidence.

27. CEC proposed finding 107 cites to I&E Bulletin 79-05C, which is not in evidence and which, in any case, does not explain the reactor coolant pump trip requirement as founded in a CEC-perceived "difficulty of distinguishing between small break LOCA's and severe overcooling events . . . ."

28. In spite of the citation in CEC proposed finding 108, Licensee witness Karrasch did not testify that natural circulation heretofore has been considered a distinctly secondary cooling technique.

29. Contrary to the implication in CEC proposed finding 114, Licensee's witnesses did not testify that voiding could be caused by a severe overcooling event which might lead the pressurizer to empty. While at page 43 of their written testimony (cited by CEC) Messrs. Karrasch and Jones identify such an event as one of three which should be examined for potential void formation, their subsequent testimony, as CEC is well aware, concluded that no voids would be formed. Karrasch-Jones Testimony at 45. CEC's own witness, Dr. Lewis, testified that voiding could "conceivably occur during a severe overcooling transient but that is likely to be a short lived phenomenon." Lewis Testimony at 10.

30. In response to CEC proposed finding 119, we note that while reflux boiling has not been experimentally tested in a PWR, the record also shows that the concept was demonstrated during the TMI-2 accident. Tr. 803, 804 (Jones).

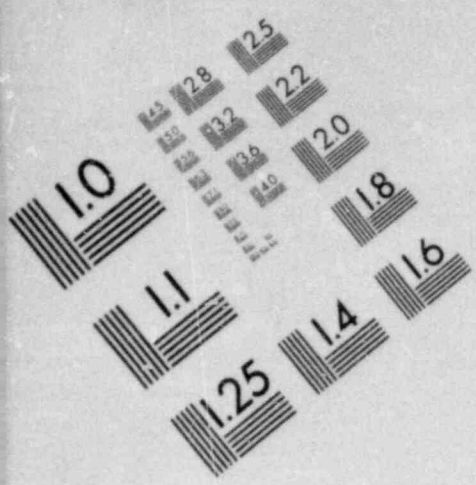
31. CEC states, in its proposed finding 120, that the effectiveness of reflux boiling is uncertain when the secondary level is only 50 percent on the operating range, whereas the testimony cited states that reflux boiling can be achieved at the 50 percent level, but that it is prudent to go to the 95 percent level, which the guidelines direct.

32. Contrary to the citation in CEC proposed finding 129, Licensee's witness was describing the achievement of a cold shutdown condition with a stuck open safety valve, and with a secondary heat sink. Tr. 960, 961 (Jones).

33. CEC suggests that Rancho Seco operators do not clearly understand the reflux boiling or feed and bleed cooling modes. CEC PF 132-134. Our reading of the depositions shows that the testimony provided was directly responsive to the quality and clarity of the questions posed. Asked the general question (by CEC) whether there were any circumstances where it would be desirable to maintain a small break, the operator did not postulate the highly remote condition of a loss of all feedwater. CEC Ex. 38 at 22, 23. Later, asked the more specific question (by Licensee) of how he would cool the core in a small-break condition with no feed to the OTSG, the operator described the feed and bleed cooling mode. Id. at 76.[8] Similarly, the testimony cited in CEC proposed finding 133 reflects the senior operator's difficulty responding to the exceedingly general assumptions specified in the questions.

---

8 We decline to adopt the evidentiary presumption, suggested in CEC PF 132, that hearing recesses automatically impugn the integrity of a witness's testimony.



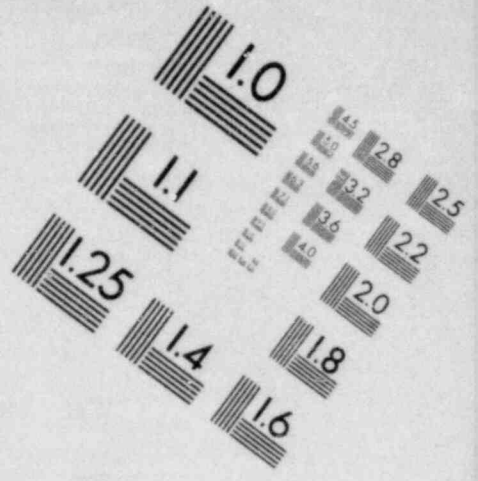
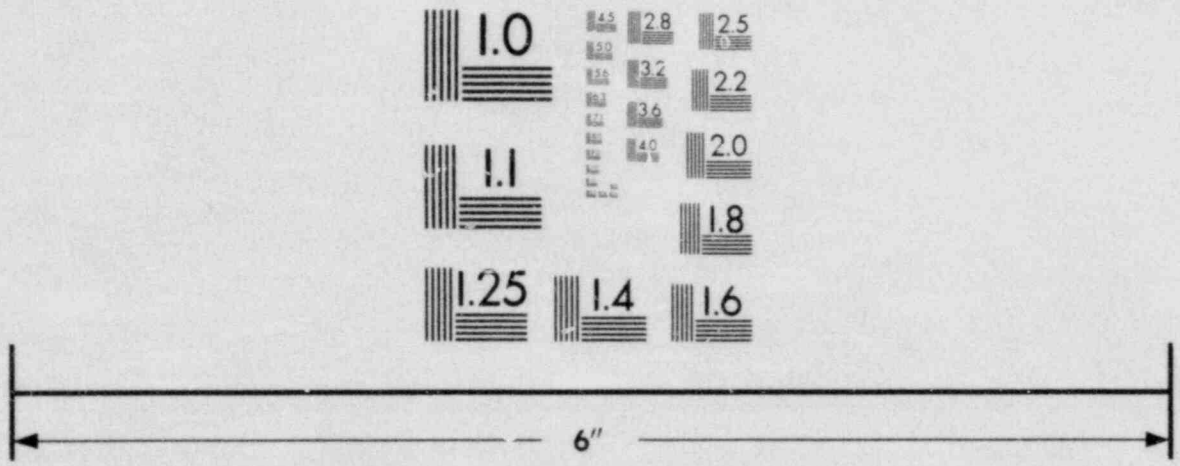
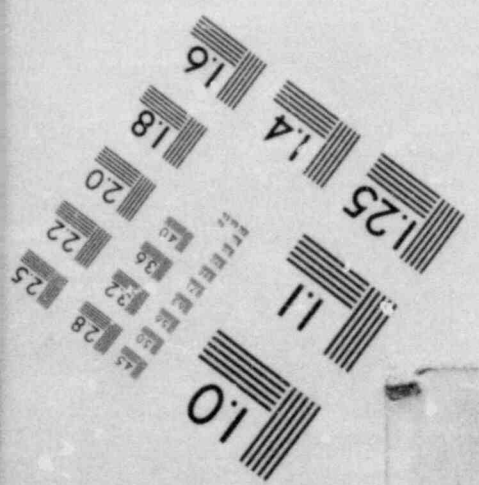
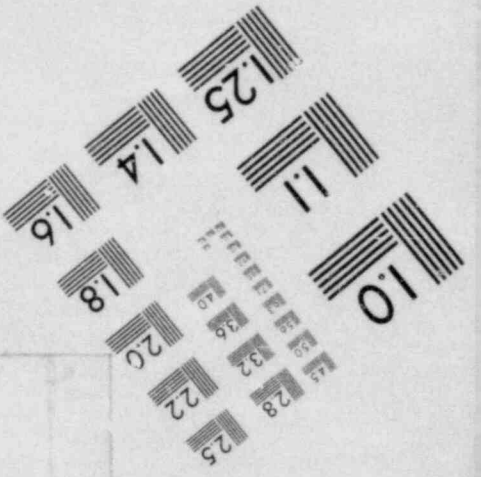


