February 25, 1985

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
METROPOLITAN EDISON COMPANY	)	Docket No. 50-289-SP
	)	(Restart Remand
(Three Mile Island Nuclear	)	on Management)
Station, Unit No. 1)	)	

LICENSEE'S PROPOSED FINDINGS IN REPLY TO PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW ON DIECKAMP MAILGRAM ISSUE SUBMITTED BY TMIA AND NRC STAFF

Shaw, Pittman, Potts & Trowbridge

Ernest L. Blake, Jr., P.C.
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REPLY FINDINGS

TABLE OF CONTENTS

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Licensee submits herein its Reply Findings. Licensee submitted its initial set of proposed findings on January 28, 1985. These findings were organized in the form of a Partial Initial Decision and followed an outline previously proposed by Licensee, provided to the other parties, and accepted by the Licensing Board. See Tr. 31,699-706. The NRC Staff's findings, which largely adopt Licensee's findings, followed the same outline, although the Staff proposed an additional section (II.D.) regarding NUREG-0760 and the testimony of Norman Moseley and David Gamble. Intervenor TMIA, on the other hand, pursued its own outline of the case in structuring its proposed findings.

In this Reply, Licensee addresses the findings proposed by TMIA and the Staff. Licensee's Reply again follows the outline accepted by the Board, and it proposes additional paragraphs in a Partial Initial Decision to discuss the proposed findings of the parties.1/ Licensee chose this organizational approach to facilitate correlation and comparison of the three parties' arguments, and to best consolidate reply to TMIA's arguments where they appear at several different places in TMIA's findings. Noted at the beginning of each section of the Reply are the numbered paragraphs of TMIA's findings to which Licensee has explicitly replied, to further assist in locating corresponding arguments.2/

Licensee correlated TMIA's proposed findings with Staff's and Licensee's proposed findings as follows: The first section of TMIA's proposed findings (TMIA PF 1-14) was introductory and was correlated to Staff's and Licensee's introductory findings (LIC PF 1-6). TMIA's Section II, entitled "Is the Dieckamp Mailgram False or Inaccurate" (TMIA PF 15-170), was the counterpart of Section III.B of Staff's and Licensee's proposed findings, which addressed whether subsequently adduced evidence justified the conclusion that someone had interpreted the pressure spike in terms of core

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1/ Thus, for example, Licensee's Reply to the other parties' introductory sections would be inserted after paragraph 6, the last paragraph in Licensee's introductory findings of January 28, 1985.

2/ Appendix A attached to this Reply provides a complete index to pages on which each of the numbered proposed findings of Licensee, Staff, TMIA and Licensee Reply appear. Appendix B attached hereto provides an index by TMIA finding number to the location of Licensee's Reply.

damage at the time of the spike. Part A of TMIA's Section III, entitled "The Purpose of the Mailgram" (TMIA PF 171-178) was the counterpart of Staff's and Licensee's Section IV.C, which addressed whether Mr. Dieckamp expected the NRC to rely on the mailgram for any regulatory purpose. The remaining parts B and C of TMIA Section III (TMIA PF 179-237) argue that Mr. Dieckamp knew the mailgram was false, and are best correlated to Staff's and Licensee's Section I.B, "On What Information Did Mr. Dieckamp Base His Mailgram".

TMIA Section IV, which is entitled "Assuming that Dieckamp Did Not Know the Statements in His Mailgram Were False at the Time He Sent the Mailgram He Should Have Known They Were False," contains a number of arguments unrelated to this issue. TMIA formulates five arguments which it attributes to Licensee or Mr. Dieckamp (TMIA PF 238-241) and to which it then replies.

Subsection IV.A (TMIA PF 239-240, 243-247) attacks what TMIA alleges is Mr. Dieckamp's unduly restrictive definition of the issue before the Board. Subsection IV.B (TMIA PF 248-256) attacks what TMIA alleges is Licensee's argument that a complex technical analysis is needed to determine that the pressure spike was caused by a hydrogen burn due to a zirconium-water reaction. Subsection IV.C (TMIA PF 257-270) attacks what TMIA contends is Mr. Dieckamp's analysis of prior statements by Messrs. Chwastyk, Mehler and Illjes. Subsection IV.D (TMIA PF 271-283) attacks the support NUREG-0760 provides to Mr. Dieckamp's conclusion. These four subsections correspond to Staff's and Licensee's Section

IV.B, which addresses whether Mr. Dieckamp has a reasonable basis to continue to believe that no one interpreted the pressure spike in terms of core damage. TMIA's subsection IV.E (TMIA PF 284-303) disputes that Mr. Dieckamp could have believed William Lowe was the first person to discover the significance of the pressure spike; this subsection is best correlated to Staff's and Licensee's Section I.B, "On What Information Did Mr. Dieckamp Base His Mailgram." Only TMIA subsection IV.F (TMIA PF 304-307) addresses whether there was any evidence of which Mr. Dieckamp should have been aware; this last subsection is the counterpart of Staff's and Licensee's Section II.A.

Finally, TMIA Section V (TMIA PF 312-315) addresses whether Mr. Dieckamp should have corrected the mailgram after the fact. This section is the counterpart of Staff's and Licensee's Section IV.D.

Licensee does not address every proposed finding of the other parties. With respect to the Staff's proposed findings Licensee has no objection and sees no need for specific comment. With respect to TMIA's proposed findings, Licensee replies to virtually all the arguments made by TMIA. Licensee has ignored in its written reply only those TMIA findings which are essentially the same as Licensee's position, or are conclusory, irrelevant, immaterial, beyond the scope, or totally unsupported by any citation whatsoever.

REPLY FINDINGS

INTRODUCTION3/

(Response to TMIA PF 5, 8-10, 12)

REPLY 1. On January 28, 1985, in accordance with the Board's directive (Tr. 31,713-19), Licensee filed Licensee's Proposed Findings of Fact and Conclusions of Law in the Form of a Partial Initial Decision on the Dieckamp Mailgram (hereinafter cited as "LIC PF"). On February 8, 1985, TMIA, with the permission of the Board and parties, late filed Three Mile Island Alert's Proposed Findings of Fact and Conclusions of Law on Dieckamp Mailgram Issue (hereinafter cited as "TMIA PF"). TMIA subsequently provided corrections and additions on February 11, 1985, and on February 12, 1985. The Commonwealth of Pennsylvania did not file proposed findings, and has therefore defaulted.4/ 10 C.F.R. § 2.754(b). See Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-717, 17 N.R.C. 346, 371 (1983). The NRC Staff filed its Proposed Findings (hereinafter cited as "STAFF

3/ The Reply Findings in this section are intended to follow LIC PF 6 in Licensee's proposed findings of January 28, 1985.

