

July 1, 1985

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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USNRC

Before the Atomic Safety and Licensing Board

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In the Matter of )

THE CLEVELAND ELECTRIC )  
ILLUMINATING COMPANY, ET AL. )

Docket Nos. 50-440 *el*  
50-441

(Perry Nuclear Power Plant, )  
Units 1 and 2) )

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APPLICANTS' REPLY TO PROPOSED FINDINGS OF FACT  
AND CONCLUSIONS OF LAW FILED BY THE OTHER  
PARTIES (HYDROGEN CONTROL)

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## TABLE OF CONTENTS

	<u>Page</u>
I. SUMMARY.....	2
II. THE HYDROGEN RULE.....	3
III. HYDROGEN CONTROL SYSTEM.....	7
A. Combustible Gas Control System.....	7
B. BWR System Features to Minimize Risk of Large Hydrogen Releases.....	8
C. Igniter System Selection and Preliminary Evaluation.....	8
D. Igniter System Design and Operation.....	10
E. Ultimate Structural Capacity of Containment.....	12
F. Containment Response and Equipment Survivability.....	26

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Pursuant to 10 C.F.R. § 2.754(a)(3), Applicants reply herein to the proposed findings of fact and conclusions of law of the other parties.1/

Applicants do not attempt in this reply to respond to each proposed finding and conclusion of intervenors with which Applicants disagree. Nor is the Atomic Safety and Licensing Board (the "Board") required to address expressly each and every individual finding proposed by every party. See Public

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1/ The NRC Staff's ("Staff's") proposed findings and conclusions are in most material respects consistent with Applicants' proposed findings and conclusions. Accordingly, Applicants have directed this reply primarily to the findings and conclusions submitted by Ohio Citizens for Responsible Energy ("OCRE"), with which Applicants have substantial disagreements as detailed in our reply.

Service Company of New Hampshire (Seabrook Station, Units 1 and 2), ALAB-422, 6 N.R.C. 33, 41 (1977), and cases cited therein. Where disagreements are plain, and the positions are accompanied by accurate citations to the record, for example, we have not repeated our positions, but rely on Applicants' previously submitted proposed findings and conclusions.

Citations to Applicants' numbered proposed findings and to the numbered proposed findings of the other parties are in the format "App. PF \_\_," "OCRE PF \_\_," or "Staff PF \_\_," with the appropriate paragraph number(s) supplied. In citations to pre-filed direct testimony and exhibits, Applicants employ the abbreviations established in Appendices A and B, respectively, of Applicants' previously submitted Proposed Findings of Fact and Conclusions of Law in the Form of a Partial Initial Decision (Hydrogen Control).2/

#### I. SUMMARY

The Board has given careful consideration to the proposed findings of fact and conclusions of law filed by the parties.3/

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2/ Appendix B to Applicants' proposed findings did not contain a correct description of OCRE Ex. 14, and inadvertently omitted reference to OCRE Ex. 15. The description of OCRE Ex. 14 should read: "Letter from M. Edelman to J. Keppler, dated March 7, 1985 re Drywell Airlock Door Seals." The entry for OCRE Ex. 15 should read: "Letter from Mr. M. Edelman to Mr. B.J. Youngblood, dated May 29, 1984 re Piping Design Review, Identified at Transcript Page 3465, Admitted at Transcript Page 3467, Following Transcript Page 3467."

3/ See Applicants' Proposed Findings of Fact and Conclusions of Law in the Form of a Partial Initial Decision (Hydrogen

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As is reflected in our discussion and resolution of the material issues of fact and law relating to Issue No. 8, set forth herein, the Board has decided to follow in this partial initial decision the findings of fact and conclusions of law proposed by Applicants. The Staff's proposed findings and conclusions are consistent in most material respects with those of Applicants; however, Applicants' submission was the more detailed and complete and we have adopted it as the basis for our decision. This partial initial decision adopts subject headings used in Applicants' proposed findings of fact and conclusions of law. The Board's discussion of OCRE's proposed findings of fact and conclusions of law is included under the appropriate subject headings.

## II. THE HYDROGEN RULE

OCRE'S proposed finding 2 misstates the basis on which the Board admitted Issue No. 8 in its reworded form. OCRE's proposed finding 2 suggests that the reworded contention was admitted as challenging Applicants' compliance with subsections

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Control), dated June 3, 1985 ("App. PFC"); Applicants' Reply to Proposed Findings of Fact and Conclusions of Law Filed by the Other Parties (Hydrogen Control), dated July 1, 1985; OCRE's Proposed Findings of Fact and Conclusions of Law in the Form of A Partial Initial Decision (Issue #8, Hydrogen Control), dated June 13, 1985 ("OCRE PFC"); and NRC Staff Proposed Findings of Fact and Conclusions of Law in the Form of an Initial Decision Concerning Issue 8, dated June 24, 1985 ("Staff PFC").

(c)(3)(iv)-(vii) of 10 C.F.R. § 50.44. OCRE PF 2; see also OCRE Conclusions of Law, OCRE PFC At 78. However, in the March 14, 1985 Memorandum and Order, at pages 6-7, the Board was careful to state that OCRE's contention could not be formulated in terms of the new hydrogen control requirements in 10 C.F.R. § 50.44(c)(3)(iv)-(vii) (the "hydrogen rule"), because of schedule allowances in the rule. The Board indicated that it would later decide the applicability of specific provisions in the hydrogen rule.

OCRE argues that the Board should not give full effect to the language of paragraph (c)(3)(vii)(a) of the hydrogen rule, containing the requirements for a preliminary analysis, because "section (vii) underwent last minute changes," and because "it is likely that its language was not chosen with care." OCRE PFC At 50-51. There is no basis for the Board to ignore this or any other provision in the Commission's rules. We therefore reject OCRE's invitation to do so. Moreover, after considering the language and context of paragraph (c)(3)(vii)(a) of the hydrogen rule, the Board agrees with Applicants' interpretation that the Commission excluded the detailed requirements of paragraphs (c)(3)(iv)(B), (v) and (vi) from the preliminary analysis requirements of the rule. See App. PFC at 12-13.4/

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4/ In any case, we have concluded herein that Applicants' preliminary evaluation addresses all provisions of the rule, including paragraphs (c)(3)(iv)(B), (v) and (vi), in a satisfactory manner.

OCRE asserts that previous analyses for ice condenser plants, Sequoyah and McGuire, "are apparently equivalent to the preliminary analysis under Section (vii) of the rule," citing 50 Fed. Reg. 3501. OCRE PFC at 51. The Board finds no basis for this interpretation. The Commission at 50 Fed. Reg. 3501 discusses certain analyses that have been used for demonstrating equipment survivability at Sequoyah and McGuire (prior to the promulgation of the hydrogen rule). Nowhere in the hydrogen rule, or in the supplementary information explaining the rule, is it stated that the preliminary analysis for a Mark III BWR hydrogen control system is "equivalent" to the hydrogen control analyses used at Sequoyah and McGuire. The record on the hydrogen control issue in this proceeding contains no substantive information regarding analyses performed at Sequoyah and McGuire. Hence, the Board is without any basis to say that the standards for a preliminary analysis at PNPP are "apparently equivalent" to the standards applied at these other plants.

OCRE argues that the Board should apply paragraph (c)(3)(vii)(D) of the hydrogen rule in deciding whether Applicants have met the preliminary analysis requirements of the rule. OCRE PFC at 13, 51. However, paragraph (c)(3)(vii)(D) relates only to factors to be considered by the NRC Staff in setting "a final schedule for meeting the requirements of paragraphs (c)(3)(iv), (v) and (vi)" (emphasis added). OCRE itself acknowledges that the rule does not require Applicants to

complete their final analysis before operation above 5% power. OCRE PFC at 51-52. Thus, there is no basis for the Board to apply paragraph (c)(3)(vii)(D) to Applicants' preliminary evaluation.

The Board does not agree with OCRE's characterization of the NRC Staff's role with respect to this issue. First, OCRE states that "Section (vii)(B) and other parts of the rule ((iv)(B) and (vi)(B)(3)) appear, if taken literally, to give the Staff the sole power to determine whether compliance with the rule has been achieved." OCRE PFC at 13. OCRE further states, "the testimony presented by Staff and Applicants, not surprisingly, endorses this interpretation. I.e., they would have us summarily affirm the Staff's findings." Id. The literal provisions of the hydrogen rule to which OCRE refers grant discretion to the Staff to determine compliance with the rule. They do not, as OCRE suggests, remove issues from consideration by the Board. We view Staff's and Applicants' positions to be in accord with the interpretation that the Board may review the Staff's findings. See, e.g., Applicants' PFC at 13. Moreover, the voluminous record developed by Applicants and Staff on this issue is hardly tantamount to a request for "summary affirmation" of the Staff's judgments concerning the adequacy of Applicants' preliminary evaluation.

OCRE reminds the Board of its duty to subject the Staff's position to the same scrutiny as that of the other parties, and reject it if necessary. OCRE cites Vermont Yankee Nuclear

Power Corporation (Vermont Yankee Nuclear Power Station), ALAB-138, 6 A.E.C. 520, 532 (1973), and other cases. OCRE PFC at 13-14. The Board has independently scrutinized the Staff's acceptance of Applicants' preliminary evaluation, as evidenced in this partial initial decision. In doing so, however, the Board has been mindful that the Commission intended it to place at least some reliance on the Staff's judgment of what constitutes a satisfactory preliminary analysis under the new rule. See Applicants' PFC at 13. The cases cited by OCRE did not involve similar express delegations by the Commission, and did not raise the same issue as is presented by the Commission's delegation to the Staff in paragraph (c)(3)(vii)(B) of the rule.<sup>5/</sup> In any event, the Board has independently concluded that Applicants' preliminary evaluation meets the tests established by the Commission's rule.