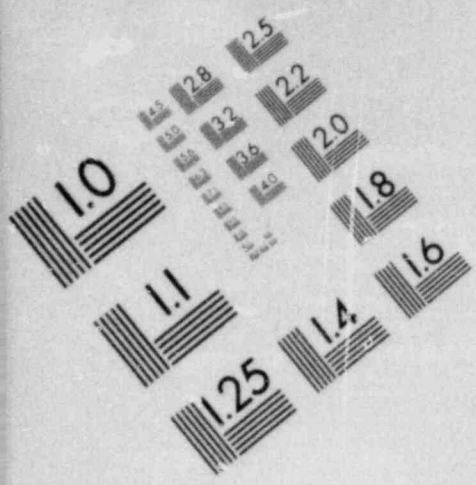
IMAGE EVALUATION
TEST TARGET (MT-3)



MICROCOPY RESOLUTION TEST CHART







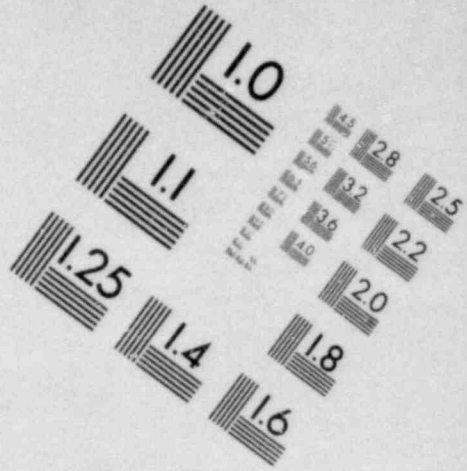
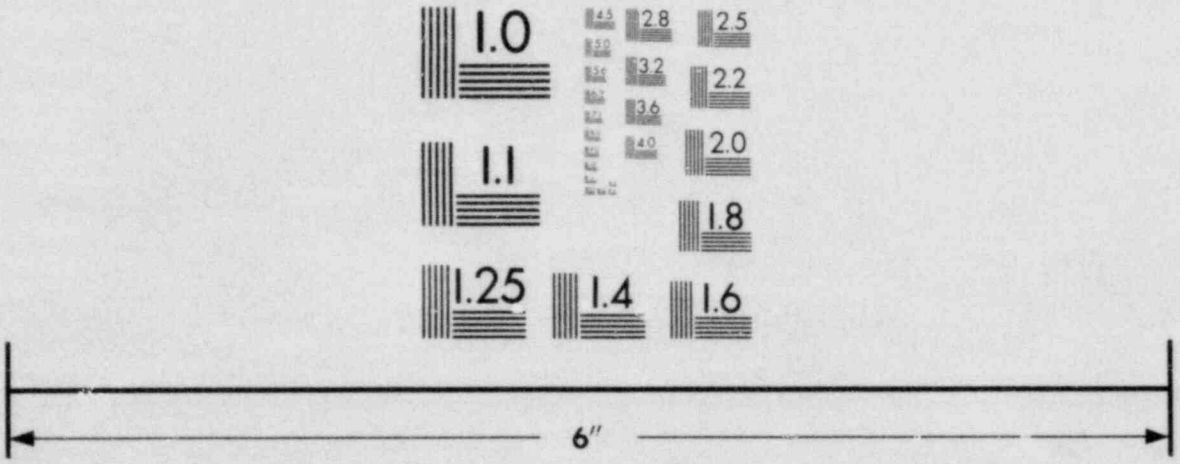
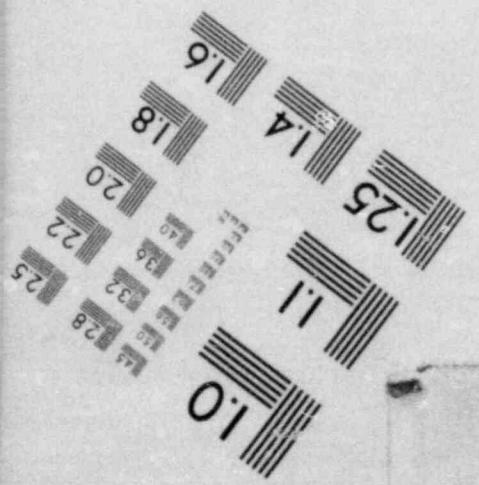
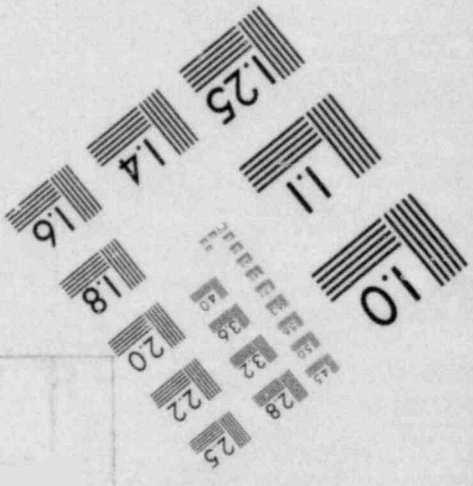


IMAGE EVALUATION
TEST TARGET (MT-3)



MICROCOPY RESOLUTION TEST CHART





34. CEC has questioned whether Rancho Seco and all other PWRs are in compliance with 10 C.F.R. § 50.46. CEC PF 138-145. The actual evidence in the record, however, is undisputed in support of Licensee's compliance with the ECCS acceptance criteria. See Licensee PF 114; Staff PF 79, 80. Consequently, there is no basis for CEC proposed conclusion of law 5(e). As the record makes clear, the additional small-break LOCA analyses performed in response to the Commission's Order of May 7, 1979, were directed toward the development of realistic operator guidelines and were not meant to be an Appendix K (to 10 C.F.R. Part 50) demonstration. See Tr. 1036, 1037 (Jones).

E. Auxiliary Feedwater System Reliability

35. An important element of the Commission Order of May 7, 1979, was its emphasis on improving the timeliness and reliability of the delivery of auxiliary feedwater at Rancho Seco. All witnesses at the hearing who gave testimony on this subject agreed that accomplishment of the nine short-term AFW system action items included in the Order contributed to a faster and more reliable delivery of AFW to the steam generators. See, Tr. 1559, 1570-1572 (Matthews); Tr. 2077, 2078 (Dieterich); Tr. 3255-57 (Rodriguez); Matthews AFW Testimony at 14, 15; Dieterich Testimony at 10; Staff Evaluation at 12; and see, Licensee PF 136-148; Staff PF 116-118, 124. Surprisingly, CEC's proposed findings 69 and

81(a) would have the Board express the opinion that the nine short-term modifications did not materially upgrade the timeliness and reliability of the AFW system at Rancho Seco.[9] The Board cannot agree with such a proposed finding, for not only is it without any support in the record, but it is based on questionable reasoning.

36. CEC proposed finding 69 would deny significance to six of the nine short-term items because they were procedural in nature and referred to actions that the Rancho Seco operators already knew how to perform. However, Staff and Licensee witnesses explained at length why these procedural changes were useful and improved the AFW timeliness. See, Licensee PF 137-141, 144, 1 , 148; Staff PF 117, 118.[10]

---

9 CEC PF 66-68 and 70 criticize the process of selection of the items included as short-term modifications in the AFW area and allege that they were arrived upon without analysis and solely on the basis of expediency, as items which could be completed in a short period of time so as to "ensure rapid restart of the facility." As noted earlier, it is not for this Board to investigate the motives of the parties in proposing or adopting the actions at issue here. Moreover, we note that all the testimony indicates that the short-term actions were chosen because "they were those that were more directly related to the safety of the plant." Tr. 2077 (Dieterich). Both Staff and Licensee witnesses expressly denied that the time in which the measures could be implemented was a factor in whether they were included as short-term items. Tr. 1571 (Matthews); Tr. 3261 (Rodriguez).

10 It is puzzling that CEC would find little value in the institution of written procedures to instruct the Rancho Seco operators on the proper actions to take to ensure AFW flow, since CEC would have the Board require new and revised plant procedures, ostensibly as an improvement to safe plant operation. Compare CEC PF 69 with CEC CL 5(d), 5(f), 5(g), 5(n), 5(o).