4/ By letter dated February 6, 1985, the Commonwealth informed the Board of its intent not to file proposed findings, but stated it reserved its right to reply to or comment on the proposed findings filed by the other parties. The Commonwealth, however, has no such right. An opportunity for the Commonwealth to comment on Licensee's proposed findings was provided by the staggered schedule for proposed findings, and has been missed. Other than this missed opportunity, the Commonwealth has no right to file reply findings, a right which is reserved under the Commission's Rules of Practice for the party with the burden of proof -- Licensee. See 10 C.F.R. § 2.754(a)(3).

PF") on February 15, 1985, and on February 25, 1985, Licensee filed Reply Findings (hereinafter cited as "LIC REPLY").

REPLY 2. The Board notes that adoption of TMIA's proposed findings would call for this Board to reject as false the testimony of approximately 80 percent of the witnesses who appeared under oath in this proceeding. The Board observed and listened to the witnesses carefully. It is not the first time that Board members have observed some of these same witnesses.5/ Although the Board believes some witnesses were mistaken in their present recollection of events which occurred over five years earlier, it concludes that the witnesses were generally open and truthful. The Board's rejection of TMIA's widespread and indiscriminate attack on the credibility of witnesses, particularly (as pointed out below) where inaccurate record citations (both as to substance and to location) are relied upon, is sufficient ground in itself to reject TMIA's proposed findings in their entirety.

REPLY 3. Despite the fact that TMIA's proposed findings are collectively unsound in their portrayal of false testimony, the Board has reviewed individually each of TMIA's proposed findings as well as the findings proposed by Licensee and the Staff, as discussed throughout this decision. Any finding of fact or conclusion of law proposed by TMIA or the other parties and not

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5/ Members of this Board have previously observed as witnesses Messrs. Broughton, Keaten and Dieckamp, to name a few. See Broughton, ff Tr. 5,038; Keaten, ff Tr. 13,242; Dieckamp, ff Tr. 13,434 (Restart Proceeding) and see Broughton, ff Tr. 328 (TMI-1 Steam Generator Repair Proceeding).

incorporated directly or inferentially in this Partial Initial Decision is rejected as unsupported in law or fact or as unnecessary to the rendering of this decision.

REPLY 4. The Board accepts Licensee's introductory section which was adopted by the Staff (LIC PF/STAFF PF 1-6). While TMIA's introduction generally describes the procedural background of this case, there are a number of inaccurate or irrelevant statements in TMIA's introduction which the Board cannot accept as noted below.

REPLY 5. TMIA states that in the August 1981 Partial Initial Decision, the central question concerning information flow was "whether Dieckamp deliberately or negligently made false and inaccurate statements in the mailgram." TMIA PF 5. TMIA misreads our prior decision. The Dieckamp mailgram issue was merely one topic related to information flow into which the Board made preliminary inquiry. See, e.g., Tr. 13,069, 13,060-64. It was not a matter litigated, particularly by TMIA which defaulted in its pursuit of information flow issues. Tr. 30,976. See also, LBP-81-12, 14 N.R.C. 381, 541-542, 551, 556 (1981).

REPLY 6. TMIA proposes a finding concerning information flow beyond the Dieckamp mailgram issue. TMIA PF 8. The Appeal Board's ruling on information flow issues other than the Dieckamp mailgram is irrelevant to this decision; of these issues only the Dieckamp mailgram issue was remanded to this Board. See ALAB-772, 19 N.R.C. 1193, 1268 (1984).

REPLY 7. Nor do we share TMIA's reading of ALAB-772 in other respects. TMIA PF 9. The Appeal Board did not direct the Licensing Board to consider the implications of Dieckamp's actions in terms of the influence he has on the overall management of the corporation. The issue defined by the Appeal Board is as stated precisely by Licensee (LIC PF 2).

REPLY 8. The Board categorically rejects TMIA's suggestion that Licensee's litigative position on the Dieckamp mailgram issue impugns the integrity of Licensee's current management. See TMIA PF 10. First, TMIA misstates Licensee's current position. Licensee maintains that the mailgram was accurate when sent and that its thrust -- that no one interpreted the pressure spike or spray actuation in terms of core damage at the time of the spike -- remains a reasonable conclusion. Second, TMIA's suggestion is bootstrapping and is inherently unfair. Licensee was entitled, indeed obliged, to present its views on the Dieckamp mailgram issue. Those views were honest, straightforward, and persuasive.

REPLY 9. Finally with respect to the background of this proceeding we reject TMIA's characterization of this Board's July 9, 1984 Prehearing Conference Order. See TMIA PF 12. The Prehearing Conference Order did not rephrase the mailgram issues as stated by TMIA. TMIA fails to state accurately a single issue or subissue.

I.B. On What Information Did Mr. Dieckamp Base His Mailgram?6/

(Response to TMIA PF 191-194, 197-204, 207-217, 221-226, 228-236, 241, 284-303)

REPLY 10. TMIA attacks Mr. Dieckamp's expressed basis for his mailgram on four grounds. See generally TMIA PF 241. TMIA first argues Dieckamp's belief that William Lowe was the first to interpret the pressure spike the night of March 29th/30th was not reasonable. Next TMIA argues Dieckamp knew better because Herbein and Miller briefed him on plant status on March 28th, including the fact that a hydrogen burn had occurred. Third, TMIA contends that Robert Keaten, on the basis of information obtained from Gary Broughton at the site the morning of March 29th, briefed Dieckamp on plant status and informed Dieckamp at that time of the hydrogen burn. Finally, TMIA argues that Dieckamp's understanding of the degree of core damage on the 28th or early on the 29th implied that he was aware of the hydrogen burn at that time.

Lowe's Discovery of the Significance of the Pressure Spike

REPLY 11. TMIA argues that Dieckamp could not have reasonably understood that William Lowe was the first person to correctly interpret the pressure spike. See TMIA PF 284-303. To make this point, TMIA attempts to discredit Lowe's testimony, mainly by arguing that a number of engineers recognized the

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6/ The Reply Findings in this section are intended to follow LIC PF 32 in Licensee's proposed findings of January 28, 1985.

significance of the pressure spike during a meeting on March 29th held several hours7/ before Lowe recognized it.