### III. HYDROGEN CONTROL SYSTEM

#### A. Combustible Gas Control System

In its proposed findings of fact and conclusions of law, OCRE fails to challenge the adequacy of the PNPP combustible gas control System ("GGCS"), which includes the recombiners and several other subsystems. OCRE PF 3; OCRE PFC at 14. The

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<sup>5/</sup> The Board is, of course, without authority to question the approach taken by the Commission in paragraph (c)(3)(vii)(B), and must try to give effect to the apparent purpose of the provision.

Board has concluded that the CGCS is adequate to handle the amounts of hydrogen which it was designed to control. See App. PFC at 21.

B. BWR System Features to Minimize Risk of Large Hydrogen Releases

OCRE asserts that Applicants have sought to avoid compliance with the hydrogen rule "by arguing that a degraded core accident resulting in the generation of substantial quantities of hydrogen is unlikely to occur." OCRE references testimony by Mr. Holtzclaw on BWR 6/Mark III design features. OCRE PFC at 9-10. The Board has concluded that Mr. Holtzclaw's testimony was relevant to OCRE's contention, and that the testimony did not challenge the hydrogen rule. See App. PFC at 21-22.

C. Igniter System Selection and Preliminary Evaluation

Citing paragraph (c)(3)(vii)(D) of the hydrogen rule, OCRE argues that all the areas addressed in Applicants' preliminary evaluation must be "satisfactorily resolved" and "adequately addressed" before operation above 5% power. OCRE PFC at 51-53.<sup>6/</sup> OCRE asserts that it would be unreasonable to permit

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<sup>6/</sup> Indeed, OCRE argues that Applicants are required -- prior to exceeding 5% power -- to resolve issues which are not discussed in Applicants' preliminary evaluation or in the hydrogen rule but which OCRE raised during the hearing. OCRE lists drywell pool loads and drywell bypass leakage as examples. Id. Although the Board disagrees with OCRE's interpretation of the preliminary analysis requirements of the hydrogen rule, the Board has considered the technical issues raised independently by OCRE and believes they have been satisfactorily addressed.



Applicants "to defer" any of the matters addressed in the preliminary evaluation and discussed by OCRE during the hearing, "[w]ith the exception of diffusion flames to be studied in the 1/4 scale tests." Id. OCRE further claims that Applicants and Staff have chosen "only those areas relatively free of controversy for inclusion in the preliminary analysis, deferring the other, uncertain issues to the final analysis." Id.

The Board finds no basis for these assertions. First, OCRE's arguments ignore the fact that the Commission has only required a "preliminary" analysis of the hydrogen control system as a prerequisite to receiving a full power license. Clearly the Commission anticipated that matters would be deferred for Staff resolution after full power operation in each of the areas covered by the rule. Otherwise, the distinction in the rule between "preliminary" and "final" analyses would be meaningless. See App. PFC at 12-13. As the Board noted earlier, OCRE's reliance on the factors set forth in paragraph (c)(3)(vii)(D) is misplaced. That paragraph relates only to the schedule for Applicants' final analysis, which has not yet been established by the Staff. See supra pp. 5-6.

The Board also finds no basis for OCRE's suggestion that Applicants have been selective in choosing the areas covered in the preliminary evaluation, or that contested issues have been improperly deferred to the Staff for resolution. Applicants' preliminary evaluation is extensive. It addresses in a comprehensive manner all of the substantive criteria set forth in the



hydrogen rule -- beyond what the Board believes is required by the preliminary analysis provision in the rule. Moreover, Applicants and the Staff addressed to the Board's satisfaction additional issues raised by OCRE during the hearing. OCRE raises no credible basis to challenge the position advanced by Applicants and Staff, that the preliminary evaluation of the PNPP igniter system provides a satisfactory basis to conclude that PNPP will be safe to operate at full power until the final analysis has been completed.

D. Igniter System Design and Operation

OCRE asserts that the Board is obligated to review and approve the implementing instructions and procedures that will govern the operation of the igniter system. The instructions and procedures will be finalized prior to exceeding 5% power, but are still under development. OCRE PFC at 14-17, 52; OCRE PF 6-8, 13. The Board finds nothing in the hydrogen rule, or in OCRE's contention, that requires us to examine the detailed procedures that will be used for the hydrogen control system.<sup>7/</sup>

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<sup>7/</sup> Cf. Louisiana Power and Light Company (Waterford Steam Electric Station, Unit 3), ALAB-732, 17 N.R.C. 1076, 1106-07 (1983), where the Appeal Board rejected a similar complaint by intervenors that implementing procedures for the applicant's emergency plan were not in final form and were not made part of the record. In Waterford, the applicant was required by regulation to submit implementing procedures to the NRC Staff prior to receiving an operating license. Nonetheless, the Appeal Board ruled that the Commission did not intend the implementing procedures to be required for the "reasonable assurance" find-

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As OCRE acknowledges, there was testimony setting forth the general approach to be incorporated in the procedures that would be followed in the event Applicants are required to use the system. Id.; App. PF 54-55. Based on the evidence presented, the Board is satisfied that Applicants will be able to develop satisfactory implementing procedures for the operation of the igniter system.

OCRE also asserts that the Board is under an obligation to consider final calculations relating to containment venting flow paths and rates, and design basis offsite doses. OCRE PFC at 15. However, OCRE completely fails to show how this information might assist the Board in determining the adequacy of Applicants' distributed igniter system. Moreover, the evidence at the hearing (e.g., Tr. 3599-3600 (Buzzelli), demonstrating that current design basis offsite dose values are conservative), indicates that the venting and offsite dose issues raised by OCRE are being adequately handled by Applicants in a manner consistent with the Commission's regulations. Similarly, the Board rejects OCRE's unsupported claim that there is

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ing, and that the Commission "did not want licensing hearings to become bogged down with litigation about such details." ALAB-732, 17 N.R.C. at 1107. In the instant case, there is no specific provision in the hydrogen rule requiring Applicants to submit implementing procedures to the Staff, as there was in Waterford. Thus, Applicants' position that final implementing procedures need not be considered in the hearing is even stronger.

reason for the Board to inquire further about the availability of instruments during accident conditions.<sup>8/</sup>

E. Ultimate Structural Capacity of Containment

OCRE suggests that Applicants' ultimate structural capacity analysis using ASME Service Level C limits was deficient because it neglected dead load for penetrations other than the personnel airlock and equipment hatch. OCRE PFC at 20-21; OCRE PF 20. However, App. Ex. 8-4 makes clear that dead load was considered and was determined to be insignificant. App. Ex. 8-4 at 16. OCRE fails to show that Applicants analysis is in error, or that it is inconsistent with the ASME Code provisions in paragraph (c)(3)(iv)(B) of the rule, or with any other portion of the rule.

OCRE asserts that "Applicants also neglected the effect of elevated temperatures due to hydrogen combustion on material properties." OCRE PFC at 20; OCRE PF 24. Although not

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<sup>8/</sup> OCRE refers, without explanation, to OCRE Ex. 21 at 196, in support of this claim. OCRE PFC at 15. At page 196 of OCRE Ex. 21, Sandia merely states that it had "not examined the availability or reliability, under accident conditions, of those systems involved in the primary-vessel water level measurement," and that it was "somewhat concerned that the HIS [hydrogen ignition system] actuation is done manually." Id. OCRE fails to establish how these statements call into question Applicants' instrumentation. The evidence at the hearing failed to raise any concern in the Board's mind that Applicants' instrumentation might be inadequate during accident conditions. Moreover, the Commission concluded in promulgating the hydrogen rule that manual actuation of the igniters is acceptable. See 50 Fed. Reg. 3504.

required by the hydrogen rule, Gilbert-Commonwealth Inc. ("G/C") did consider the variation of PNPP containment materials strength due to the elevated temperature from hydrogen burns. The evidence shows that any reduction of allowable stresses due to elevated temperatures is not significant, and that the structural analysis performed by G/C is conservative. See App. PF 68.

OCRE challenges Applicants' use of the actual material properties of Penetration P-205 in the G/C ultimate structural capacity analysis. OCRE PFC at 21-22; OCRE PF 20. However, the hydrogen rule expressly permits the use of actual material properties. See 10 C.F.R. § 50.44(c)(3)(iv)(B). OCRE argues that "the use of actual material properties for P-205 results in no margin to account for uncertainties in material properties, modeling techniques, or construction tolerances, as required by 10 CFR 50.44(c)(3)(iv)(B) (contrary to Applicants' assertion at Tr. 3589-90)." OCRE PFC at 22. OCRE conducted no cross-examination regarding the margins utilized for P-205. OCRE provides no basis for its assertion that suitable margins were not used in Applicants' analysis of P-205. Applicants' uncontroverted testimony is that suitable margins were used. See, e.g., Tr. 3589-90 (Alley); App. PF 64. The Board has concluded that Applicants' analysis was in compliance with the hydrogen rule, and that the structural integrity of the PNPP containment, including P-205, would not be challenged in the event large amounts of hydrogen are burned. See App. PF 64-67.

OCRE asserts that "Applicants also neglected the effects on stresses resulting from the as-built, out-of-tolerance conditions of the PNPP containment vessels." OCRE PFC at 20; OCRE PF 25. OCRE refers to testimony by Mr. Alley regarding an analysis performed by Newport News to determine the stresses resulting from out-of-tolerance conditions in the general shell at 15 psig internal pressure. The analysis showed increases in circumferential stresses. However, Mr. Alley testified that the increases were not significant. Mr. Alley stated that the pressure capacity of the shell due to out-of-tolerance conditions would still be significantly above the limiting pressure capacity of the controlling penetration in the event of a hydrogen burn. Tr. 3345-47, 3596 (Alley). The evidence also refutes the suggestion by OCRE in its proposed finding 25 that the geometric imperfections referred to above will decrease the shell's resistance to buckling. The dome region is the limiting region with respect to buckling in the G/C analysis, and the dome region is within specified tolerances. Tr. 3349, 3596-97 (Alley); App. Ex. 8-4 at 4-6.