37. The remaining three items (Nos. 5, 7 and 8), which pertain to additional instrumentation to verify in the control room that AFW flow has been provided, are dismissed by CEC on the grounds that operators "already had methods to verify the proper functioning of the AFW system." CEC PF 69. Again, all witnesses testified that this additional instrumentation increased the timeliness and reliability of the AFW system by providing better indication to the operators of whether AFW had been initiated and whether it was functioning properly. See Licensee PF 142, 143, 145, 146, 148; Staff PF 117, 118.[11] We reject, therefore, CEC proposed findings 69 and 81(a) as unsupported by the record.

38. CEC proposed findings 70 and 81(a) criticize the Commission Order of May 7, 1979, for not requiring the completion of an AFW reliability study prior to the restart of the facility. However, Staff and Licensee witnesses concurred that the short-term actions were sufficient to upgrade the AFW system at Rancho Seco. Tr. 1570, 1571 (Matthews); Tr. 2078 (Dieterich). That the criticism leveled by CEC is not valid is evidenced by the results of the reliability study, which indeed

---

11 CEC's position with respect to additional instrumentation to verify AFW flow is, to say the least, inconsistent with its proposed findings in the instrumentation area, where it would have the Board require installation of core level indicators, wide range pressurizer indicators and natural circulation flow meters, even though these items are not even available and would provide only backup to information that the operators already possess. Compare CEC PF 69 with CEC PF 227-231.

identified only minor equipment and procedural changes as needed to make the AFW system even more reliable. Tr. 1571, 1618-1619 (Matthews).

39. CEC would find the AFW reliability study incomplete because it did not utilize avoidance of steam generator boil dry as a success criterion; on the basis of this alleged shortcoming, CEC would have the study redone after the AFW system is upgraded to safety grade. CEC PF 72, 73, 81(b). We see no need for such action. While Licensee and the Staff have different views on what is the proper criterion for mission success for the AFW system, the reliability analysis included one case (operator reaction within 5 minutes) that would be roughly equivalent to a steam generator dryout avoidance criterion. Licensee PF 153, Staff PF 120. Therefore, if the Staff is right in its position (a question we need not resolve, see Staff PF 122), the AFW reliability analysis results for the 5-minute case can be used to determine the comparative reliability of Rancho Seco vis-a-vis Westinghouse

("W") plants,[12] without having to repeat the study.[13] Tr. 1607-1610, 1657-1665 (Matthews).

40. Another set of CEC proposed findings (74-76, and 81(c)) would require Licensee to verify and revise, as necessary, its procedures for AFW operation in the event of a loss of all AC power. This matter is raised only because the Staff has requested, as a further improvement in AFW reliability,

---

12 The AFW reliability study shows that the Rancho Seco AFW has comparable reliability to W plants for the 5-minute case, a result that will not change if the mission success criterion is redefined. Licensee PF 153; Staff PF 121, 122.

CEC misconstrues the record when it says, in its PF 78, that if the AFW success criterion were revised to be no boil dry of the OTSG, the Rancho Seco results would tend to show less reliability in comparison to W PWRs. None of the record citations offered ("Tr. 1608, 1660-61 (Matthews); 1490 (Novak)") supports such a finding. In fact, at Tr. 1660-61 the following exchange is recorded:

> MR. SHON: I think we established this morning... that...[Mr. Matthews] didn't think that the comparison between Westinghouse reactors and SMUD offered by this diagram would change very substantially if the criterion used in the calculation for SMUD were the steam generator should not boil dry. That's what I understood you to say this morning.
>
> MR. MATTHEWS: Yes, and I believe that to be true. Let me just say two other things to try and clarify this. Number one, if the--if we used only boil dry as the sole criteria of success of the AFW system, and that boil dry time were decreased, then I think insofar as the SMUD chart, it would have the tendency to move the triangle to the left. It would go in that direction, whereas it would not do that on the case of Westinghouse studies simply because the five minutes is considerably shorter than the boil-dry time for the Westinghouse plants. (Emphasis added).

13 No claim has been made that the data or methodology employed in the AFW reliability study were improper.

that Licensee station an operator at the flow control valves following a loss of all AC power, and that adequate lighting and communication with the control room, independent of AC power, be provided for two hours at that location. CEC Ex. 21, Enclosure 1 at 8.[14]

41. Licensee has disagreed with this Staff position Tr. 2355 (Dieterich). Licensee observes that loss of all AC power is outside the design basis of the plant. Tr. 2374 (Dieterich). Licensee also points out that loss of all AC power is an extremely unlikely event, since off-site power to Rancho Seco is provided by five separate 220 kV transmission lines on two different routes, so that no single failure can lead to loss of all off-site power. Tr. 2376, 2386 (Dieterich). Rancho Seco has never experienced a loss of off-site power since commercial operations began in 1975. Tr. 2377 (Dieterich). Additional sources of AC power are provided by two independent, on-site diesel generators which are tested periodically to verify their operability. Only one failure of one of those diesel generators during testing has been experienced so far. Tr. 2376, 2377 (Dieterich).

42. A complete loss of all AC power requires, therefore, the simultaneous occurrence of three events: loss of all off-site power (in itself requiring a multiple failure)

---

14 The same item would require Licensee to make long term plant modifications so that AFW system operation and steam generator level control can be maintained from the control room for two hours upon a loss of all AC power. CEC Ex. 21, Enclosure 1 at 8.

and loss of both diesel generators. Staff witness Matthews testified that this multiple failure event has a very low probability. Tr. 1498 (Matthews). We do not attempt to resolve the dispute between the Staff and Licen ee, which is unrelated to the May 7, 1979 Order or the AFW reliability analysis. Instead we note that, in view of the low probability of a loss of all AC power, no significant reduction in the reliability of the Rancho Seco AFW system will result while the Staff and Licensee work out their differences.

43. Finally, CEC would have us order that the Rancho Seco AFW system be upgraded until it is more reliable than those at W PWRs. CEC PF 77, 81(b). We emphatically reject such a requirement. All parties agree that the Rancho Seco AFW system should be "extremely reliable." Tr. 1489, 1490 (Novak); Tr. 2093 (Dieterich). The Staff, however, has set no quantitative goals to differentiate B&W plants from those of other manufacturers in terms of reliability. Tr. 1487, 1488 (Matthews). This is not a race among licensees, and we doubt that our imposing such a standard would be meaningful or even lawful.

44. In its present condition, the Rancho Seco AFW system meets the AFW system acceptance criteria contained in the NRC Standard Review Plan, Section 10.4.9. Matthews AFW Testimony at 4-6. All witnesses, including CEC witness Lewis, agreed that the Ranco Seco AFW system is very reliable, never having failed when called upon to deliver auxiliary feedwater. Lewis Testimony at 3, 4; Tr. 3255 (Rodriguez); Tr. 1522

(Capra); Rodriguez Testimony at 49.[15] Moreover, the Rancho Seco AFW system will soon be upgraded to safety grade standards, rendering it "extremely reliable", as the Staff defines the term. Staff Ex. 4 at 5-41; Tr. 2095 (Dieterich). Beyond that, additional long-term modifications will be undertaken to improve its reliability even further. Licensee PF 156; Staff PF 124, 125. Quite frankly, we fail to understand CEC's rationale for seeking to study the system again or having its reliability measured against that of W or any other plants. We reject the actions proposed in CEC proposed finding 81.