REPLY 12. At the outset, the Board notes that even if it were true that someone at that March 29th afternoon meeting correctly interpreted the pressure spike, it would neither affect the accuracy of the mailgram nor discredit Dieckamp's reliance on Lowe's recognition of the pressure spike. Dieckamp's mailgram would still be true if the spike had been first interpreted in terms of core damage in that meeting which took place more than 24 hours after the pressure spike. One could not reasonably interpret the phrase "at the time of the spike" as extending to this time. In addition TMIA does not deny the significance of Lowe's recognition of and communications about the pressure spike, particularly with respect to the flurry of analytical activity that recognition invoked. It dramatically altered the response to the accident. See, e.g. Lowe, ff Tr. 28,151, at 10-14. Lowe's recognition of the spike was certainly a milestone in this saga -- an event of profound significance of which Dieckamp became aware and upon which he reasonably relied.

REPLY 13. As discussed below, however, the Board finds that the pressure spike was not interpreted in terms of core damage

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7/ The first meeting of the Events Analysis and Recovery Team, at which TMIA claims the spike was correctly interpreted, ran from about 3:30 to 5:00 or 6:00 p.m. on the 29th. Lowe, ff Tr. 28,151, at 3-4. Lowe testified he recognized the significance of the pressure spike at about 11:00 p.m. -- give or take a couple of hours. Id., at 6-8.

during the meeting in question. The Board therefore concludes that Dieckamp was correct in his reliance on a belief that William Lowe first recognized the significance of the spike.

REPLY 14. TMIA commences its attack on Lowe's testimony by remarking that Lowe has stated that he does not know whether he was the first to recognize the significance of the pressure spike. TMIA PF 287. This statement does not detract from Lowe's credibility. Lowe was not present at TMI on March 28th and does not claim to know what people believed on that day. He did testify, however, that he "believed" he was the first to recognize its significance. Tr. 28,154-55 (Lowe). See also, Tr. 28,216-17 (Lowe). This testimony presents no contradiction. As he testified, "I find it inconceivable that if anyone had known hydrogen was present in containment and had ignited, they would have concealed that knowledge from peers or managers and that the on-site technical support team would not have been told of it." Lowe, ff Tr. 28,151, at 14.

REPLY 15. TMIA next attempts to discredit Lowe by referring to his testimony concerning a telephone conversation he had with Jack Thorpe on March 28th. TMIA PF 288-289. Lowe testified that Thorpe reported that the plant thought core cooling was recovered. Lowe, ff Tr. 28,151, at 3. TMIA observes that a note of this conversation dictated by Lowe states "Plant thinks core is recovered but proof not yet established." See TMIA Mailgram Exh. 1. TMIA asserts that this phrase means that the core had been uncovered. TMIA ignores, however, Lowe's explanation during cross-examination

that in the industry, recovery is a term of art meaning the return to an understandable status. Tr. 28,163 (Lowe). Moreover, TMIA also ignores the context of the paragraph from which it plucks the statement in question. That entire paragraph refers to attempts to establish core cooling, which indicates that "core recovery" indeed referred to the reestablishment of understandable core cooling. See TMIA Mailgram Exh. 1.

REPLY 16. TMIA then begins its argument that Lowe's story is incredible because, as TMIA claims, "it appears that there were general discussions about the pressure spike, hydrogen burn and hydrogen build-up in the reactor building during the afternoon of March 29, full, eight hours8/ prior to Lowe's alleged revelation." TMIA PF 290. TMIA prefaces its argument by referring to notes taken at the time concerning a statement made by Richard Wilson at the first meeting of the Events Analysis and Recovery Team. TMIA PF 291 (presumably referring to TMIA PF 230). According to the notes, Wilson referred to the financial loss they should assume from the core damage. See TMIA PF 230.

REPLY 17. TMIA does not explain why this statement is significant. Wilson testified in this proceeding that his assessment of core damage was derived from radiation levels which indicated that a large number of fuel pins had failed. Wilson, ff Tr. 31,504; Tr. 31,539 (Wilson). He recognized from this that the plant would not be operative for an extended period of time. Tr.

8/ With regard to the timing of these purported discussions, see LIC REPLY 11 n.7, supra.

31,539 (Wilson). Wilson's statement does not support TMIA's proposition that the occurrence of a hydrogen explosion was known or discussed.

REPLY 18. TMIA also refers to statements by Julien Abramovici to support the proposition that there was concern for hydrogen buildup to four percent and discussion of hooking up a hydrogen recombiner during this same meeting. TMIA PF 292-293, 298-300. TMIA claims that only by a zirconium-water reaction could hydrogen accumulate to four percent in so short a time. TMIA concludes the discussion must therefore have been predicated on a recognition that a zirconium-water reaction had occurred. TMIA PF 293.

REPLY 19. Abramovici, however, never testified that there was concern expressed for hydrogen from a zirconium-water reaction. Abramovici stated that George Kunder raised the concern over hydrogen, but Abramovici did not recall discussion of how hydrogen might have been produced.9/ TMIA Mailgram Exh. 32H, at 43-44. Kunder testified in this proceeding that he merely mentioned long-term hydrogen generation as a topic for recovery planning. Tr. 30,007-08 (Kunder). On March 29th, Kunder did not

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9/ Abramovici thought that Kunder had the results of a containment atmospheric sample which indicated four percent hydrogen. TMIA Mailgram Exh. 32H, at 43. However, the first containment atmospheric sample was not taken until March 31 and that sample showed 1.7% hydrogen. Lowe, ff Tr. 28,151, at 13. In addition Kunder testified that he did not have any knowledge of hydrogen concentration until the weekend (March 31-April 1). Tr. 30,011 (Kunder).

consider the possibility of a zirconium-water reaction, and had no concern that hydrogen had reached flammable limits. Tr. 30,007-08, 30,016 (Kunder). Kunder's testimony is consistent with his prior statements. See JME 1(c)(80), at 74-75; JME 1(c)(118), at 52-55.