OCRE raises several concerns about reviews performed for Applicants of inaccessible welds in the PNPP containment containing potentially rejectable indications based on the ASME Code. OCRE PFC at 22-25; OCRE PF 26-33. The welds in question were analyzed by Aptech Engineering Services, who are specialists in the area of fracture fatigue analyses of the type performed in their review of the inaccessible welds. See App. PF

76-77. Aptech concluded in its report that the weld indications were acceptable through the life of the plant for the design basis stress levels. Id. OCRE acknowledges that "the Aptech analysis contains conservatisms," but suggests that there is an insufficient minimum ratio of fracture toughness to applied stress intensity factor demonstrated by the Aptech analysis. OCRE PFC at 22-23. OCRE argues that Applicants should perform additional reviews evaluating the effects of hydrogen combustion loads on the welds. Id.

The Board has reviewed the Aptech report and has found it to be thorough and conservative. OCRE completely fails to show that the 1.34 minimum ratio of fracture toughness to applied stress intensity factor in the Aptech report represents insufficient conservatism. OCRE failed to conduct cross-examination on this point. The Board is aware of no evidence in the record indicating that the 1.34 minimum ratio would provide insufficient margin in the event of hydrogen burning. Moreover, the evidence shows that the 1.34 ratio is conservative, since the stress intensities assumed by Aptech were based on the maximum stress levels with the maximum number of fatigue cycles. See Tr. 3327-28 (Alley); OCRE Ex. 13 at 3-7, 3-10. The evidence demonstrates that the design basis loading stresses evaluated by Aptech were conservative and significantly exceed the stresses which the welds would experience following the generation and burning of large amounts of hydrogen. Consequently, there is no basis to believe that the welds in question might



lose their integrity as a result of hydrogen temperatures or pressures. App. PF 76-78.

OCRE questions Aptech's use of digital radiographic enhancement to determine the flaw size of the inaccessible welds in question. OCRE PFC at 23; OCRE PF 29. OCRE states that "[t]he Staff considers the digital radiographic enhancement technique used by Aptech to be acceptable only when the radiographs used are good quality, and that it cannot be considered a standard technique without further demonstrations of accuracy." OCRE PFC at 23. OCRE asserts that "[t]he PNPP weld radiographs in question are of poor quality" (emphasis added). Id.

There is a general statement in OCRE Ex. 18 regarding the poor quality of the 500 radiographs covered by Applicants' original significant deficiency report. OCRE Ex. 18 at 1. However, only 67 of these radiographs involved inaccessible welds that were subjected to digital radiographic enhancement. See OCRE Ex. 13 at 1-1 (discussing the two groups of weld locations involved). There is no reliable basis in the record to conclude that the quality of these radiographs precluded the use of digital radiographic enhancement; indeed, the clear and convincing evidence is to the contrary.

The record indicates that Aptech is knowledgeable in the use of the digital radiographic enhancement technique, and that the Staff reviewed and approved Aptech's use of the technique in this case. Tr. 3320, 3322-25 (Alley); OCRE Ex. 13 at



ii-iii, 6-12 - 6-13; App. PF 76; Staff Ex. 6 (PNPP Safety Evaluation Report, Supplement No. 4, February 1984) at 3-2 - 3-3. The SER makes clear that the Staff approved Aptech's application of digital enhancement despite the Staff's general statement about the possible limitations of the technique. Thus, there can be no question that the Staff concluded that the quality of these specific radiographs was sufficient to permit digital radiographic enhancement. There is no record basis, therefore, to question Aptech's use of digital radiographic enhancement.

OCRE argues that Applicants should perform further evaluation of the welds in question because of "the severe consequences of fracture initiation." OCRE PFC at 23; OCRE PF 31-32. However, the evidence shows that a "propagating circumferential crack" such as OCRE postulates would not occur at PNPP. Tr. 3337-38 (Alley).

OCRE asks the Board to give "no weight" to Mr. Alley's testimony that Applicants evaluated the welds in question for 50 psig and determined that the resulting stresses were less than the stresses evaluated by Aptech. OCRE PFC at 23-25. OCRE first argues that the Board must review the calculations underlying G/C's analysis before it can accept Mr. Alley's testimony. OCRE PFC at 24. OCRE itself failed to ask Applicants to furnish copies of the calculations, and asked no questions about the calculations that Mr. Alley was unable to answer. The Board has reviewed the evidence and finds no basis

to question Mr. Alley's testimony on this point. OCRE has not persuaded the Board that a review of the underlying calculations is required or necessary.

OCRE also claims there are "serious problems with Mr. Alley's credibility." OCRE cites asserted discrepancies between Mr. Alley's testimony and information contained in OCRE Ex. 18, an internal NRC Staff summary of an April 1983 meeting between Staff and Applicants which Mr. Alley and others attended. OCRE PFC at 24. The NRC memorandum summarizes a brief presentation by Applicants on the status of the Aptech review prior to the time the review was completed. OCRE conducted no cross-examination on the substance of the meeting summary, and never cross-examined Mr. Alley about the document or the meeting summarized in the document.

The Board has reviewed the two asserted inconsistencies cited by OCRE. On the first point, the Board finds no inconsistency between information in OCRE Ex. 18 and Mr. Alley's testimony at Tr. 3324 concerning whether there was a problem with surface roughness of the inaccessible welds examined by Aptech using the digital enhancement technique. OCRE asked Mr. Alley at Tr. 3324 whether the radiographs for which the digital enhancement technique was used were not clear because the welds had not been ground before they were radiographed. Mr. Alley replied that in some cases Aptech reviewed two radiographs for a weld joint "to make sure they got the best characterization of the flaw," and stated that "[a]t times there are cases where

because one joint hasn't been ground, that it is more difficult to read, but I do know that that was a problem in this particular case." Tr. 3324 (Alley).

OCRE never asked Mr. Alley about OCRE Ex. 18. The document contains the general statement with respect to the 500 welds covered by Applicants' original significant deficiency report, that "[b]ecause of the poor quality of the radiographs and the rough surfaces of the welds, it has been difficult to obtain a consensus of interpretation as to whether the welds were deficient . . . ." As already noted, see supra p. 15, the latter statement was not directed to the comparatively small number of radiographs subjected to the digital enhancement technique. The evidence clearly indicates that the radiographs could be subjected to digital enhancement despite any possible rough surfaces on the welds. The Board thus finds no contradiction between Mr. Alley's statement and the reference in OCRE Ex. 18.

Nor does OCRE's second point call into question Mr. Alley's credibility as a witness. Mr. Alley testified that to his knowledge, Table 3-1 of the Aptech report, which discusses weld joint 5 only, did not take credit for the concrete in the containment annulus. Tr. 3592-93 (Alley). The general statement in the NRC memorandum is not specific to weld joint 5, and can only be considered by the Board as a preliminary indication of whether G/C intended to take credit for the annulus concrete as of the April 1983 status report to the Staff.

OCRE also claims that Mr. Alley's testimony at Tr. 3323, concerning a particular number contained in one of the Aptech report tables, was "evasive," and was "contradictory" to later testimony by Mr. Alley at Tr. 3341, endorsing Aptech's review. OCRE PFC at 24. At Tr. 3323, Mr. Alley testified, "I really can't comment specifically on" the particular figure in a table cited by OCRE, and then testified that the number may have been incorrectly noted in the table. He went on to state that, in any case, the figure and the others in the table represented "a conservative estimate" of weld depth. See Tr. 3322-23 (Alley). Thus, Mr. Alley was endorsing the Aptech report as conservative. This was neither contradictory to his testimony at Tr. 3341, nor "evasive," as OCRE asserts.

Thus, OCRE's arguments that Mr. Alley lacks credibility are without basis. The Board heard lengthy testimony from Mr. Alley and found him to be a knowledgeable and candid witness. See App. PFC at 18-19; App. PF 10.

The Board has also reviewed testimony by Mr. Yang of the Staff which OCRE claims did not meet the standard of reliable, probative evidence. OCRE PFC at 24. In the Board's view, Mr. Yang's testimony on this matter, together with the Staff's review as documented in Supplement No. 4 to the Staff's Safety Evaluation Report for PNPP (Staff Ex. 6), constitute reliable and probative evidence of the adequacy of Staff's and Applicants' reviews. See App. PF 78; OCRE PFC at 25.

OCRE states that it is "not convinced that meeting the ASME service level C limits ensures a leak tight barrier." OCRE PFC at 25. Similarly, OCRE asserts that "the ASME Code may not be the most conservative method for all parts and conditions encountered in the PNPP containment." OCRE PFC at 27. OCRE's assertions are without basis. See, e.g., App. PF 80. More importantly, the assertions directly challenge 10 C.F.R. § 50.44(c)(3)(iv)(B), which provides that containment structural integrity may be demonstrated by showing that ASME Service Level C limits are met. OCRE itself acknowledges this provision in the hydrogen rule. See OCRE PFC at 10-11. For these reasons, the Board rejects OCRE'S assertions.

OCRE states that Applicants "neglect the phenomenon of compression set, which increases as a result of thermal and radiation aging." OCRE PFC at 25; OCRE PF 39. But the uncontroverted evidence demonstrates that compression set is not a problem for the environmental conditions associated with hydrogen burning. See App. PF 82. OCRE challenges Mr. Alley's competence to testify about the issue, because he testified at Tr. 3650 that he "wasn't completely familiar with" the term "synergistic effects." Id. OCRE has not established that Mr. Alley's response at Tr. 3650 invalidates his testimony about the effects of compression set. Nor is the Board concerned by the fact that between the time Mr. Alley provided the first answer cited by OCRE on the equipment hatch o-ring's constituent elements (OCRE PFC at 25-26; Tr. 3277) and his subsequent

additional testimony (OCRE PFC at 26; Tr. 3582), he obtained additional information. Mr. Alley apparently reviewed during a break in the hearing the constituent elements of the equipment hatch o-rings so that he would provide better details later in the hearing. See OCRE PFC at 25-26. Similarly, OCRE has failed to explain why Mr. Alley's testimony at Tr. 3583 on the smoothness of hatch seating surfaces, or his testimony regarding maintenance procedures for the o-rings, was "lacking in credibility." See OCRE PFC at 26. The Board finds no basis to question Mr. Alley's testimony on these subjects, and is aware of no facts that call the testimony into question. See App. PF 82-83.