F. Safety System Challenges

45. In its proposed finding 90, CEC asserts that neither Licensee's direct testimony nor its proposed decision addresses the concern set forth in Issue CEC 1-1, which CEC recasts as follows: that the frequency of high pressure injection system operation at Rancho Seco is in excess of that assumed during the design and licensing of the facility. Licensee's witnesses did testify that the expected increase in the number of reactor trips as a result of the modifications at Rancho Seco is not anticipated to require an increase in the

---

15 The "failure" alluded to by CEC in its PF 79 (boil dry of one or both OTSG) during the 1978 "light-bulb" incident at Rancho Seco was not caused by a failure of the AFW system, but by a non-nuclear instrumentation failure that delayed AFW initiation. CEC Ex. 45, attachment at 2. The AFW system did operate during the incident and maintained flow to at least one OTSG through the transient. Staff Ex. 4 at 5-56, 5-57; Tr. 3308-3310 (Rodriguez).

actuation frequency of high pressure injection. Karrasch-Jones Testimony at 41; Tr. 997 (Karrasch). Licensee's witness also testified that high pressure injection is among the events for which specific data are recorded and monitored to assure that challenges to safety systems do not exceed their design and licensing basis. Rodriguez Testimony at 50, 51; Licensee PF 161. Thus, the question posed in Issue CEC 1-1 (which addresses the total number of challenges), though not the version written into CEC's proposed findings (which addresses the frequency of actuation), was answered by Licensee.

46. CEC proposed findings 92-94 rely almost exclusively on the survey of reactor trip data through September, 1979, reported in Table 4.1 of Staff Exhibit 4. Yet, the Staff advises as follows on the use of the survey results:

> The difficulties in accepting these trip frequencies as valid inferences of the effects of revised setpoints are discussed in Sections 4.4.2 and 4.4.3 of this report. Thus, the reader is cautioned against using the reactor trip frequencies presented in Table 4.1 as predictors of future performance.

Staff Ex. 4 at 4-12.

47. In proposed finding 96, CEC would have the Board make a number of factual statements on the effects of the revised setpoints for the PORV and high pressure reactor trip, without a single citation to the evidentiary record. We cannot adopt such proposed findings, which are not a mere summary of previously presented findings. See 10 C.F.R. § 2.754(c) (proposed findings of fact shall include exact citations to the

transcript of record and exhibits in support of each proposed finding).

48. In CEC proposed finding 97, we are presented with a vivid example of the casualness with which CEC would have this Board modify the Commission's Order of May 7, 1979. Observing -- (1) that it appears possible to increase the reliability of the PORV by making the PORV and related systems safety grade; (2) that a proposal for such a PORV fix has been made by Consumers Power but not acted upon by the NRC; and (3) that there is no reason Rancho Seco could not implement such a fix -- CEC proposes that we order Licensee to make the PORV safety grade. CEC PF 97. Yet, we have no testimony before us recommending such a change, no evidence indicating that such a change is necessary to provide reasonable assurance that the facility will respond safely to feedwater transients, no evaluation of the feasibility of such a change, and no integrated systems analysis of the effects of the change on plant operation. We cannot redesign reactors with such a haphazard, "why not" approach and do justice to the NRC's responsibility to protect the health and safety of the public. It is for this reason that the Staff is first studying the Consumers Power proposal. Staff Ex. 4 at 5-29. Accordingly, we reject CEC proposed finding 97.

49. CEC proposed findings 98-102 on the number of challenges to the high pressure injection system ignore Licensee's testimony that operating procedures at Rancho Seco

have been changed to avoid adding thermal cycles to the HPI nozzles. See Tr. 3358-3359, 3409-3410 (Rodriguez).

G. Operator and Management Competence

50. CEC begins its proposed initial decision on operator and management competence issues with the observation that since B&W plant sensitivities have not been reduced by design changes, Licensee must substantially upgrade plant operator education, training and experience, again citing the April, 1979, Staff report (CEC Ex. 26). CEC PF 153. CEC's earlier proposed findings, however, do not focus principally on whether B&W plant sensitivities have been reduced, but rather on whether they have been eliminated. See CEC PF 27, 31, 41, 43. The only CEC proposed finding which asserts a failure to reduce sensitivities (CEC PF 37) has been rejected as unsupported by the substantial evidence. See paragraph 22, supra. Consequently, the Board does not accept the premise which underlies CEC's proposed findings on this issue.

51. CEC proposed finding 154 asserts that the additional training directed by the Commission's Order of May 7, 1979, is the only additional operator training experience [sic] instituted at Rancho Seco since the TMI accident. This is not true and the statement is directly contradicted by the testimony of Mr. Rodriguez and Mr. Wilson which is cited by CEC. The May 7 Order required specific TMI-2 training on the B&W simulator, whereas the witnesses described additional

lecture and informal discussion training by the Rancho Seco Operations Supervisor, Training Supervisor and Shift Supervisors, formal training by General Physics Corporation, and the (non-simulator) testing of operators. See Rodriguez Testimony at 15-16 and Appendix III; Wilson Operator Testimony at 4-7. See also, Licensee PF 171; Staff PF 143. In addition, the record shows that Licensee has modified its requalification training program to include the TMI lessons learned. Licensee PF 169; Staff PF 138. None of these training efforts, other than the special simulator training, were required by the Commission's May 7 Order.

52. CEC denigrates Licensee's special post-TMI training of operators because the training consumed only 27 hours. CEC PF 155, 157. In fact, that figure does not include Shift Supervisor training of operating crews on plant modifications and procedure changes, including a plant walk-through to assure familiarity with the location of active components in the auxiliary feedwater system. Rodriguez Testimony at 17 and Appendix III. In any case, as CEC's witness pointed out, the number of hours involved should not be the sole basis for assessing the adequacy of training, and we decline to hold that 27 hours or any other number of hours represent inherently insufficient training. See Tr. 3610, 3611 (Bridenbaugh).

53. In the testimony of Mr. Rodriguez (Tr. 3088) cited in CEC proposed finding 158, the witness is discussing only the requalification training program. Changes to the "hot

license" training program, however, are described in the record. Tr. 3075 (Rodriguez).

54. Contrary to CEC proposed finding 161, Staff witness Wilson did not testify that Licensee's (presumably current) operator training program is similar in scope, amount, and type of training to general industry practice. Rather, he testified that there were no substantial differences. Tr. 3810 (Wilson). Later he compared the SMUD and TMI training programs prior to the TMI-2 accident, and testified that while he assumed they were fairly similar, he had not made a detailed comparison. Tr. 3811, 3812 (Wilson).

55. CEC faults Licensee for not offering persuasive evidence to support a finding that the Rancho Seco training program is qualitatively better than that of other utilities. CEC PF 162. CEC assumes a standard, however, which is patently inappropriate and unsupported. There is no requirement that Licensee prove superiority to other utilities. Rather, our mandate is to determine whether there is reasonable assurance that the facility will respond safely to feedwater transients. That inquiry is not advanced one wit by considering CEC's proposed standard (which, of course, Licensee could not meet without presenting evidence on a multitude of other utility training programs). Accordingly, the Board will concentrate on Rancho Seco -- which we believe is our charter from the Commission.

56. For the reasons set forth in Staff proposed finding 141, the Board does not adopt CEC proposed findings 163-168 on operator training at the B&W simulator.