REPLY 20. Since Kunder's concern was only with long-term hydrogen generation and not prompted by a specific knowledge of a hydrogen concentration, whatever discussion ensued on the 29th concerning setting up a hydrogen recombiner says nothing about zirconium-water reaction and is thus irrelevant. Urgent attempts to contact people to assist in setting up hydrogen recombiners did not occur until Friday, March 30th, after th significance of the pressure spike had been recognized. Tr. 31,010-11, 30,018-019 (Henrie).10/

REPLY 21. TMIA next refers to written statements by Thomas Crimmins made during discovery. TMIA PF 294-296. TMIA infers from Crimmins' statements that the chart showing the pressure spike was viewed and discussed by everybody at the March 29th meeting; TMIA then suggests that Lowe must also have seen the pressure spike and must immediately have recognized its significance. Crimmins, however, stated that he (Crimmins) viewed and

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10/ TMIA refers to Dieckamp's notes of the 30th to suggest that Licensee attempted to contact Atomics International a few hours earlier on the 30th than Henrie remembers. TMIA PF 300. See TMIA Mailgram Exh. 27, at 3. Dieckamp's notes, however, do not indicate who was contacted; but even if it had been Henrie, the inability to remember a precise hour of a day almost six years ago simply does not detract from the credibility of his testimony.

discussed the spike during the meeting, and that the spike was assessed to have been a spurious instrumentation problem.11/ Crimmins did not state that the pressure spike was shown to Lowe or to anyone else. TMIA Mailgram Exh. 32F. Lowe testified that he was not shown the strip chart, although he did remember someone mentioning at some point on the 29th the pressure spike as a spurious indication. Lowe, ff Tr. 28,151, at 10; Tr. 28,177-78 (Lowe). The Board finds this testimony consistent, not contradictory. It also indicates strongly that at the time of this meeting, more than 24 hours after the pressure spike, the significance of the pressure spike had not yet been recognized.

REPLY 22. Finally, TMIA refers to testimony by Kunder. TMIA PF 297. TMIA states that Kunder "recall[ed] that the pressure spike was discussed at the first meeting of the Task Force." Kunder, however, testified that "I became aware of the pressure spike either on the 29th or 30th either during or after a meeting that I attended in Unit 2 to begin the assessment of the accident." Tr. 29,998 (Kunder) (emphasis added). When TMIA's counsel suggested to Kunder that he had previously testified that he remembered the discussion at the first meeting of the task force --

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11/ That the pressure chart was seen by Crimmins the late afternoon of March 29th is conceivable but by no means clear. The chart was removed about noon on the 29th. See LIC PF 98-103; LIC REPLY 165-168 infra. It was the subject of discussions among plant personnel the evening of March 29th before it was shown to Lowe in the control room at about 11:00 p.m. See LIC PF 22-23, 100. No one has testified nor is there other probative evidence, however, that anyone understood the cause of the spike prior to Lowe's interpretation of the pressure chart at about 11:00 p.m.

on the 29th -- Kunder subscribed to the suggestion and stated that it was about the same time. Tr. 29,999 (Kunder). TMIA's suggestion, however, was inaccurate. In a May 1979 interview, Kunder stated that he learned of the spike "somewhere around Friday that would have been the 30th." JME 1(c)(37), at 50. He stated that it was either during the Events Analysis and Recovery Group meeting or during a discussion he had with Broughton's group of engineers. Id. In a September 1979 interview, Kunder stated that it was sometime after, though perhaps at, the Events Analysis and Recovery Group meeting that he was informed of the pressure spike. JME 1(c)(80), at 74-75.

REPLY 23. Kunder also testified in this proceeding that he thought Gary Broughton was the individual who showed him the chart. Tr. 30,001 (Kunder). Kunder believed that hydrogen, along with instrument malfunction, was offered as a possible explanation -- possibilities that needed to be examined. Tr. 30,004-05 (Kunder). Kunder also previously stated that the individual who showed him the pressure spike told him it had occurred that day. JME 1(c)(37), at 51.

REPLY 24. Broughton testified in this proceeding that he remembered no discussion or observation of the pressure spike at the meeting or with Kunder on the 29th. Tr. 31,159, 31,166 (Broughton). Moreover, he testified with confidence that he did not learn there had been a hydrogen explosion until Friday morning (March 30). Tr. 31,198-201 (Broughton). In addition, Broughton testified that when he was informed of the pressure spike, he at

first did not understand that it had not just occurred. Tr. 31,199 (Broughton). Since Kunder remembers being told of the spike by Broughton and also remembers being told that the spike had occurred that day, it appears extremely likely that any conversation with Kunder occurred on Friday.

REPLY 25. Accordingly, the Board finds that the testimony or evidence to which TMIA refers does not discredit Dieckamp's belief -- a belief which the Board accepts -- that William Lowe was the first person to correctly interpret the pressure spike.

REPLY 26. Finally, TMIA states that Abramovici recalls during the afternoon meeting on March 29th discussion concerning the need to contact Atomics International in order to hook up a hydrogen recombiner. TMIA points to a log entry for 8:55 a.m.12/ as evidence of the startup of a hydrogen recombiner. TMIA PF 298. TMIA's inference that a hydrogen recombiner was started at 8:55 a.m. on March 30, 1979 approaches the impossible. Kunder testified that he knew of no efforts to start a recombiner on March 30th and since he was given the full-time assignment to coordinate the effort to hook up a recombiner during the week-end of March 31st, he would have been aware of any prior efforts to hook up and operate a hydrogen recombiner. Tr. 30,041-45, 30,087-089 (Kunder). Kunder described the effort to hook up and check out the recombiner as an around-the-clock effort for two to two and a half days. Tr. 30,087-88 (Kunder).

12/ TMIA does not say what day this entry refers to. The Board's review of TMIA Mailgram Exh. 16, at 6 suggests the 8:55 a.m. entry probably refers to March 30, 1979. See Tr. 30,042-043 (Kunder).

REPLY 27. TMIA in footnote 30 (TMIA PF 298 n.30) of its proposed findings cites James Henrie's testimony that the hydrogen recombiner was started on Monday, April 2, 1979 (TMIA incorrectly states that Monday was April 1). However TMIA misstates that Atomics International personnel were not asked to come to TMI until March 31, 1979, "[p]resumably [because] Licensee had no serious concern about hydrogen in the reactor building...until that time." TMIA's statement reflects a total lack of understanding of the events associated with the accident as well as the evidence adduced in this proceeding: Henrie testified that he was first contacted by GPU on Friday, March 30th, probably before noon; he was asked to be on standby alert to go to TMI and was requested to get approvals to go. Tr. 31,010 (Henrie). Through the afternoon and evening of March 30th a series of telephone conversations occurred between GPU and Henrie. Tr. 31,011 (Henrie). This squares with the flurry of activity on that day following Lowe's discovery. See LIC REPLY 12, 20 and 20 n.10, infra. Compare Tr. 31,011 (Henrie) (questions by AI to GPU of need for hydrogen recombiners on March 28 and 29 met with negative response).