OCRE also raises questions about the ability of the inflatable seals used in the personnel airlock to resist leakage. OCRE PFC at 26-27; OCRE PF 40. OCRE has provided no credible evidence to show that the inflatable seals at PNPP would lose their integrity during a hydrogen event. The uncontroverted evidence indicates that the seals would maintain their integrity. See App. PF 84.

OCRE expresses a concern that Applicants used finite element techniques in their analysis of penetrations. OCRE PFC at 27-28; OCRE PF 21. The supplementary information section accompanying the final hydrogen rule indicates that "finite element analysis is one acceptable technique for use with the methods considered" for demonstrating containment structural integrity. 50 Fed. Reg. 3501 (January 25, 1985). OCRE cites



Sandia experiments involving testing of containment models to failure, claiming the experiments showed that finite element techniques "may be nonconservative." OCRE PFC at 27-28; OCRE PF 22. The hydrogen rule, as interpreted by the commission in the supplementary information section to the rule, does not permit the Board to consider such challenges to the use of finite element analysis. Even if the rule did permit such a challenge, the evidence shows that Sandia's test-to-failure experiments, which involved non-linear plastic type analyses, are not relevant to G/C's ultimate capacity analysis for PNPP, which is based on ASME Service Level C limits well within the elastic range. App. PF 79.

The Board is unpersuaded by OCRE's arguments that it is "not sure" Applicants' analysis are confined to the elastic range. See OCRE PFC at 28. OCRE cites "early analyses of penetrations," and discussions of ASME Service Level A and B loadings, which do not appear to the Board to controvert the consistent testimony during the hearings concerning G/C's analysis using ASME Service Level C limits. See App. PF 79.

OCRE does not agree that G/C's ASME Service Level D calculations establish additional margin, as stated in Applicant's testimony. OCRE PFC at 28. The basis given for OCRE's assertion is that "[t]his analysis used actual material strengths, again without margins, for the equipment hatch and personnel airlock and a plastic analysis for P205. Applicants' Ex. 8-4 at 22." OCRE PFC at 28. OCRE failed to cross-examine



Applicants' witnesses on this point, and there is no basis in the record which would suggest that margins are not in fact present in the Service Level D analysis, or that Applicants' analysis was inconsistent with the ASME Code or otherwise improper. The Board therefore rejects OCRE's assertion. See App. PF 66-67.

The Board also rejects OCRE's claim that the Board must review the results of Applicants' containment structural integrity test, and integrated leak rate test, before concluding that Applicants have satisfied the preliminary analysis requirements of the hydrogen rule. See OCRE PFC at 28-29; OCRE PF 36. The hydrogen rule does not require prior Board approval of such confirmatory tests, and there is no basis in the record to believe that the tests might call into question either the ability of the PNPP containment to meet its design basis pressure (see OCRE PFC at 29; OCRE PF 36), or the adequacy of Applicants' distributed igniter system.

OCRE finds acceptable Applicants' evaluation of the negative pressure capacity of the containment, "but for the uncertainty as to the ability of the vacuum breaker to survive hydrogen burn pressures." See OCRE PFC at 29, 45-46; OCRE PF 34, 93. Applicants' preliminary evaluation provides satisfactory preliminary evidence for the Board to find that the vacuum breakers will survive the pressures caused by hydrogen combustion. See App. Ex. 8-1 at 21D; App. PF 113; Tr. 3570-71 (Buzzelli). Thus, the Board does not agree with OCRE's

suggestion that Applicants' justification must be confirmed by testing before it can be found acceptable under the hydrogen rule. See OCRE PFC at 45-46.

OCRE questions Applicants' evaluation of the PNPP drywell pressure capability on the grounds that there may be undetected voids in the PNPP drywell wall. OCRE PFC at 29. The uncontradicted evidence in the record is that drywell voids were adequately detected and corrected where necessary. Tr. 3415-17 (Alley). OCRE provides no basis to question this evidence. Thus, the Board rejects OCRE's unsubstantiated speculation that there may be undetected drywell wall voids which call into question the pressure capacity of the drywell.<sup>9/</sup>

OCRE also challenges Applicants' evaluation of the PNPP drywell pressure capability, which was based on a comparison to the similarly-designed Grand Gulf drywell, on the grounds that "[t]he Grand Gulf analysis is not available for our scrutiny." OCRE PFC at 30. OCRE was free to cross-examine Applicants' witnesses during the hearing on the bases for Grand Gulf's analysis, insofar as it was used in Applicants' evaluation of

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<sup>9/</sup> OCRE's assertion appears, in part, to challenge the effectiveness of Applicants' QA/QC inspection program to assure that no significant voids presently exist in the drywell wall, either in the areas referenced by OCRE which were inspected, or in other areas. As such, the assertion is outside the scope of Issue No. 8, and is contrary to the Board's prior determination affirming the adequacy of Applicants' quality assurance program. See Partial Initial Decision (Quality Assurance Contention), LBP-83-77, 18 N.R.C. 1365 (1983).

the PNPP drywell. OCRE conducted minimal cross-examination on the Grand Gulf analysis, and has provided no credible basis for the Board to be concerned about that analysis, or the manner in which it was used in Applicants' drywell evaluation. For these reasons, the Board rejects OCRE's arguments.

F. Containment Response and Equipment Survivability

OCRE states that it finds the use of the MARCH Code in Applicants' containment response analysis to be acceptable. OCRE PFC at 16. The Board agrees that Applicants' use of the MARCH Code in the preliminary evaluation is acceptable. See App. PFC at 29-31; App. PF 89-94. Based on OCRE's review of the drywell break ("DWB") loss-of-coolant accident ("LOCA") and stuck-open relief valve ("SORV") transient scenarios analyzed by Applicants, see App. PF 86-88, OCRE "consider[s] Applicants' approach with respect to the release histories for these two scenarios to be acceptable." OCRE PFC at 16. See OCRE PFC At 16; App. PFC at 29-31; App. PF 89-94. The Board agrees that Applicants' approach with respect to the release histories for the two scenarios analyzed is acceptable under the hydrogen rule. See App. PFC at 29-31; App. PF 89-94.

OCRE states that it is "concerned that the scenarios chosen do not represent the most severe challenge to containment from hydrogen combustion, as is required to be considered. 50 FR 3502." OCRE PFC at 17. OCRE states that "[t]he station blackout degraded core accident is such a scenario," and argues

that "station blackout must be satisfactorily addressed before exceeding 5% power." Id.

There is no basis in the hydrogen rule or in the record of this proceeding for the Board to require Applicants to consider a station blackout scenario as part of the preliminary analysis. The rule does not require Applicants to analyze station blackout. It does state that the hydrogen control analysis required by paragraph (c)(3)(vi)(A) of the rule must "[u]se accident scenarios that are accepted by the NRC Staff." 10 C.F.R. § 50.44(c)(3)(vi)(B)(3). The Staff has accepted the scenarios used in Applicants' preliminary evaluation and has not required any consideration of a station blackout scenario in the preliminary evaluation. See App. PF 87-88.

OCRE points out that the Staff is requesting as part of the final analysis that Applicants "consider" station blackout as an initiating event, or provide suitable justification for its exclusion. See Notafrancesco II at 6; OCRE PFC at 17-18. Thus, it has not been established that Applicants will even be analyzing station blackout as part of the final analysis, since they have the option to present suitable justification for its exclusion. The Staff's request, therefore, certainly does not support OCRE's claim that Applicants should analyze a station blackout in the preliminary analysis.

OCRE points out that the igniters would not be operable during a station blackout event. See OCRE PFC at 17; OCRE PF 12; Tr. 3432 (Buzzelli). However, as noted in the

supplementary information to the hydrogen rule, at 50 Fed. Reg. 3502, "[p]rovision of a backup power supply is not required by this rule."<sup>10/</sup> OCRE apparently reads the latter statement as limited to ice condenser plants. See OCRE PFC at 18. Although the statement is preceded by discussions of previous Staff actions at the Sequoyah and McGuire ice condenser plants, the statement itself is not limited to ice condenser plants.<sup>11/</sup> See 50 Fed. Reg. 3502.

OCRE inaccurately refers to "50 FR 3502" for the proposition that scenarios representing "the most severe challenge to containment from hydrogen combustion" are "required to be considered" by the rule. OCRE PFC at 17. 50 Fed. Reg. 3502 does not indicate that scenarios analyzed must represent "the most severe challenges," nor does any portion of the rule or the supplementary information to the rule say this.

Finally, there was uncontroverted evidence that a station blackout event would be unlikely to progress to the point that

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<sup>10/</sup> The igniters would be supplied with power from the emergency diesel generators in the event of a LOCA with loss of offsite power. See Tr. 3632-33 (Buzzelli).

<sup>11/</sup> OCRE refers to the statement in the succeeding paragraph at 50 Fed. Reg. 3502, that "[i]t is apparent that applicants and licensees with conceptually different reactors may have to address other scenarios." See OCRE PFC at 18. However, this statement regarding scenarios appears to the Board to refer to the preceeding discussion of the scenarios which were examined at Sequoyah and McGuire, and not to the unambiguous, unqualified statement that "[p]rovisions of a backup power supply is not required by the rule." See 50 Fed. Reg. 3502.

significant quantities of hydrogen would be generated. See Tr. 3437 (Buzzelli), 3609-10 (Richardson). OCRE challenges this assertion, claiming that "the method of operation claimed by Applicants would involve override of automatic functions," and asserting that the station blackout analysis referred to in the testimony was unavailable for scrutiny. OCRE PFC at 19.12/ OCRE never asked to scrutinize the analysis in question during the hearings, and fails to show any necessity to do so at this time. Similarly, OCRE failed to demonstrate on the record that there would be an override of automatic functions, and never asked during the hearings whether there would be an override of automatic functions. In any case, OCRE fails to explain why the asserted override of automatic functions, even if true, would call into question Applicants' testimony that a station blackout would be unlikely to progress to significant hydrogen production. The Board therefore rejects OCRE's assertions.