57. CEC would have the Board find, based upon its review of the three operator depositions in the record, that we are unpersuaded that their training is superior, or that they are more competent than operators at other facilities. CEC PF 173. See also, CEC PF 179. Again, for the reasons advanced earlier (paragraph 55, supra), we reject CEC's suggested competitive standard. See also, Staff PF 151. CEC would have us draw many conclusions from the deposition testimony. See, e.g., CEC PF 132, 133, 169-173. While our reading of the testimony in many cases differs from CEC's,[16] there are other reasons which dissuade us from attaching great weight to the deposition testimony. These depositions were called by the California Energy Commission during the course of discovery,

---

16 We note, for example, that CEC references Mr. Tipton's deposition in support of its assertion that "multiple failure accidents are rarely presented in the [B&W] simulator course" and that Mr. Tipton "was probably given only one multiple failure transient" during his most recent week of simulation training. CEC PF 167. However, our reading of Mr. Tipton's deposition leads us to conclude that Mr. Tipton believes he was given more than one multiple failure experience, one of which was the TMI-2 sequence of events. CEC Ex. 36 at 91. Similarly, CEC cites Mr. Tipton's deposition at pages 95-96 as the basis for its statement that "the senior operator stated that he had never been tested either in writing or orally on his knowledge of the contents of [a special order]" reflecting changes in emergency procedures. CEC PF 176. Further in his deposition, however, Mr. Tipton states that operators are tested on emergency procedures in both the NRC license exam and subsequent requalification training. CEC Ex. 36 at 115-116.

and the testimony therefore reflects almost exclusively the examination conducted by CEC. In the control room, operators are presented with a great deal of information from which to diagnose the status of the plant and determine the appropriate actions to be taken. They would not be faced with one or two general assumptions, imposed without further information on the plant's status, which formed the hypotheticals used in the questions posed by CEC. Consequently, our reading of the depositions shows that there was often poor communication between CEC counsel and the witness. Staff witness Wilson, of the Operator Licensing Branch, also observed that initial conditions posed in the deposition questions were not sufficiently specific. Tr. 3808 (Wilson). While the Board here is not being critical of CEC's counsel, neither can we reach major conclusions about the competence of Rancho Seco operators on the basis of the deposition testimony cited by CEC. See also, Staff PF 151.

58. CEC proposed finding 178 discusses the time available to operators for training. Based upon a leaping inference from an operator's comment that there have been many procedure changes, and the testimony of Mr. Rodriguez (at Tr. 3081) that the swing shift comes in early for training[17] --

---

17 CEC also proposes a finding that when operators leave for simulator training this puts a considerable strain on remaining personnel. CEC PF 178. What Mr. Rodriguez stated, however, was that it would create a burden if operators were sent for a second week of annual simulator training. Tr. 3232 (Rodriguez).

evidence which CEC itself characterizes as inconclusive -- CEC would have the Board modify the Commission's Order of May 7, 1979. See CEC CL 5(i). We decline to do so. See also, CEC CL 5(j) (installation of an on-site simulator, suggested in the hearing by CEC's counsel and by no sworn testimony).

59. CEC repeatedly emphasizes, and would have us attach great weight to, the fact that a Staff audit in June, 1979, revealed some deficiencies in the operators' knowledge. CEC PF 113, 156, 169, 179, 230. No one disputes, however, that the operators needed additional training after the TMI-2 accident. That is why the Commission's Order of May 7, 1979, required additional training as both a short-term and long-term action. The Board is not surprised, then, that the Staff found a need for even more training. We also note the Staff's testimony that these deficiencies could partly be attributed to the fact that some of the operators interviewed had not yet attended the TMI-2 training session at the simulator. Wilson Operator Testimony at 7. The final audit of the Staff before plant restart uncovered no deficiencies. Staff Evaluation at 23-25.

60. On the question of Licensee's management competence, CEC suggests that NRC Staff witnesses Johnson, Zwetzig and Canter relied heavily upon Licensee's record of non-compliance items and reportable occurrences in concluding that Rancho Seco is operated competently. CEC PF 184, 191. The Board's review of that testimony shows that while the

witnesses did inform us of the number of such items, they also testified on the types of events, the quality of Licensee's management response, the attitude of management personnel, and their personal observations about plant operation. See, e.g., Johnson Testimony at 8, 10, 11; Canter Testimony at 8, 9.

61. In proposed finding 193, CEC fails to include Mr. Wilson's testimony that he does not believe the ratio of personnel-caused LERs to total LERs to be a valid indication of personnel competence. Tr. 3901-3903 (Wilson). See also, Tr. 3904 (Wilson) (if the total number of LERs is comparatively low, there is no basis for concern if the ratio of personnel-caused LERs is comparatively high).

62. CEC also ignores the evidence in its proposed findings 194 and 195. The Staff witnesses flatly rejected CEC's suggestion of significance in the increased number of LERs, and testified that they would look for safety-related patterns, and not at the total numbers of reports. Tr. 4075 (Canter); Tr. 4091 (Johnson).

63. In proposed finding 198, CEC accuses Licensee's Manager of Nuclear Operations of having "no idea" how operators were performing on the requalification exams. What Mr. Rodriguez actually testified, however, is that he could not recall the specific grades. Tr. 3084-3086 (Rodriguez).

64. Rejecting all other evidence and relying exclusively on the testimony of the Performance Appraisal Branch witnesses (CEC PF 185-190), CEC proposes to conclude our

findings on this issue with the observation that SMUD's management controls are poor in comparison to other utilities. CEC PF 199. The Board is more interested, however, in whether Rancho Seco's management is competent to respond to feedwater transients. There is no negative testimony on this question, while there is an abundance of affirmative evidence. See Licensee PF 195-203; Staff PF 170-180. Accordingly, we decline to modify the Commission's Order, as suggested by CEC, to impose conditions which have not even been identified. See CEC CL 5(k).

65. The Board finds little significance in the so-called admission by Licensee that it is possible for unlicensed operators to be called upon to perform an operation for which they had never been trained and which they had never performed. See CEC PF 205 and 208. CEC failed to cite Mr. Rodriguez's testimony, however, that unlicensed operators normally are instructed in the performance of an operation before they are called upon to do it, and that their training would assist them even if an unexpected event were to occur. Tr. 3437, 3438 (Rodriguez).

66. In their proposed findings 206 and 207, CEC suggests that we discuss the allegations which led to an NRC inspection at Rancho Seco in 1979 on the questions of turnover in unlicensed operators and the adequacy of their training, without proposing that we then discuss the findings of the investigation. The inspectors found: no items of

noncompliance or deviation; that while the turnover of unlicensed operators was high there were no regulatory requirements or specific safety concerns related to this fact; that the training of new personnel was not minimal as alleged; that all operators appeared competent; that experienced people were available to provide help to inexperienced personnel if needed; and that while it is possible that improvements could be made, Licensee's training appeared adequate from a regulatory standpoint. CEC Ex. 39 at Summary and 4.

67. Issue CEC 3-3 questions whether NRC and SMUD adequately ensure that emergency instructions are understood by and are available to plant personnel in a manner that allows quick and effective implementation in an emergency. CEC would now create a new issue after the hearing is concluded. In its proposed findings 209-211, CEC suggests a Board inquiry into the format and the content of one Rancho Seco emergency procedure, rather than on operator understanding of the procedure and its availability. Beyond the fact that the issue is not before us, no witness testified that the procedures are inadequate or in need of revision. The record shows that licensed operators understand the emergency procedures. See Staff PF 160. We decline, then, to order the wholesale revision of Licensee's emergency procedures suggested by CEC. See CEC CL 5(o).

H. Instrumentation

68. CEC witness Minor testified that the ability to quickly diagnose the Rancho Seco plant would be enhanced by the addition of core water level indication and a natural circulation meter. Minor-Bridenbaugh Testimony at 17. Mr. Minor's testimony was contradicted, however, by several witnesses, including Dr. Lewis on behalf of CEC.[18] Licensee PF 211-213; Staff PF 189-193. No witness testified that additional instrumentation at Rancho Seco is necessary to provide reasonable assurance that the plant will respond safely to feedwater transients. Consequently, we do not adopt CEC proposed findings of fact 225-231 and conclusion of law 5(p).

I. Hydrogen Control

69. The proposed findings submitted by the parties evidence agreement on most of the facts relevant to Board Question H-20. CEC proposed finding 253, however, would have the Licensing Board find that Rancho Seco does not have a readily available hydrogen recombiner. The undisputed evidence

---

18 CEC proposed finding 126 cites the testimony of Dr. Lewis for the proposition that the feed and bleed cooling mode he envisioned could be used only if one has core coolant level indication. Dr. Lewis, however, was describing a cooling mode in which there was intermittent operation of high pressure injection. See Lewis Testimony at 12. Licensee and Staff witnesses, on the other hand, referred to "feed and bleed" cooling as a mode with continuous HPI operation. See Tr. 955, 956 (Jones); Tr. 1355 (Norian). There is no evidence that vessel level indication is required for this cooling mode. See Tr. 872-874 (Jones).

shows the opposite. Rancho Seco could have a recombiner delivered on loan to the site upon a day's notice. Licensee PF 231; Staff PF 207. While no procedures currently exist for its use, installation of the recombiner would be a simple matter. Id. The recombiner would be available early enough in the accident to assist in reducing the hydrogen concentration in containment. Id.