Dieckamp's Information from Miller and Herbein

REPLY 28. Through a remarkable interpretation of the evidence, TMIA would have us find that Herbein and Miller briefed Dieckamp during the afternoon of March 28th, either during their short conversation on the steps of the Capitol or after their meeting with the Lieutenant Governor, on incore thermocouple

readings greater than 2200°F, the pressure spike and the hydrogen burn. TMIA PF 197, 200-202. Mr. Dieckamp, on the other hand, testified that at no time on the 28th or 29th did anyone mention to him such incore thermocouple readings, the pressure spike, or hydrogen. Dieckamp, ff Tr. 28,316, at 5. Inasmuch as we conclude that Herbein and Miller did not know in the afternoon of the 28th that there had been a pressure spike, did not know that it had been caused by a hydrogen explosion, and did not believe that the reported thermocouple indications were accurate (Herbein did not know of the incore temperature readings in the range of 2200°F), we necessarily conclude that they did not pass such information on to Dieckamp. See LIC REPLY 107-137 infra. Even if we were to assume that Miller and Herbein were aware of or appreciated these facts, their passing them to Dieckamp is unadulterated supposition.

REPLY 29. TMIA suggests two times when Miller and Herbein could have briefed Dieckamp on the 28th on the status of the plant -- just before and just after the Lieutenant Governor's meeting. TMIA PF 197, 200-202. TMIA's argument, however, is supported solely by attacks on the credibility of the alleged participants.

REPLY 30. In an attempt to bolster its position that Dieckamp received such a briefing by Miller and Herbein on the 28th despite Dieckamp's denial, TMIA suggests that Dieckamp's statement to the Pennsylvania Public Utility Commission (PaPUC) made at 11:30 in the morning of the 28th that "there is no evidence of any radiation that is detectable above the background

levels in the area" was a misrepresentation.13/ TMIA PF 192-194. Thus, TMIA argues, if Dieckamp's statements to the PaPUC regarding radiation readings were not accurate, we should question his testimony on his knowledge of the pressure spike. It was established during the hearings by a preponderance of the evidence, most of which TMIA chooses to ignore, that contrary to TMIA's suggestion Dieckamp's statement to the PaPUC reflected his knowledge at the time.

REPLY 31. TMIA attempts to show that Dieckamp was informed by Walter Creitz, President of Metropolitan Edison Company (Met-Ed), of off-site radiation readings above background prior to addressing the PaPUC at 11:30 a.m. TMIA PF 192. We find it unlikely, however, for a number of reasons that Creitz talked to Dieckamp before Dieckamp addressed the PaPUC at 11:30.14/

13/ TMIA also asserts that Dieckamp omitted information on the accident from an earlier statement to the PaPUC at about 9 a.m. on the 28th. TMIA PF 193 n.21. See TMIA Mailgram Exh. 4. Dieckamp's knowledge at that time of off-normal radiation releases and his concern regarding the functioning of the ECCS form the basis for TMIA's assertion. Dieckamp explained that the off-normal radiation releases of which he was aware were within the plant (Tr. 28,386, 28,609-10 (Dieckamp)), and that the President of Metropolitan Edison Company, Walter Creitz, had informed him just prior to the PaPUC meeting that there had been no off-site radiation readings above background (Tr. 28,937-38 (Dieckamp)). As to the functioning of the ECCS, there is no evidence showing that Dieckamp's concern led him to believe a danger to the public existed. See JME 1(c)(66), at 123 (Dieckamp); Dieckamp, ff Tr. 28,316, at 6. We find his earlier statement to the PaPUC reflected Dieckamp's appreciation of the seriousness of the accident at the time it was made.

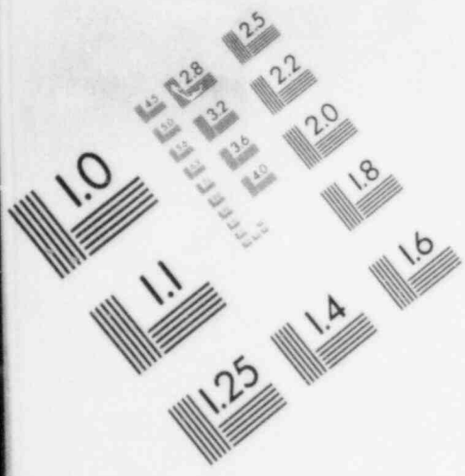
14/ This would have been a second conversation between Creitz and Dieckamp. It is uncontroverted that Creitz earlier spoke with Dieckamp prior to the start of the PaPUC meeting at 9:00 a.m., informing Dieckamp of no off-site radiation readings above background. See LIC REPLY 30 n.13, supra.

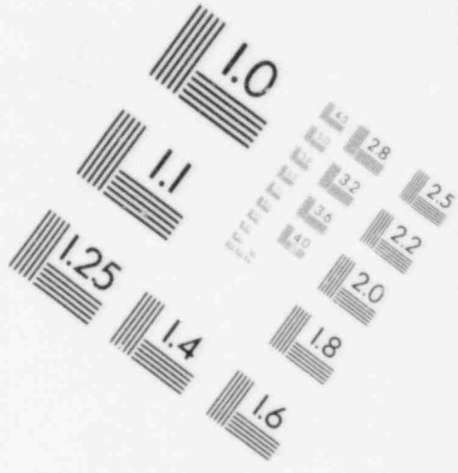
REPLY 32. First, Dieckamp does not recall Creitz informing him of off-site radiation readings (Tr. 28,301, 28,390, 28,400 (Dieckamp)) and questions the timing of the call (Tr. 28,940 (Dieckamp)). Second, Creitz fixed the time of his conversation with Dieckamp "prior to noon", not prior to Dieckamp's appearance before the PaPUC at 11:30. Creitz deposition, ff Tr. 29,708, at 25. Third, while Creitz stated that he learned of off-site readings prior to 11:00 a.m. (Creitz deposition, ff Tr. 29,708, at 24), the first off-site radiation readings were measured after 11:00 a.m.15/ Creitz could have learned about them and informed Dieckamp only after that. However, Dieckamp attended a press briefing being given by the Lieutenant Governor which began at 10:55 a.m. (JME 1(c)(143), App. C, at 131 (Udall Report); Tr. 28,401 (Dieckamp)) and ran about 30 minutes. Tr. 28,938 (Dieckamp). Fourth, Creitz testified that he called the Lieutenant Governor about the off-site readings after the press briefing but before he called Dieckamp.16/ Creitz deposition, ff Tr.