For all these reasons, the Board concludes that Applicants need not analyze a station blackout scenario as part of the preliminary analysis.

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12/ OCRE also refers to "uncertainty expressed by Applicants' witness," regarding testimony which OCRE asserts was given by Mr. Holtzclaw at Tr. 3660 and Tr. 3664. See OCRE PFC at 18-19. The testimony at Tr. 3660 was by Mr. Richardson, not Mr. Holtzclaw, contrary to OCRE's assertion. In any case, OCRE fails to show how the RCIC suction issue, discussed at these portions of the transcript, undermines in any way Applicants' testimony that a hydrogen event is unlikely to progress to significant hydrogen production.



OCRE urges the Board to "rel[y] heavily" on Sandia National Laboratory's review of the Grand Gulf igniter system, contained in OCRE Ex. 21. OCRE claims that OCRE Ex. 21 is "the most comprehensive and scholarly evaluation of the igniter system in our record." OCRE PFC at 30. However, as OCRE itself acknowledges, the only testimony in the record addressing OCRE Ex. 21 establishes that "it was out-of-date and that the HECTR computer model therein was crude and did not model a Mark III containment." OCRE PFC at 30; see App. PF 106. OCRE asks the Board to reject this uncontroverted testimony for several reasons.

First, OCRE argues that Mr. Notafrancesco of the Staff "is obviously not a combustion expert (Tr. 3672)." OCRE PFC at 30. OCRE points to nothing in any of Mr. Notafrancesco's substantive testimony about the hydrogen issue to substantiate OCRE's assertion. The Board has considered Mr. Notafrancesco's qualifications and testimony and has concluded that he was knowledgeable and competent to testify about the Sandia igniter study and other matters raised during the hearings. See App. PFC at 19-20; App. PF 13.

Next, OCRE acknowledges that "Sandia has been refining its HECTR models," but asserts "[o]ur record does not indicate that these later versions predict lower pressures and temperatures than OCRE Ex. 21; in fact, a later version of what Mr. Notafrancesco termed a realistic representation of the Mark III containment (Tr. 3738) produced higher peak pressures than in



OCRE Ex. 21. Tr. 3741-42." OCRE PFC at 31. OCRE mischaracterizes the record, which indicates that later versions of HECTR have predicted decreased pressures and temperatures. See App. PF 106.

The case cited by OCRE, discussed at Tr. 3738, involved a model with no drywell. See Tr. 3738 (Notafrancesco). Mr. Notafrancesco's testimony at Tr. 3738 did not affirm that this model involved higher pressures (it was OCRE who referred to the higher pressures at Tr. 3738, not Mr. Notafrancesco), and Mr. Notafrancesco did not agree that the HECTR model being discussed was an appropriate model to use, given the lack of a drywell. OCRE's questions at Tr. 3741-42 appeared to be based on HECTR calculations from Sandia's 1983 report, OCRE Ex. 21.<sup>13/</sup> Thus, the testimony at Tr. 3741-42 does not refute the consistent testimony that HECTR pressures have decreased since the time of the analysis in OCRE Ex. 21. See App. PF 106.

OCRE suggests that the Board should not consider HECTR calculations subsequent to those in OCRE Ex. 21. See OCRE PFC at 31. There is no basis for the Board to disregard the evidence on later HECTR calculations. That evidence clearly shows the over-conservatism of the HECTR calculations in OCRE Ex. 21 and indicates that the Board cannot rely on these calculations for purposes of judging Applicants' preliminary evaluation.

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<sup>13/</sup> Although OCRE Ex. 21 was issued in 1983, it is based on the results of the analysis of the Grand Gulf plant through 1981 only. See Tr. 3723 (Notafrancesco); OCRE Ex. 21 at 9-10.

According to OCRE, "Mr. Notafrancesco's arguments that HECTR overestimates flame speeds and combustion completeness (Tr. 3737) are also without merit." See OCRE PFC at 31. OCRE refers to several computer runs in OCRE Ex. 21 which OCRE states were "set to be identical to CLASIX 3 assumptions in some of runs in OCRE Ex. 21. Findings 80-84." See OCRE PFC at 31; OCRE PF 80-84.

The Board has reviewed the sections of OCRE Ex. 21 cited in OCRE findings 80-84. From the information in OCRE Ex. 21, there is no reliable basis for the Board to question Mr. Notafrancesco's testimony that OCRE Ex. 21 over-predicted flame speed and combustion completeness. OCRE Ex. 21 does not state that the computer runs analyzed thereon were "identical" to CLASIX 3 assumptions, as OCRE claims. Indeed, OCRE Ex. 21 points out:

Comparisons between the various computer codes is difficult because we know little of the calculational models within CLASIX-3 and even MARCH. We have attempted to carry out calculations with MARCH and HECTR that are nearly identical to several CLASIX-3 cases. Unfortunately, we invariably end up comparing "apples" to "oranges."

OCRE Ex. 21 at 12. Moreover, OCRE failed to conduct any cross-examination which might have provided clarification on this point at the hearing. In any case, OCRE's citations to OCRE Ex. 21 do not refute Mr. Notafrancesco's testimony about later research results calling the HECTR assumptions in OCRE Ex. 21 into question. See, e.g., Tr. 3737-38 (Notafrancesco). For these reasons, the Board rejects OCRE's assertions.

OCRE states that "[w]hile other HECTR cases . . . use higher values for flame speed and combustion completeness, they are offset by use of a smaller hydrogen source term and less conservative propagation parameters. Findings 81, 85, 86, 87." OCRE PFC at 31-32; OCRE PF 81, 85-87. However, OCRE fails to establish the relevance of this assertion to Mr. Notafrancesco's testimony. None of the portions of OCRE Ex. 21 cited by OCRE provide a basis for the Board to conclude that Mr. Notafrancesco's testimony is "without merit," as OCRE asserts.

OCRE also states: "Mr. Notafrancesco's comments about HECTR lacking a drywell (Tr. 3738, 3742) are also unpersuasive. Sandia evaluated this through MARCH sensitivity studies, and found that presence of the drywell might lower peak pressures by less than 10 psi. OCRE Ex. 21 at 148." See OCRE PFC at 32.

Page 148 of OCRE Ex. 21 discusses an effort by Sandia to include in Sandia's MARCH calculations the effects of a drywell, so that comparisons could be made with the results of the HECTR code. It is not clear how the analysis relates to Applicants' CLASIX-3 analysis. For example, as indicated at page 148 of OCRE Ex. 21, Sandia included the effects of the drywell by adding a zero-flow-resistance connection from either the wetwell or a region corresponding to the entrance of the vacuum breakers, whereas CLASIX-3 uses a finite-flow-resistance connection to model the vacuum breaker flow. OCRE Ex. 21 at 148. Sandia itself recognized at the beginning of its report

the difficulties caused by the lack of a drywell compartment model in HECTR. OCRE Ex. 21 at 12. Sandia acknowledged that comparisons of the type referenced by OCRE "invariably end up comparing 'apples' to 'oranges.'" Id.; see supra p. 32. In addition, there was uncontroverted testimony at the hearing that the MARCH containment model used by Sandia in OCRE Ex. 21, referenced at page 148 of OCRE Ex. 21, is considered inadequate by the NRC Staff. See Tr. 3690 (Notafrancesco). For these reasons, the Board rejects OCRE's arguments concerning Mr. Notafrancesco's testimony about the lack of a drywell in HECTR.

OCRE claims that Applicants improperly tried to use Dr. Berman's testimony to object to the use of OCRE Ex. 21. OCRE cites Tr. 3725 and Tr. 3745. See OCRE PFC at 32. In the first case cited by OCRE, Applicants first asked Mr. Notafrancesco whether he was "generally familiar with any current position that Sandia might have with respect to the hydrogen control system at Grand Gulf." Tr. 3724. The Board ruled that this question was not objectionable, since it followed up on OCRE's exhibits. Tr. 3724 (Board). Mr. Notafrancesco's response referenced Dr. Berman's March 26, 1985 affidavit.<sup>14/</sup> He then indicated that he agreed with the conclusions in the Berman Affidavit. Tr. 3725-26 (Notafrancesco). OCRE did not object

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<sup>14/</sup> See NRC Staff Response to OCRE's Motions for Continuance and to Compel the Appearance of Dr. Berman (March 27, 1985), and attached Affidavit of Marshall Berman ("Berman Affidavit"); App. PFC at 9.

during the hearing to Applicants' cross-examination regarding the Berman Affidavit. The affidavit had been fully addressed by the parties and the Board prior to the hearing.<sup>15/</sup> In the Board's view, the affidavit was a proper subject of cross-examination, particularly in light of OCRE's reliance on the Sandia report, OCRE Ex. 21.

At Tr. 3745, which OCRE also cites (OCRE PFC at 32), Applicants' counsel made the statement, "We have an affidavit from Dr. Berman." The statement was made during counsel's objection to questions by OCRE about a Supplement to the Staff's Safety Evaluation Report for Grand Gulf. Applicants' objection was denied by the Board. See Tr. 3745. As noted above, the Board had already considered the Berman Affidavit in connection with the Board's consideration of OCRE's motion to compel Dr. Berman's appearance. The Board does not agree with OCRE's assertion that Applicants' reference to the Berman Affidavit at Tr. 3745 was improper. In any case, counsel's statement at Tr. 3745 is not evidence and has no bearing on the Board's conclusions herein.