70. CEC postulates an accident more severe than a five percent fuel failure, yet not as severe as the accident at TMI-2, and theorizes that a recombiner "would possibly permit early enough utilization to keep hydrogen concentrations below the 4 percent flammable level." CEC PF 249. There was no testimony, however, identifying the accident sequences (if any) that would fall into the category postulated by CEC, nor any indication that the use of a recombiner would provide successful mitigation of those accident sequences and that a purge system would not.[19] In the absence of any record support for CEC's conjecture, the Board cannot order Licensee to "install one or more hydrogen recombiner systems" at Rancho Seco, particularly since the system currently available meets all NRC requirements and Licensee has already made arrangements to obtain on loan the same equipment whose compulsory installation is sought. We will leave such a directive, if appropriate, to be issued upon completion of the NRC generic rulemaking.

---

19 The proposed NRC rulemaking proceeding on hydrogen management would be the logical forum for identifying any accident sequences for which a recombiner would provide protection not available from a purge system.

J. Controlled Filtered Venting

71. All parties filed extensive and detailed proposed findings on CEC Issue 5-2. See Licensee PF 247-290, Staff PF 222-249, and CEC PF 266-326. The breadth and technical detail of the findings suggest that this is not an issue amenable to simple answers and indicate that, as Licensee and the Staff suggest, the proper place for resolving the many open questions left in the record regarding controlled filtered venting system ("CFVS") feasibility is the rulemaking proceeding soon to be instituted by the NRC. Licensee PF 290, Staff PF 249.

72. The Rancho Seco containment building meets the General Design Criteria set forth in Appendix A to 10 C.F.R. Part 50, and is, therefore, safe to operate. Licensee PF 248; Staff PF 234. The Rancho Seco containment can remain leaktight through a design basis accident ("DBA"), which is a severe LOCA generating pressures of 52 psig. Licensee PF 254; Staff PF 230. The Rancho Seco containment is designed to withstand a pressure of 59 psig under earthquake and wind loading conditions, has been tested successfully at 69 psig, and may very well be able to withstand pressures of 120 psig or more. Licensee PF 255-256; Staff PF 230-233. The pressure at which the Rancho Seco containment would fail is unknown, and is probably not a single pressure but a band of pressures depending on the accident sequence. Licensee PF 257; Staff PF 230-232.

73. Since the Rancho Seco containment satisfies the General Design Criteria and can probably withstand pressures greatly in excess of those resulting from the DBA, a fundamental question about the feasibility of a CFVS is whether implementing such a system at Rancho Seco might degrade the integrity of the containment to the point of violating the Commission's General Design Criteria. CEC proposed findings 271-273 attempt to prove that a CFVS would not violate the General Design Criteria because such a system could be made to activate at pressures beyond those generated in the DBA. This could be accomplished, in CEC's view, by designing the systems' interface with the containment, the so-called "rupture disc," to withstand pressures above the containment design pressure. Rupture discs, however, can malfunction and fail at pressures below the containment design basis, in which case the General Design Criteria would be violated. Tr. 2232 (Dieterich).[20]

74. In addition, it may prove necessary to set the disc rupture pressure below 59 psig in order to accommodate the transient produced during certain overpressurization sequences. Staff witness Meyer testified that such a possibility has already been identified by the Staff in the Indian Point and Zion studies:

> One of the problems, at least with the Zion and Indian Point study, that is complicating

---

20 Placing several identical discs in series to protect against premature disc rupture would not necessarily solve the problem because of the possibility of a common mode failure. Tr. 2383, 2384 (Dieterich).

considerably the question is that for some of the accident sequences that we are considering, there is a large pressure spike that comes along with the molten core coming in contact with the accumulative water. This pressure spike has been estimated to rise up to about 120 psig. It is a considerable complication because the spike rises so rapidly that the penetrations to the containment would have to be very, very large in order to accommodate that if you have a high pressure point, high pressure set point for activation of the system. Therefore, one of the considerations is to lower that set point considerably in anticipation of that pressure spike occuring later in the accident sequence.

If, for example, you would have that type of accident sequence with a very high pressure set point, let's say, 85, 90 psi, then it probably -- that system probably would not be able to accommodate that particular accident.

Tr. 2828-2829 (Meyer) (emphasis added).

75. If a rapid transient such as that described by Mr. Meyer were part of a dominant overpressurization sequence, an effective CFVS might by necessity have to violate the General Design Criteria in order to halt the transient before it led to containment failure. Tr. 2232-2235 (Dieterich).

76. In view of these very realistic and yet unaddressed problems, the Board is unable to conclude on the basis of the record before us that a CFVS can be designed so that it does not violate the NRC's General Design Criteria.

77. Assuming, nevertheless, that a CFVS can be designed so that it satisfies the NRC's General Design Criteria, it would not be practical to implement such a system unless there was a significant risk against which the CFVS

could provide protection beyond that currently available at Rancho Seco.[21] CEC PF 279. In order to identify such risk, one must define the accident sequence creating it, estimate the accident's probability of occurrence, and assess its public health and economic consequences. All these matters were debated at the hearing, and substantial questions were left unresolved as to each of them.

78. Of all possible modes of containment failure, an effective CFVS would only provide mitigation of those accident sequences in which the containment fails from over-pressurization, that is, the PWR-2 and PWR-3 release categories in the Reactor Safety Study. Licensee PF 252; Staff PF 228; CEC PF 287. It is, however, far from clear that a PWR-2 or PWR-3 accident sequence would be the dominant failure mode at Rancho Seco. It is possible that a PWR-1 accident sequence (rupture of containment by steam-explosion generated missiles) may be the dominant mode of containment failure, in which case the analytic and economic resources of the NRC and the utilities should be directed at mitigating that form of containment failure. Licensee PF 261, 262.

---

21 CEC's proposed findings incorrectly characterize the safety systems for overpressurization protection at Rancho Seco as designed to withstand only "a single design basis accident which is less severe than many postulated accident sequences." CEC PF 281; see also, CEC PF 279, 280. Actually, the containment building and the other overpressurization protection systems at Rancho Seco can accommodate all accident sequences within the envelope of the DBA, as well as a good number of accidents producing pressures and temperatures beyond those in the DBA. Licensee PF 255-257; Staff PF 231, 232.

79. Even if the PWR-2 and PWR-3 release categories constitute the dominant containment failure modes at Rancho Seco, the record does not indicate that the public risk posed by such accidents is significant. In this context, risk is defined by probability of accident occurrence times accident consequences. Accidents leading to PWR-2 or PWR-3 types of containment failure are very improbable. Licensee PF 263; Staff PF 246. Therefore, the consequences of such an accident would have to be shown to be very severe in order for the public risk to be anything but negligible. No such showing was made.