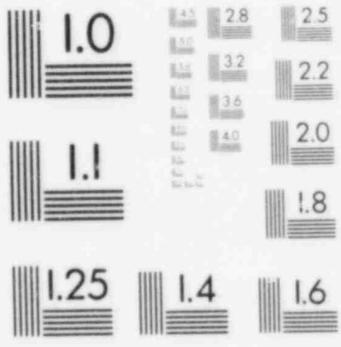
15/ TMIA cites an NRC Preliminary Notification issued on March 28th which states that a 3 mR per hour reading had been recorded off-site by 10:45 a.m. for the proposition that off-site radiation readings had been recorded that early. TMIA PF 193. This information appears to be inaccurate. Readings of that magnitude had been measured before 10:45 a.m., but on-site in the North Parking Lot. See Tr. 28,961-62 (Dieckamp). The first off-site readings above background were measured after 11:00 a.m. JME 1(c)(62), App. II C, at II-C-1 (NUREG-0600). If Creitz had information regarding radiation readings prior to 11:00 a.m. they had to be on-site readings. Creitz's own notes relied upon by TMIA confirm this to be the case. TMIA Mailgram Exh. 9, at 5-6.

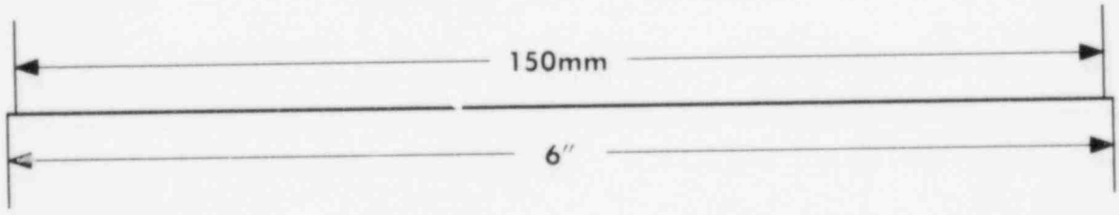
16/ Creitz's notes fix the time of his call to the Lieutenant Governor at about 11:30. TMIA Mailgram Exh. 9, at 5.

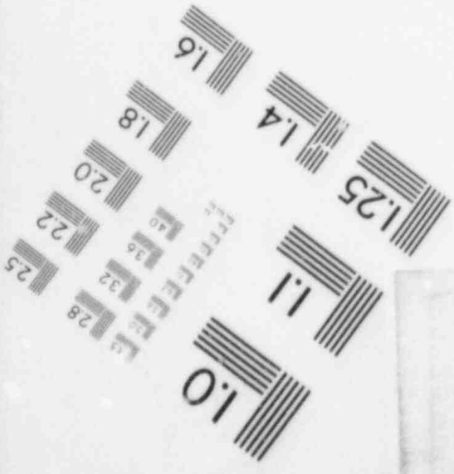
IMAGE EVALUATION TEST TARGET (MT-3)

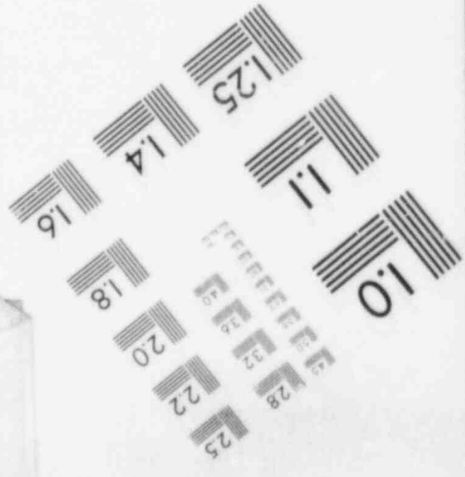












29,708, at 29. Creitz would therefore have had to have made two calls in the 11:25 to 11:30 a.m. time period if he talked with Dieckamp before Dieckamp addressed the PaPUC at 11:30 a.m. While it may be physically possible for Creitz to have spoken with both the Lieutenant Governor and Dieckamp between 11:25 and 11:30 a.m. it is very unlikely. It would have required extremely fortuitous timing for Creitz to have caught up with and talked to the Lieutenant Governor and then to have talked to Dieckamp in a time window of just a few minutes.

REPLY 33. Lastly, Creitz testified that when he talked with Dieckamp he told him that he had already talked with the Lieutenant Governor. Creitz deposition, ff Tr. 29,708, at 29. Had Dieckamp just learned of information he knew literally had just been given to the Lieutenant Governor, we find it inconceivable that he would not have provided that information to the PaPUC.

REPLY 34. Though the timing of Dieckamp's conversation with Creitz is in doubt, there is no doubt that Dieckamp had heard in the Lieutenant Governor's press conference just prior to his addressing the PaPUC that no radiation readings above background had been measured. JME 1(c)(143), App. C, at 131-32 (Udall Report). Dieckamp also knew that the Pennsylvania Bureau of Radiation Protection (BRP) was in continuous contact with plant personnel (Tr. 28,400-401, 28,925-26 (Dieckamp)) and a representative of the BRP participated in the briefing (JME 1(c)(143), App. C, at 131-132 (Udall Report)).

REPLY 35. Based on the above we find Dieckamp's statement to the PaPUC was an accurate reflection of what he knew at the time.

REPLY 36. TMIA continues its attack on the credibility of Dieckamp, as well as the credibility of Herbein, Miller and Kunder by arguing that it is incredible that the participants in the conversation on the Capitol steps do not remember more being said.17/ TMIA PF 197. However, the testimony of the participants was that very little was discussed, not that they do not recall what was discussed. Tr. 28,402-03 (Dieckamp); Tr. 30,071 (Kunder); Tr. 30,214-16 (Miller); Tr. 30;378-79, 30,381 (Herbein). It is quite reasonable that little was discussed, since Miller, Herbein and Kunder were already late for their meeting with the Lieutenant Governor (Tr. 28,402-03 (Dieckamp); Tr. 30,215-16 (Miller)) and Dieckamp was concerned that they proceed to the meeting as quickly as possible (Tr. 30,071 (Kunder)).