OCRE asserts that OCRE Ex. 21 is "far more credible" than the testimony of Dr. Fuls and Mr. Notafrancesco. See OCRE PFC at 32 n.2. OCRE claims that Dr. Fuls is not credible because he "did not recognize that a listing of input values was not

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<sup>15/</sup> See Memorandum and Order (Motions for Continuance of Hearing and to Compel Appearance of NRC Witness) (March 29, 1985).

for MARCH but for CONTEMPT-LT28, and was about to try to correlate the CONTEMPT listing with the MARCH manual (Tr. 3543-46)." Id. It was explained at the hearing that the input values were supplied by the NRC to Dr. Fuls as additional information and were never used by Dr. Fuls, since Dr. Fuls' CLASIX-3 analysis was based on the output of MARCH. See Tr. 3546 (Richardson), 3620 (Fuls). There is no basis for the Board to find that Dr. Fuls lacks credibility because of the discussion at Tr. 3543-46 over a computer listing that was not part of his analysis.<sup>16/</sup> To the contrary, the Board has found Dr. Fuls to be a highly competent and credible witness. See App. PFC at 17; App. PF 6.

The Board also rejects OCRE'S assertion that OCRE Ex. 21 is "far more credible" than Mr. Notafrancesco, who OCRE claims "is not a combustion expert and whose testimony we found too protective of Applicants." OCRE PFC at 32 n.2. The Board has previously noted the grounds for concluding that Mr. Notafrancesco is knowledgeable and competent to testify about hydrogen control issues. See supra pp. 30, 32-34. OCRE cites no examples of Mr. Notafrancesco's alleged "protective" testimony. The Board believes Mr. Notafrancesco gave reliable and independent testimony, and was not "protective" of Applicants.

OCRE indicates that its purpose in relying on OCRE Ex. 21 is "not to consider the HECTR results as absolutes," but argues

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<sup>16/</sup> Moreover, OCRE does not challenge Applicants' use of MARCH in the CLASIX-3 analysis. See supra p. 26.



that the Board would find essential "qualitative insights" by comparing the effects of different HECTR input and modeling assumptions in OCRE Ex. 21 with CLASIX-3. See OCRE PFC at 32-33.

For the reasons set forth herein, the Board finds it neither "essential" nor useful to compare OCRE Ex. 21 with Applicants' CLASIX-3 analysis for the purpose of judging the adequacy of Applicants' preliminary evaluation. The Staff's witnesses testified that they know of no information in OCRE Ex. 21 which in their judgment calls into question the adequacy of Applicants' preliminary analysis in this case. Tr. 3723. The record clearly demonstrates that the HECTR analyses in OCRE Ex. 21 are overly-conservative and out-of-date. See supra 30-31; App. PF 106.<sup>17/</sup> Sandia itself acknowledged the difficulty of comparisons of the type relied upon by OCRE. See supra p. 30. If OCRE had intended for the Board to place weight on OCRE Ex. 21, which is a lengthy, complex document, OCRE was under an obligation to develop an adequate record through the witnesses at the hearing concerning the relevance and materiality of OCRE Ex. 21 to Applicants' CLASIX-3

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<sup>17/</sup> Even if the Board were to conclude that the HECTR code used in OCRE Ex. 21 constituted a properly validated code, which was more elaborate and advanced than CLASIX-3 (neither of which appears to be the case, based on the evidence presented), the Board still would not reject Applicants' CLASIX-3 analysis as unreasonable. For the reasons discussed herein, it has not been shown that CLASIX-3 is so oversimplified that Applicants' and the Staff's conclusions based on CLASIX-3 are unreasonable. See Eagle-Picher Industries v. United States E.P.A., 759 F.2d 905, 921-22 (1985).

analysis.<sup>18/</sup> However, OCRE failed to conduct cross-examination on the findings and conclusions in OCRE Ex. 21 which might have permitted such comparisons to be made. Consequently, the Board cannot conclude that "essential insights" are possible using comparisons between OCRE Ex. 21 and Applicants' analysis, as OCRE suggests. In light of the evidence developed on OCRE Ex. 21, as discussed herein (see, e.g., supra pp. 30-37; Tr. 3723), the Board places no weight on the analyses in OCRE Ex. 21 for purposes of this partial initial decision.

OCRE challenges Applicants' assumption of an 8% hydrogen concentration ignition limit, as used in the PNPP CLASIX-3 analysis. See OCRE PFC at 33. OCRE states that Sandia assumed a downward propagation limit of 9% hydrogen concentration. Id. OCRE refers to testimony by Dr. Lewis at Tr. 3514, that the criterion for downward propagation "should be of the order of eight and a half percent or a little higher, eight to eight and a half to ten." Tr. 3514 (Lewis).<sup>19/</sup> However, OCRE ignores the uncontroverted evidence that the 8% ignition limit is conservative. See, e.g., Applicants Testimony at 46; App. PF 48,

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<sup>18/</sup> OCRE was on notice that there was a Staff witness, Mr. Notafrancesco, with personal knowledge of material facts on this issue. See Memorandum and Order (Motions for Continuance of Hearing and to Compel Appearance of NRC Witness) (March 29, 1985), at 4-5.

<sup>19/</sup> According to OCRE, Dr. Lewis testified that "[t]he downward propagation limit for hydrogen is 8.5 to 10%. Lewis, Tr. 3514." OCRE PF 60; OCRE PFC at 33.

100.20/ Moreover, OCRE fails to show how the information on the downward propagation limit calls into question the ignition limit assumptions in Applicants' CLASIX-3 analysis.21/ For these reasons, OCRE's reliance on the downward propagation assumption in OCRE Ex. 21 provides no basis to challenge the ignition limit assumption in Applicants' analysis.

OCRE suggests that the placement of the igniter assemblies close to ceilings (and the spray shield of the housing) would inhibit combustion effectiveness, citing statements in OCRE Ex. 21. See OCRE PFC at 33; OCRE PF 60. OCRE also claims that tests at the Nevada Test Site have shown that ignition at lean concentrations (6%) could not be achieved for an igniter

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20/ In any case, the Berman Affidavit, which was affirmed by Mr. Notafrancesco during the hearing (Tr. 3724-27) states:

Much research has been conducted since the publication of NUREG/CR-2530. Uncertainties in burn propagation behavior have been reduced. Intermediate-and large-scale experiments have confirmed that there is a high probability of igniting hydrogen mixtures at concentrations of 6-8% hydrogen or less.

Berman Affidavit at 1-2.

21/ Nor is there a basis for the Board to question Applicants' use of an 8% propagation assumption. See, e.g., App. Ex. 8-1, Appendix A, Table 4. OCRE does not attempt to argue that the downward propagation approximation of 8-10% given by Dr. Lewis at Tr. 3514 would require Applicants to assume a general propagation parameter higher than 8%, and it has not been established that the downward propagation limit is the controlling limit for propagation. In fact, OCRE concedes that Applicants' propagation assumption of 8% is conservative. OCRE PFC at 36; see infra p. 42.

location at the top of the vessel. OCRE refers to testimony by Mr. Richardson at Tr. 3627. OCRE PFC at 33; OCRE PF 61. The Board has concluded, based on uncontroverted testimony at the hearing, that OCRE's assertions are without basis. See App. PF 47.22/ OCRE failed to conduct cross-examination concerning the statements at pages 195-96 of OCRE Ex. 21. Moreover, the statements emphasize that Sandia was only questioning whether ignition would reliably occur for 6-8% hydrogen concentrations. Since Applicants' analysis conservatively assumes ignition at 8% hydrogen concentration, Sandia's opinions (the technical basis of which are not given in their report) do not refute Applicants' analysis and testimony on this subject.

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22/ The Board declines OCRE's invitation for the Board to consider testimony assertedly given by Dr. Lewis in 1981 in the McGuire operating license proceeding. See OCRE PFC at 34 n.3. OCRE never asked Dr. Lewis about this testimony during the hearing. The testimony is clearly not a part of the record of this proceeding and is not an appropriate subject for "official notice," as OCRE suggests. At this point it would be prejudicial to Applicants for the Board to consider Dr. Lewis' 1981 testimony, without OCRE having given Dr. Lewis the opportunity to explain its relationship to his testimony in this proceeding. In any case, the testimony attributed to Dr. Lewis, even if accurately characterized by OCRE and left unaddressed by Dr. Lewis, would not change any of the conclusions set forth herein.

Similarly, the Board rejects OCRE's suggestion that "Dr. Lewis has not kept up with the latest research in this field." OCRE PFC at 34. There is no credible basis in the record for OCRE's assertion. Indeed, based on his testimony and credentials, the Board finds Dr. Lewis' current state of knowledge regarding hydrogen control issues to be beyond question. See App. PFC at 16-17; App. PF 4-5.

OCRE'S reliance on testimony at Tr. 3637 by Mr. Richardson, in OCRE proposed finding 61, is misplaced. Mr. Richardson testified at Tr. 3627 that he would not expect any conditions in which the igniters at PNPP would fail to ignite at low (6%) concentration. Mr. Richardson discussed the one case in which a single igniter at the top of the facility failed to ignite in the Nevada Test Site test cited by OCRE, and explained that a similar igniter placement at PNPP would not be a problem given the number of igniters at PNPP.<sup>23/</sup>

OCRE challenges Applicants' reliance on tests by Fenwal Corporation, showing the reliability of the igniters, on the grounds that the tests "used central ignition in a 3-foot diameter vessel (Karlovitz, Tr. 3639, 3649), which we do not consider applicable to conditions in the Mark III containment." OCRE PFC at 34. OCRE provides no basis for its assertion that the igniter reliability tests do not apply to PNPP, and there is no basis in the record for the Board to question Mr. Karlovitz's and Dr. Lewis' expert judgment that the reliability tests, which involved the same glow plug igniter as that used at PNPP, are applicable to Applicants' analysis. See App. PF 40; Tr. 3627 (Lewis).

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<sup>23/</sup> There is a transcription error at Tr. 3627, line 11, where the word "not" was omitted before the word "expect." See Applicants' proposed transcript corrections, dated July 1, 1985.