80. The basis for CEC's estimates of the consequences of a PWR-2 or PWR-3 containment failure mode is a study entitled "Analysis of Public Consequences From Postulated Severe Accident Sequences In Underground Nuclear Power Plants" prepared by a CEC consultant, and received in evidence as SMUD Exhibit 18.[22] The assumptions utilized in SMUD Exhibit 18 are discussed in detail in Licensee's proposed findings 265-269. Two additional points must be made in response to CEC's proposed findings. First, it takes no independent analysis to conclude that the health and economic consequences from an

---

22 The main report produced by CEC as part of its study of underground siting of nuclear power plants was entitled "Underground Siting of Nuclear Power Reactors: An Option For California," ("the Underground Siting Study"), received in evidence as SMUD Ex. 11. The analysis contained in SMUD Ex. 11 was to a large extent, if not entirely, prepared by contractors. SMUD Ex. 11 at 7-2.

uncontrolled release given in Mr. Nix's testimony are grossly inflated because they are based on extreme assumptions.[23] Those assumptions are well identified in SMUD Exhibit 18, where many of the results appear in parametic form so that the effect of different assumptions can be ascertained. CEC chose the combination of assumptions that produced the most severe health consequences[24] and thus produced a totally unrealistic scenario.[25]

---

23 CEC attempts to discredit Licensee's proposed findings with respect to the consequences of a PWR-2 accident on the basis that Licensee has never conducted independent studies of the matter. CEC PF 293. For that matter, neither have CEC witnesses. The study was performed by a consultant, who frankly acknowledged that its mandate was to provide upper bounds to all relevant parameters so as to cause the most severe consequences, and to perform "[c]alculations of public health consequences ... based on enveloping considerations for those accident sequences." SMUD Ex. 18 at 5.

24 CEC PF 294, n.46 claims, on the basis of a statement at p. 7-5 of SMUD Ex. 11, that a four-hour evacuation time was used to compute the consequences of a PWR-2 accident. The statement in SMUD Ex. 11 is erroneous. The contractor that performed the analysis clearly indicated in its report that "[t]he summarized results for the surface plant...are for the 24-hour emergency evacuation case, although fewer early health effects were computed for other effective emergency evacuation criteria." SMUD Ex. 18 at V-36.

25 CEC PF 294 defends the results presented in Tables 2 and 3 of Mr. Nix's testimony by stating that "rather than assuming specific variables, it analyzed the range of consequences resulting from a broad spectrum of critical assumptions." Such is not the case. The results are given as a range of values not because they utilize varying assumptions, but because they represent four plant locations in California. CEC had available the specific results applicable to Rancho Seco, which happened to fall towards the low end of the range. We fail to understand why those specific results were not used.

81. We find, therefore, that the public health and economic consequences of an uncontrolled overpressurization accident have not been adequately addressed in this proceeding, but are certain to be far more modest than the estimates offered by CEC witness Nix. This finding, combined with the extreme improbability of an overpressurization failure of the Rancho Seco containment, leads the Board to conclude that public risk associated with an overpressurization accident is small enough that no immediate action needs to be taken by Licensee to provide protection against such an accident.[26]

82. The second point which needs to be made is that no connection has been established or suggested (except in CEC PF 297 and 325, which are rejected as unwarranted) between Rancho Seco's status as a B&W reactor and the probability of containment failure from overpressurization. Plants with B&W NSS systems are not more likely to experience containment

---

26 According to Licensee PF 269, the risks posed by CEC's estimated consequences of an overpressurization failure of containment at Rancho Seco are "not out of line with other risks, both man-made and natural, deemed acceptable by society although not necessarily by all individuals." CEC PF 293 and 296 upbraid Licensee for proposing such a finding, which CEC terms "sanguine acceptance" of the risk posed by an overpressurization accident. The conclusion cited, however, is not Licensee's, but was reached by CEC in its Underground Siting Study after reviewing the same health and economic consequences estimates presented by CEC here. See SMUD Ex. 11 at 7-10. In SMUD Ex. 11, CEC arrived at the conclusion that the potential of 17 deaths from an overpressurization failure of containment was acceptable "[g]iven the general unlikeliness of the accidents considered in this study." Id. We agree with this conclusion and observe that it is not the relatively modest consequences of such an accident which alone make the risk acceptable, but the combination of those consequences with a very low probability of accident occurrence.

failure from overpressure than those designed by other manufacturers. Dieterich Containment Testimony at 4. If anything, the equipment and procedural modifications instituted at Rancho Seco in the wake of the TMI-2 accident make it less likely, instead of more, that a feedwater transient at Rancho Seco will lead to an overpressurization failure of the containment building. Dieterich Containment Testimony at 1, 2.

83. In any case, the evidence at the hearing left many doubts in the Board's mind as to whether a CFVS can be "designed correctly and implemented properly" at the present time. Licensee's proposed findings 273 to 275 summarize the difficulties in designing a passive CFVS due to the multiplicity of potential containment failure pressures and the uncertainty of what those pressures would be. CEC characterizes these difficulties as "more apparent than real" and suggests that the solution to the problem is to disregard them. CEC would discount the possibility of unnecessary filter actuation because "the very high effectiveness of the filter would largely mitigate any unnecessary releases." CEC PF 309. We do not share CEC's "sanguine acceptance" of the possibility of unnecessary radioactive releases. Aside from the fact, further discussed below, that the performance of the CFVS is far from established, this Board cannot endorse implementation of a concept whose most important parameter (pressure setpoint) has not been determined, and which if improperly set may lead to unnecessary radioactive doses to the public.

84. Finding the proper rupture pressure for the discs is not the only performance problem with CFVS identified at the hearing. Other problems that came to light are discussed in Licensee's proposed findings 276 to 282 and Staff proposed finding 242. CEC had no answer to these problems. In particular, CEC failed to respond to the criticism that the attenuation factors shown in Table 5 of CEC witness Nix's testimony, and computed for an underground nuclear power plant, are inapplicable to a surface facility like Rancho Seco. They were computed on the assumption that the filter discharged into the plant's foundation many feet beneath the surface, a procedure not available at surface facility. Therefore, the record does not show what attenuation factors could be achievable with the CFVS proposed by CEC at a plant such as Rancho Seco, but they most likely would not be of the same magnitude as those cited in Mr. Nix's testimony.[27]

85. In addition to performance questions, Licensee and Staff witnesses pointed out some potential problems that may be produced by a CFVS, such as adverse impacts on other plant safety systems, the possibility of hydrogen ignition due to the system's operation, the possibility that a CFVS might exacerbate a low-consequence accident into a major one, and the potential negative impact of a concentrated radioactive

---

27 CEC dismisses this criticism by leaving it to a site-specific study to determine whether it is possible to implement a surface filter equivalent in size to the subsoil beneath the underground plant. CEC PF 306. The answer is obvious and in the negative.

discharge in areas near the facility because of the lower bouyancy of a filtered plume. See Licensee PF 283-286; Staff PF 242.

86. CEC's facile answer to most of these problems was to assume that the containment would fail anyway from overpressure, so that the problems were of no significance. CEC PF 310-314. While this is true if the containment is inevitably going to fail, the adverse interactions between a CFVS and other plant systems may occur in situations where the containment was not about to fail. In those situations the problems remain real and unaddressed. Also unaddressed was the possibility of hydrogen explosions in the containment or in the vent line itself, which were conceded to be potential problems even by CEC witness Nix. Tr. 2723, 2724 (Nix). CEC's answer is again that a hydrogen fire or explosion is of no consequence if a core has melted. CEC PF 315, 316. That is clearly not a satisfactory answer.

87. The above enumeration of open questions and problems, plus the undisputed uncertainty as to the cost of a CFVS (see Licensee PF 287 and Staff PF 243), clearly indicate to the Board that CFVS development is at an embryonic stage. It would be premature to require consideration of such a system for Rancho Seco at the present time, or even to order site-specific feasibility studies of such a system for Rancho Seco. This conclusion is reinforced by the facts that the Commission is conducting an extensive, high priority program to

address the areas of uncertainty in containment overpressurization protection; that a rulemaking proceeding on methods for mitigating the consequences of core melt accidents, including CFVS, is impending; and that the Staff is conducting a study of possible implementation of a CFVS at the Indian Point 2 and 3 and Zion 1 and 2 plants, which study may clarify many generic questions in this area. Staff PF 247, 248; Licensee PF 288, 289.