17/ TMIA also questions Herbein's credibility by making the wholly unsupported statement that Herbein told the Lieutenant Governor during their 2:30 p.m. meeting "that Met-Ed had measured no off-site radiation releases" even though he knew such measurements had been made. TMIA PF 203-204. The only document cited by TMIA in support of this statement, JME 1(c)(142), at 42, makes no mention of Herbein, has no description of what Herbein, Miller or Kunder said at the meeting and says nothing about what they knew. We find no reason to doubt Herbein's testimony to the effect that if he knew about off-site readings above background he told the Lieutenant Governor about them. Tr. 30,374-75, 30,377 (Herbein). We also note that the only off-site releases above background that had been measured up until the meeting, had been taken after 11:00 a.m. (See JME 1(c)(62), App. II-C, at II-C-1 (NUREG-0600)) and were apparently passed on to the Lieutenant Governor by Creitz at about 11:30 a.m. (TMIA Mailgram Exh. 9, at 5), 3 hours before the meeting with Miller, Kunder and Herbein.

REPLY 37. TMIA argues that it is incredible that Dieckamp would return to Parsippany, New Jersey after talking with Miller, Herbein and Kunder without seeking further information, either from them or from other sources. TMIA PF 198-199, 202. Dieckamp has testified that he felt he did not need additional information because he had been given the impression that the plant was stable from the conversation on the Capitol steps with directly involved and, to him, the most knowledgeable plant personnel. Tr. 28,333, 28,403-05 (Dieckamp). He also felt that to go to the plant would unnecessarily interfere with whatever recovery efforts were in process. JME 1(c)(123), at 10-11 (Dieckamp). We find Dieckamp's testimony reasonable and uncontroverted.

REPLY 38. In further support of their argument that Miller, Herbein and Kunder briefed Dieckamp after the meeting, TMIA attempts to correlate what it refers to as "time gaps." TMIA PF 200-202. These "time gaps" are periods of time, after the meeting with the Lieutenant Governor, during which Miller, Herbein and Kunder have testified that they cannot recall what they did other than return to the site. See Tr. 30,072-73 (Kunder); Tr. 30,220 (Miller); Tr. 30,382-83 (Herbein). Dieckamp has testified that he returned to Parsippany but has no specific recollection of his activities other than hearing a radio broadcast of a statement by the Lieutenant Governor during his return trip. Tr. 28,892 (Dieckamp). The mere fact that Herbein, Miller and Kunder do not recall anything that they did during the period following the Lieutenant Governor's meeting other than to return to the site

does not constitute evidence that they briefed Dieckamp. The simple statement of the proposition reveals its absurdity.

REPLY 39. In addition, the alleged "time gap" is quite short if it exists at all. Miller, Herbein and Kunder left TMI at about 2:00 p.m. Tr. 30,245-47 (Miller); 30,419 (Herbein). The trip to the capitol takes 30 minutes. Tr. 30,246 (Miller). The meeting with the Lieutenant Governor lasted between one half an hour and one hour. JME 1(c)(67), at 17 (Herbein) ("a little less than an hour"); JME 1(c)(62), App. IA, at I-A-89 (NUREG-0600) ("30-45 minutes"). Considering that the return trip to TMI took 30 minutes, the earliest they conceivably could have been back at TMI is between 3:30 p.m. and 4:00 p.m., assuming there were no delays for any reason at any point in the trip. Some accounts place Miller at the site at at 4:00 p.m.; others, at 4:30.18/ JME 1(c)(10), at 21 (Miller et al.); JME 1(c)(62) App. IA, at I-A-103 (NUREG-0600). This hardly supports the one and one half to two hours TMIA asserts. See TMIA PF 201. In all likelihood there is no "time gap". That there is not today a recollection of the return trip may represent no more than an absence of anything important which they can recall, not the basis for filling the time with a trumped-up, clandestine meeting. Indeed, all four individuals have consistently testified that there was no such meeting (Tr. 28,408 (Dieckamp); Tr. 30,072 (Kunder); Tr. 30,214-15, 30,221

18/ Miller, Herbein and Kunder traveled together to Harrisburg to brief the Lieutenant Governor. Tr. 30,213 (Miller); Tr. 30,343, 30,382 (Herbein); Tr. 30,070 (Kunder).

(Miller); Tr. 30,382-83 (Herbein)) and nothing prompts us to question that testimony.

REPLY 40. TMIA asserts that it is not believable that Dieckamp did not take immediate action in response to the Lieutenant Governor's public statement in the afternoon of the 28th that the accident was more "complex"19/ than the company had first led them to believe. TMIA PF 191. Dieckamp explained that though he was stunned to hear the Lieutenant Governor's public statement on the car radio during his return trip to New Jersey, he felt no need to alter his plans and continued home. Tr. 28,409-10 (Dieckamp). The public statement did not appear to Dieckamp to reflect information different from what he gathered from Herbein, Miller and Kunder. Id. Dieckamp had reason to be comforted as to the outcome of the Herbein meeting with the Lieutenant Governor. The Lieutenant Governor's public statement which Dieckamp heard said there was no danger to the public health and while the Company had given the public and the state conflicting information, "He just concluded a meeting with Company officials and hope this briefing will clear up most of your questions." JME 1(c)(143), App. D, at 133 (Udall Report). We find Dieckamp's explanation reasonable and credible.

19/ TMIA has the Lieutenant Governor stating that Met-Ed misled him as to the "seriousness" of the accident. TMIA PF 191. Compare JME 1(c)(143), App. D, at 133 (Udall Report).

Dieckamp's Information from Keaten

REPLY 41. TMIA would have us find, despite consistent and repeated testimony to the contrary by Broughton and Keaten, that Broughton told Keaten of the hydrogen burn early on March 29th and that Keaten passed that information on to Dieckamp immediately thereafter. TMIA PF 207, 211, 222, 224-226.

REPLY 42. TMIA's argument centers around a telephone briefing Broughton gave Keaten which included a statement that there had been a hydrogen explosion in the containment. See TMIA PF 207. Both Broughton and Keaten have unequivocally stated that that briefing took place on March 30th. Tr. 31,131, 31,148-49 (Broughton); Tr. 31,269-71, 31,292, 31,297 (Keaten).