OCRE seeks to rely on OCRE Ex. 16 to show that numerous igniters at PNPP are located in close proximity to structures. OCRE asserts that this could inhibit upward flame propagation in the manner suggested at page 195 of OCRE Ex. 21. See OCRE PFC at 34-36. OCRE concludes "that an appropriate, conservative ignition limit for containment response analysis is the downward propagation limit range of 8.5 to 10%." OCRE PFC at 36. OCRE concedes that the OCRE Ex. 16 has been superceded. See OCRE PFC at 34; App. PF 45. But OCRE asserts that the document nonetheless "provides valuable descriptions of the locations of igniters and of structures in close proximity." OCRE PFC at 34. Even if the Board were to rely on this igniter location description, which has been superceded, the Board still would conclude that Applicants' ignition limit and propagation limit assumptions in the PNPP CLASIX-3 analysis are valid and conservative, for the reasons stated herein. See, e.g., supra pp. 38-40.

OCRE states that the propagation limits used in Applicants' CLASIX-3 analysis are conservative. OCRE PFC at 36. The Board agrees that the propagation limit assumptions in Applicants' analysis are conservative. See App. PF 100.

OCRE challenges the assumption of 85% combustion completeness in Applicants' analysis, claiming it is "nonconservative." OCRE PFC at 36. OCRE refers to Nevada Test Site results,<sup>24/</sup> which OCRE claims "show complete combustion

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<sup>24/</sup> Apparently, the test results cited by OCRE were only preliminary. See Tr. 3517-18.



for hydrogen concentrations above 7.7%." Id.; OCRE PF 52.

However, the uncontroverted evidence in the record is that the Nevada Test Site test referenced by Ms. Hiatt included igniter placements which "had nothing to do with trying to replicate anything in the Perry plant," and that the test "was more oriented to large dry containments for PWR's." Tr. 3515

(Richardson). Thus, the preliminary test results cited by OCRE do not provide any basis for the Board to question the combustion completeness assumption used in Applicants' PNPP CLASIX-3 analysis.

OCRE questions Applicants' assumption in the PNPP preliminary evaluation of a flame speed of 6 ft/sec. See OCRE PFC at 37. OCRE relies on higher flame speeds estimated by Sandia. Id. OCRE acknowledges Mr. Notafrancesco's testimony that Sandia's estimates were too high (Tr. 3737). But OCRE chooses to disregard this testimony, arguing that ionizing radiation would in any case have the effect of increasing flame speed. OCRE PFC at 37. The Board accepts Mr. Notafrancesco's testimony, and sees no basis to question Applicants flame speed assumptions based on the Sandia estimates cited by OCRE. Moreover, the clear and convincing evidence during the hearing demonstrated that ionizing radiation is not sufficient to increase flame speeds beyond those estimated by Applicants for the conditions analyzed at PNPP. See, e.g., Tr. 3525-29, 3614-15 (Lewis). The Board has concluded, based on the uncontroverted evidence presented during the hearing, that the

CLASIX-3 assumption of a flame speed of 6 ft/sec. in Applicants' analysis is conservative. See App. PF 100, 106.

OCRE questions the assumption in Applicants' CLASIX-3 analysis that containment sprays are automatically actuated after the first burn. First, OCRE PFC at 37. OCRE relies on a statement in OCRE Ex. 19, a September 1982 request from the Staff to Applicants for additional information to be used in the Staff's evaluation of the then-planned PNPP hydrogen ignition system. OCRE Ex. 19 is not a basis to question Applicants' spray availability assumption. See App. PF 104. The Staff has reviewed and approved Applicants' spray availability assumption in the PNPP CLASIX-3 analysis. See, e.g., Notafrancesco II at 5, 7.

OCRE also challenges Applicants' spray availability assumption on the grounds that the sprays are a subsystem of the RHR system, which also functions to cool the core. OCRE PFC at 37-38. OCRE argues that it may be inconsistent to postulate a loss of core cooling, which is necessary to produce a degraded core, and at the same time to assume containment spray availability. Id. These points were addressed to the Board's satisfaction at the hearing by Applicants' witnesses, who testified as to the basis for the spray availability assumption (see, e.g., Tr. 3445 (Richardson)), and the reliability of the RHR system to assure spray availability (Id.; see App PF 108). Thus, the Board rejects as without basis OCRE's assertion regarding Applicants' spray availability assumption in the PNPP CLASIX-3 analysis.

OCRE also questions Applicants' assumptions regarding wetwell spray carryover fraction. See OCRE PFC at 38-39. OCRE states that the containment spray headers are located far above the wetwell, but fails to show how this fact calls into question the wetwell spray carryover fraction assumed in Applicants' analysis. OCRE also would have the Board disregard Applicants' assumption that sheet flow has half the heat transfer effectiveness as droplet flow, because "this assumption has no experimental basis." OCRE PFC at 39. During the hearing, OCRE failed to cross-examine Applicants' witnesses concerning the basis for the assumption which OCRE now seeks to question. Dr. Fuls explained the basis for the assumption during Applicants' redirect examination. Tr. 3621-22 (Fuls). The Board has no basis to question Dr. Fuls' explanation or to reject the assumption. Nor will the Board require Applicants to provide an "experimental basis" for their expert judgment, in the absence of any compelling reason to do so. Accordingly, the Board rejects OCRE's unsubstantiated assertions regarding the wetwell spray carryover fraction assumed in Applicants' analysis.

OCRE seeks to challenge the uncontroverted testimony given at the hearing that the CLASIX-3 code has been validated by comparison with results of other accepted codes or experimental data. See OCRE PFC at 39-42; OCRE PF 44-46; App. PF 106. OCRE fails to provide any competent, credible basis for the Board to disregard Applicants' testimony concerning the validation of

the CLASIX-3 Code. See, e.g., Tr. 3621 (Fuls).<sup>25/</sup> OCRE claims that it is appropriate to compare CLASIX-3 with HECTR, which OCRE claims is an "accepted code." See OCRE PFC at 40-42. However, for the reasons already stated, the Board believes comparisons between CLASIX-3 and HECTR are inappropriate.

Moreover, the Board finds that there is no reliable basis in the record to conclude that the HECTR code, as used in OCRE Ex. 21, has been validated as an "accepted code," as OCRE asserts. The only basis provided by OCRE for its assertion is OCRE PF 50, which states: "HECTR has been evaluated against Nevada Test Site and was found to give conservative results. Notafrancesco, Tr. 3737." This mischaracterizes Mr. Notafrancesco's testimony, which was that HECTR results for the Nevada Test Site test showed over-predictions of pressure and temperatures, based on overly-conservative combustion completeness, burn time, and flame speed assumptions. Tr. 3737 (Notafrancesco). The Board has no basis to conclude from this testimony, or any other evidence presented, that the HECTR code version used in OCRE Ex. 21 has been properly validated.

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<sup>25/</sup> For example, OCRE states in support of its argument that "[t]he Fenwal tests were conducted in a 3 foot diameter vessel," and "[t]he Nevada Test Site vessel was a large open vessel with no compartments." OCRE PF 46. Without competent testimony explaining the significance of these facts, OCRE's assertions do not provide a basis for the Board to disregard the expert testimony concerning the applicability of these tests (see, e.g., supra p. 41; Tr. 3621 (Fuls)) and the extensive verification of CLASIX-3 (Tr. 3621 (Fuls)).

OCRE also claims that CLASIX-3 should not be used in Applicants' preliminary analysis because of comments by the Staff in an August 1984 information request (OCRE Ex. 20). The Staff's comments, which related to Applicants' use of CLASIX-3 in demonstrating equipment survivability, were based on NRC Staff comparisons of CLASIX-3 and the CONTEMPT-LT28 code. See OCRE PFC at 40; OCRE PF 73. OCRE's argument is refuted by the Staff's testimony at the hearing. See App. PF 105.

OCRE asserts that "more severe combustion might occur if core reflood was assumed at an earlier time" than was assumed in Applicants' DWB scenario, citing OCRE PF 77. See OCRE PFC at 42; OCRE PF 77. OCRE's postulated scenario is based on a "worst case," design basis accident, which is not relevant to the DWB scenario addressed in Applicants preliminary evaluation. See Tr. 3535-38, 3618-20 (Buzzelli, Richardson). Further, Applicants' witnesses did not agree with OCRE's assumption concerning the amount of steam that would be condensed. See, e.g., Tr. 3535, 3540 (Fuls). It was also pointed out in testimony that there would be a "tremendous amount" of residual steam in OCRE's postulated scenario. Tr. 3542 (Fuls). OCRE also mischaracterizes Dr. Lewis' testimony at Tr. 3542, in OCRE PFC at 42-43. It is clear from a review of Tr. 3542 that Dr. Lewis' reference to 50-55 pounds of pressure did not take into account the reduced initial pressure in OCRE's scenario. For these reasons, the Board rejects OCRE's assertion calling into question the appropriateness of Applicants' DWB scenario, which the Board has found acceptable. See App. PF 86-88.

OCRE states that it is "also concerned that the base cases may have been terminated too early." See OCRE PFC at 43. OCRE's "concern," although not clearly explained, is apparently based on calculations in OCRE Ex. 21 using the HECTR code. For the reasons noted herein, the Board has no basis to question Applicants' CLASIX-3 scenarios and assumptions based on comparisons to the HECTR analyses in OCRE Ex. 21. Accordingly, OCRE's assertions do not call into question the evidence showing the appropriateness of the scenarios used in the preliminary evaluation. See App. PF 86-88.

OCRE asserts that Applicants have not adequately considered the potential effects of drywell leakage bypassing the suppression pool. See OCRE PFC at 44-45. The uncontroverted evidence at the hearing convincingly demonstrated that drywell leakage would be of no concern to the operation of the PNPP distributed igniter system. App. PF 107.26/ The Board therefore rejects OCRE's assertions concerning potential drywell leakage.