88. CEC acknowledges these efforts by the Commission and the Staff. CEC PF 320-322. It insists, however, that Licensee should be ordered to give expedited consideration to implementing a CFVS and perform within one year "a site and facility specific study intended to develop a proposed design for a CFVS at Rancho Seco." CEC PF 326. The justification for such an effort is that Rancho Seco possesses a "somewhat higher probability of an accident" because of "the safety concerns arising from the sensitivity of the OTSG." CEC PF 325. As we noted above, the alleged safety concerns about the sensitivity of the OTSG have been addressed. Moreover, there is not one iota of evidence in this proceeding tending to suggest that Rancho Seco has a higher probability of experiencing an accident leading to overpressurization failure of the containment than any other PWR. To the contrary, a study of possible accident sequences and their consequences at B&W PWR's, performed by the Probabilistic Analysis Staff in the wake of the Crystal River-3 transient, concluded as follows:

> It is known that B&W plants have somewhat more frequent trips than do other PWRs, particularly since the TMI-inspired alterations to the trip setpoints. These excess trips seem to be originating from minor secondary side transients and non-safety-grade instrumentation faults. These transient initiators do not correlate with the occurrence of massive, common-cause failures in the engineered safety features - with a couple of noteworthey exceptions - so they are not expected to increase the frequency of the risk-dominant severe accidents in B&W plants above the level expected for other PWR designs.
>
> * * *
>
> These considerations of B&W plant characteristics are summarized in Table 7.1. We conclude that B&W plants are not significantly different from other PWRs in their vulnerability or susceptibility to severe accidents - those that dominate the nuclear risk.

Staff Ex. 4 at 7-8, 7-9, 7-13. Thus, the justification alleged by CEC for performing a separate study at Rancho Seco is not persuasive.[28]

89. In conclusion, the Rancho Seco containment building meets all existing Commission requirements and criteria and is capable of withstanding all but most extreme accident sequences. The probability of containment failure at Rancho Seco due to overpressurization from a feedwater

---

28 CEC also points to the proximity of two population centers to the Rancho Seco plant as a factor suggesting, but not mandating, performance of a study at the present time. CEC PF 325. We note, however, that the population around Rancho Seco is at least one order of magnitude smaller than that surrounding the Indian Point and Zion sites, for which CFVS feasibility studies are currently being conducted. See SMUD Ex. 11 at 8-13; Tr. 2593-2599 (Nix).

transient, the subject of this proceeding, is remote. Allowing the Commission rulemaking proceeding to determine what over-pressurization protection, if any, is necessary is an appropriate course for this Board to follow, and one that under the circumstances poses no risk to the public health and safety.

IV. PROPOSED CONCLUSIONS OF LAW

90. The Board has addressed several of the California Energy Commission's proposed conclusions of law in the foregoing discussion of the parties' proposed findings of fact. In its conclusions of law 2-5, CEC proposes that we find the short-term actions directed in the Commission's Order of May 7, 1979, to be inadequate; that Licensee has not complied satisfactorily with two of the four long-term modifications directed by that Order; and that the Order should be amended to require 18 additional actions and modifications. In proposed conclusion of law 6, CEC suggests that Licensee's compliance with the new requirements be the subject of the continued jurisdiction of this Board; or, in proposed conclusion of law 7, CEC suggests that we delegate our continued jurisdiction to an extra-agency panel. CEC has provided us with absolutely no legal analysis of our authority to adopt its numerous proposals or the standards which should govern our consideration of them.

91. The Board's decision here must be based on the whole record and supported by reliable, probative, and

substantial evidence. 10 C.F.R. § 2.760(c). CEC's proposed initial decision does not meet this standard. As the foregoing discussion illustrated, CEC tended to focus on minority positions or inferences in the record, draw sweeping and often illogical conclusions therefrom, and ignore the reliable, probative and substantial evidence. Our discussion also revealed that CEC tended to change the issues specified by the Board for hearing and to suggest an inappropriate evidentiary burden for Licensee to meet. There is no foundation in law or in fact for a standard which would require Licensee to prove that its management, operators and equipment are superior to the rest of the operating nuclear power plant industry. Obviously, we could not find for Licensee under such a standard unless we investigated some seventy other facilities. The Commission did not ask us to oversee an industry-wide contest, and we would know little more about the safety of Rancho Seco if we attempted to assign a comparative ranking to it.

92. The standard here is one which the Commission enunciated in its Order of June 21, 1979, in this docket: whether the actions and modifications directed in its Order of May 7, 1979, are necessary and sufficient to provide reasonable assurance that Rancho Seco will respond safely to feedwater transients. CEC has not addressed this standard in its proposed findings of fact and, consequently, its proposed conclusions of law are unsupported.

93. In fact, only three of the eighteen CEC-proposed additional modifications were suggested to us by any witness who testified in this proceeding. See, CEC CL 5(a) (Webb); CEC CL 5(p) (Minor); CEC CL 5(s) (Nix). The remainder apparently represent nothing more than post-hearing "ideas" advanced by CEC or its counsel. One of them is not even reasonably identified. See CEC CL 5(k). These recommendations, even if supported by the record, would have to be integrated with the many other post-TMI requirements before they could be implemented. Tr. 3667, 3668 (Capra). First, however, their desirability would have to be examined on the basis of an integrated systems analysis. Tr. 3673-3675. Keeping in mind this agency's statutory obligation to protect the health and safety of the public, we cannot go about such wholesale alteration of a nuclear power plant and its operations on so little justification and with so little knowledge of the consequences of our actions. The Board is amazed that the California Energy Commission would propose that we do so.

94. We are aware, from the record, that the Commission is proceeding with an Action Plan to provide a comprehensive and integrated approach to actions judged appropriate by the Commission to correct or improve the regulation and operation of nuclear facilities based on the experience from the accident at TMI-2, the official studies and investigations of the accident, and the Commission's extensive review and consideration of the resulting issues. If the modifications

proposed by CEC had been identified at the outset of this proceeding, it would have been difficult to have addressed them, in this adjudicatory forum, in a coherent and coordinated fashion. Apprised of them for the first time after the hearing is concluded, we find that our record does not begin to do so.

93. The Board finds, then, that its findings of fact do not support the conclusions of law proposed by the California Energy Commission. Accordingly, we adopt the proposed conclusions of law submitted by Licensee and the NRC Staff.

Respectfully submitted,

SHAW, PITTMAN, POTTS & TROWBRIDGE

Thomas A. Baxter

Thomas A. Baxter

Matias F. Travieso-Diaz

Matias F. Travieso-Diaz

Counsel for Licensee

1800 M Street, N.W.
Washington, D.C. 20036

(202) 331-4100

Dated: September 5, 1980

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
	)	
(Rancho Seco Nuclear Generating Station)	)	
	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing "Licensee's Reply to the Proposed Findings of Fact and Conclusions of Law of the California Energy Commission and the NRC Staff" and "Licensee's Memorandum of Law in Association With Its Reply Proposed Findings of Fact and Conclusions of Law" were served this 5th day of September, 1980 by deposit in the U.S. mail, first class, postage prepaid, to the parties identified on the attached Service List.

Thomas A. Baxter

Thomas A. Baxter

Dated: September 5, 1980

D503
S 0/1

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
	)	
(Rancho Seco Nuclear Generating Station)	)	
	)	

SERVICE LIST

Elizabeth S. Bowers, Esquire
Chairman
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dr. Richard F. Cole
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Mr. Frederick J. Shon
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

David S. Kaplan, Esquire
Secretary and General Counsel
Sacramento Municipal Utility District
P.O. Box 15830
Sacramento, California 95813

Richard L. Black, Esquire
Office of the Executive Legal Director
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Christopher Ellison, Esquire
Dian Grueneich, Esquire
California Energy Commission
1111 Howe Avenue
Sacramento, California 95825

Herbert H. Brown, Esquire
Lawrence Coe Lanpher, Esquire
Hill, Christopher and Phillips, P.C.
1900 M Street, N.W.
Washington, D.C. 20036

Docketing and Service Section
Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555