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26/ OCRE complains that the General Electric calculations discussed at the hearing in connection with this issue are not available for OCRE's review. OCRE failed to ask for the calculations during the hearing. OCRE asked no questions about the GE calculations which the witnesses were unable to answer. Based on the testimony presented, the Board sees no basis to question the testimony concerning the GE calculations. Consequently, there is no basis for the Board to require Applicants to produce the GE calculations, as OCRE requests.



OCRE argues that Applicants' equipment survivability analysis is deficient because it is based on containment pressure and temperature profiles determined by the CLASIX-3 code. See OCRE PFC at 45. Because the Board has rejected OCRE's challenges to the PNPP CLASIX-3 analysis, the Board must also reject OCRE's criticisms of Applicants' use of CLASIX-3 as a basis for evaluations of equipment survivability.

OCRE claims there is "no way to confirm" that Applicants' heat transfer code, HEATING-6, is conservative, or that appropriate modeling assumptions have been used. See OCRE PFC at 45. However, OCRE cites to nothing in the record which would call into question Applicants' use of the HEATING-6 code. The Staff has reviewed and approved Applicants' use of the HEATING-6 Code, which the Staff found to be an improvement over the HEATING-3 version used at Grand Gulf. See Garg at 5. The Board has concluded that Applicants' equipment survivability evaluations, including the use of HEATING-6, are appropriate. See App. PF 110-113.

OCRE acknowledges that the Nevada Test Site electrical cable tests, about which OCRE inquired during the hearings, demonstrated survivability of the cable that was tested. OCRE PFC at 45; see App. PF 115. However, OCRE states that it has no information on whether the cables were aged to an end-of-life condition, as would be required to meet equipment qualification tests under 10 C.F.R. § 50.49(e)(5). Applicants did not raise the issue of the Nevada Test Site cable tests,

OCRE did. See App. PF 115. Applicants do not rely on the cable tests in Applicants' preliminary evaluation. Moreover, the Board is not aware of information from the cable tests (and OCRE cites to no information from the tests) which calls into question Applicants' equipment survivability evaluation.<sup>27/</sup>

For the reasons previously noted (see supra pp. 24-25), the Board rejects OCRE's argument (OCRE PFC at 46) that Applicants' survivability evaluation of the PNPP vacuum breakers is inadequate.

OCRE states that "a showing that essential equipment can survive detonations is unnecessary, as detonations are unlikely to occur, even if detonable concentrations were to form." OCRE PFC at 46. The Board agrees that Applicants have demonstrated that detonations are unlikely to occur following the release and burning of large amounts of hydrogen, and that Applicants need not demonstrate that essential equipment could survive detonations. See App. PF 49; 10 C.F.R. § 50.44(c)(3)(v)(A).

OCRE claims that preliminary results from HCOG's 1/20 scale tests "indicted that diffusion flames resulting from a 75% metal-water reaction will result in unacceptable thermal loading to equipment," citing OCRE PF 95. See OCRE PFC at 46. OCRE PF 95 refers to testing by Mr. Richardson at Tr. 3553-57 as a basis for this assertion. However, Mr. Richardson's

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<sup>27/</sup> Nor does OCRE call into question Applicants' ability to comply with 10 C.F.R. § 50.49(e)(5), to which OCRE makes reference.

testimony clearly indicates that thermal loading "is likely to be acceptable for a realistic source term" (Tr. 3553), and that the 1/20 scale tests used "very conservative temperatures" which were "much higher than expected because the scaling relationships were off" (Tr. 3557). See App. PF 114. Thus, OCRE's reliance on Mr. Richardson's testimony is misplaced.

OCRE challenges Applicants' plans for the 1/4 scale tests, which will be used to define diffusion flame thermal environments as part of Applicants' final analysis. See OCRE PFC at 46-47. OCRE asserts that Applicants' final analysis plans are in violation of 10 C.F.R. § 50.44(c)(3)(v)(B), citing testimony by Mr. Richardson at Tr. 3568 and Tr. 3622-23. OCRE's arguments are unrelated to Applicants' preliminary evaluation, and as such, are irrelevant to the issue of whether Applicants have complied with the preliminary analysis requirements of the hydrogen rule.

Even if the issue raised by OCRE were relevant to this partial initial decision, the Board would not find that the portions of Mr. Richardson's testimony cited by OCRE raise a question. Mr. Richardson testified at Tr. 3568 that high hydrogen release rates resulting in flames are not expected to be sustained out to a 75% metal-water reaction for postulated recoverable degraded core events covered by the hydrogen rule. Mr. Richardson's testimony at Tr. 3622-23 is unrelated to the diffusion flame/survivability issue raised by OCRE. The testimony explains Applicants' reasons for using the BWR Heatup Code

in the final analysis as a basis for defining release rates, rather than using the unrealistic, sustained high release rates that were used in the 1/20th scale test. See supra pp. 50-51. For these reasons, OCRE's assertions are irrelevant to the preliminary analysis issue, and are in any case without basis.<sup>28/</sup>

OCRE asserts that the effects of the PNPP igniter system might aggravate the course of an accident. See OCRE PFC at 47-50. First, OCRE claims that Applicants have not adequately evaluated the potential effects of drywell pool loads, citing a Grand Gulf analysis. OCRE PFC at 48; OCRE PF 97. However, OCRE acknowledges that the Grand Gulf CLASIX-3 sensitivity studies cited by OCRE used "input assumptions other than those in Applicants' preliminary analysis." OCRE PF 97. Mr. Richardson testified that the Grand Gulf analysis used "some very conservative assumptions beyond those which were expected to occur in our use in the base case CLASIX-3 analysis." Tr. 3487 (Richardson). The Grand Gulf analyses evaluated the potential consequences and found that there were no adverse consequences. Tr. 3488 (Richardson). Moreover, Applicants have evaluated potential differential pressures, and

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<sup>28/</sup> OCRE appears not to challenge any aspects of Applicants' 1/4 scale test program for diffusion flames other than the 75% metal-water reaction issue discussed herein. See OCRE PFC at 51-53; supra pp. 8-9. Moreover, with respect to the 75% issue raised by OCRE, it appears that OCRE is not seeking to have Applicants evaluate diffusion flames based on a 75% reaction prior to exceeding 5% operation, i.e., OCRE is only requesting a "commitment" to perform the evaluation as part of the final analysis. OCRE PFC at 53.

differential pressures have been shown to be less than the differential pressures in the design basis case. Tr. 3490 (Richardson). The effects of pool swell due to differential pressures have been evaluated for the design core. Id. Applicants will continue to analyze this issue if necessary as part of the final analysis. Tr. 3493-96 (Richardson). Based on this uncontroverted evidence, the Board rejects OCRE's assertion that Applicants have not adequately considered potential drywell pool loads.

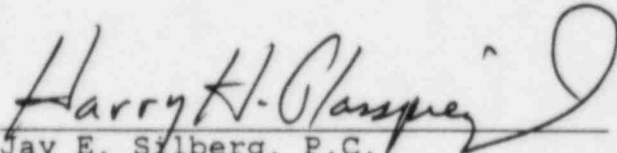
OCRE also contends that the operation of the PNPP igniter system might degrade suppression pool cooling and mixing and thus affect long term decay heat removal. See OCRE PFC at 48-49. The Board has considered OCRE's assertions and has found that they are without credible support in the record. The uncontroverted evidence clearly demonstrates that hydrogen combustion would not impair decay heat removal capability. See App. PF 108-09.

Finally, OCRE asserts that Applicants have not evaluated the potential for secondary fires. OCRE PFC at 50. The Board has concluded that OCRE's arguments in support of this assertion are without basis, and that Applicants have adequately

considered the potential for secondary fires and have shown that secondary fires are unlikely to occur as a result of PNPP igniter system operation. See App. PF 115; supra p. 47.29/

Respectfully submitted

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Dated: July 1, 1985

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29/ OCRE's reliance on OCRE Ex. 24 for the proposition that "[h]eat loads imposed on electrical cable insulation by hydrogen combustion can result in pyrolosis or gasification of the insulation compounds" (OCRE PF 101) is misplaced. Dr. Pratt testified that the statements in OCRE Ex. 24 which OCRE cites were based on analyses of PWR large dry containments and dealt with "very severe hydrogen burns, starting at very high concentrations." Tr. 3730-31. Given this testimony, and Dr. Pratt's uncertainty about the relevance of the paper he had co-authored to the PNPP distributed initers (id.), the Board cannot place any weight on the paper for purposes of this proceeding.



July 1, 1985

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

DOCKETED  
USNRC

\*85 JUL -8 P12:47

In the Matter of )

THE CLEVELAND ELECTRIC )  
ILLUMINATING COMPANY, ET AL. )

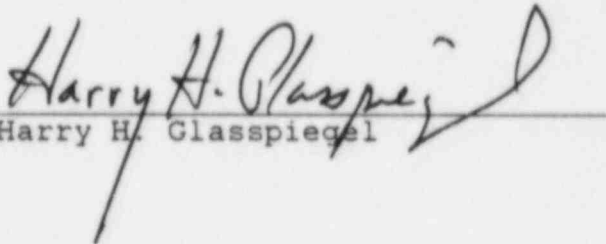
(Perry Nuclear Power Plant, )  
Units 1 and 2) )

Docket Nos. 50-440  
50-441

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CERTIFICATE OF SERVICE

This is to certify that copies of the foregoing "Applicants' Reply to Proposed Findings of Fact and Conclusions of Law Filed by the Other Parties (Hydrogen Control)" were served by deposit in the United States Mail, First Class, postage pre-paid, this 1st day of July, 1985, to all those on the attached Service List.

  
Harry H. Glasspiegel

DATED: July 1, 1985

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

THE CLEVELAND ELECTRIC  
ILLUMINATING COMPANY

(Perry Nuclear Power Plant,  
Units 1 and 2)

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) Docket Nos. 50-440  
) 50-441  
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