REPLY 43. The first flawed element of TMIA's argument that the briefing took place on March 29th is TMIA's assertion that Broughton knew early on the 29th that the pressure spike had been a hydrogen explosion, and that there had been a zirconium-water reaction. TMIA PF 211. As previously noted, Broughton testified he did not have this information on the 29th. See LIC REPLY 24, supra.20/

REPLY 44. TMIA argues that Broughton would not have talked with Keaten after Wilson (Keaten's superior) arrived at the site on the afternoon of the 29th and thus the Broughton/Keaten conversation must have occurred the morning of the 29th. TMIA PF

20/ With regard generally to information gathered by GPUSC engineers on March 28, see LIC REPLY 155-172, infra.

208-210, 212. Although it is true that Wilson took charge of the initial effort at TMI in which Broughton was participating, probably on the 29th, there is certainly no evidence that Broughton was precluded from passing information on to Keaten subsequent to Wilson's arrival. Indeed, Keaten has testified that their conversation on the 30th was pre-arranged to help him brief Dieckamp that morning. Tr. 31,248, 31,254-56 (Keaten).

REPLY 45. As early as June 1, 1979, Keaten positively fixed the date of his telephone conversation with Broughton as the 30th. He explained during an NRC interview on that date that on Thursday, March 29th, he left work early (which indicated that the magnitude of the accident was not then appreciated). JME 1(c)(45), at 6. That evening Arnold called Keaten and arranged for Keaten to talk with the GPUSC engineers (i.e., Broughton) at the site and then brief Dieckamp on what he learned. Tr. 31,254-56 (Keaten). Friday morning, March 30, Keaten went to the Morristown Airport to take a flying lesson (which is a further indication that he did not understand how serious the accident was). He met Arnold there who explained then that the accident was more serious than previously thought and that he, Arnold, was going to the site. Keaten then went to work and talked with Wilson and Broughton and thereafter to Dieckamp. It was at this point that Keaten was first aware of the severity of the accident. JME 1(c)(45), at 6-8 (Keaten). Nothing in Keaten's actions on the 29th give a hint that he had been told of the hydrogen explosion the morning of March 29th; Keaten at the time was Manager of Systems Engineering (See Tr. 31,237 (Keaten)).

REPLY 46. TMIA then proceeds to Keaten's notes of his conversation with Broughton to support its position. TMIA PF 213-217. Keaten originally noted "3/29/79" at the top of the first page of the notes of the conversation, but later realized that was an error and so indicated by adding in red ink a question mark and "3/30." Tr. 31,260-61, 31,270-71 (Keaten). The correction was made prior to an October 1979 SIG interview (Tr. 31,271 (Keaten)) and Keaten clearly identified these notes as early as June 1, 1979 as taken during his March 30th conversation with Broughton (JME 1(c)(45), at 6-8 (Keaten)). TMIA would have the Board ignore the correction, but Keaten's consistent testimony on this point is credible and we believe he was in error when he first wrote "3/29/79." We find particularly persuasive the inclusion in the same Keaten notes of the results of a primary coolant sample along with the words "last night." See TMIA Mailgram Exh. 10, at 14. Keaten pointed out that a sample of the same quantity and yielding the same results as indicated in his notes was taken on Thursday night, the 29th, according to NUREG-0600. Tr. 31,296-97 (Keaten). See JME 1(c)(62), App. IIA, at II-A-59 (NUREG-0600). TMIA's observation that Broughton included a summary of Dieckamp's activities of the previous day in his report to Keaten and Keaten noted those activities adds little to TMIA's argument. See TMIA PF 223. It is hardly surprising in a conversation whose very purpose was to provide Keaten information in order to brief Dieckamp (Tr. 31,254-56 (Keaten)), that Broughton would pass on information regarding Dieckamp's activities of which he was aware.

REPLY 47. TMIA refers to two other points in Keaten's notes in an effort to place them on March 29th. TMIA PF 221 n.23. The first is a reference to Keaten's notation of the size of the bubble in the reactor vessel. See id. TMIA argues that the number shown could be read either as "1000" or "2000" cubic feet. Id. But see TMIA PF 216 (where TMIA cites the figure as "1000"). TMIA points to Lowe's initial calculation of 1500 cubic ft. the night of the 29th/30th and concocts that the 1000 or 2000 estimate in Keaten's notes must have been an earlier, rougher calculation of which no one has been aware to this point. See TMIA PF 221 n.3. Apart from the complete lack of evidence that such an earlier calculation was ever made as postulated by TMIA, the fact is that Lowe made more than one calculation. Lowe calculated the bubble size to be 1100 cubic feet after he calculated the 1500 cubic foot volume. Lowe, ff Tr. 28,151, at 12. It is therefore more likely that the Keaten notes simply reflect 1000 which corresponds closely to Lowe's second calculation of 1100 made during the night of the 29th/30th.

REPLY 48. TMIA also argues that inclusion by Keaten in his notes of primary system pressures and temperatures recorded on March 29th under "present status" fixes the date of the notes as March 29th. However, evidence was not adduced showing that these pressures and temperatures were unique to March 29th and did not also exist on March 30th as well. In addition, TMIA's extrapolation of the pressure and temperature readings which it claims were taken at 1:30 p.m. on March 29th, to the morning of

the 29th to make them coincide with TMIA's version of the Broughton/Keaten conversation (TMIA PF 221 n.23) is completely unsupported by the record. Moreover, the particular entry in Seelinger's notes, to which TMIA refers, was made at 6:30 p.m., not 1:30 p.m. (i.e., 1830, not 1330). See TMIA Mailgram Exh. 2, at 7.

REPLY 49. We conclude that Broughton passed the information contained in Keaten's notes to Keaten on the morning of March 30th and that Keaten passed that information on to Dieckamp that same day.21/

Dieckamp's Understanding of Core Damage

REPLY 50. The Board is requested by TMIA to find that Dieckamp had sufficient knowledge of core damage on March 28 or early March 29, 1979, to imply that he was then aware of the hydrogen burn. TMIA PF 236. TMIA would have us find that Dieckamp discussed core damage on March 29th with Robert Arnold and that Dieckamp meant in that discussion core damage caused by a zirc-water reaction. TMIA PF 228. TMIA would also have us find that this discussion with Arnold preceded Dieckamp's signing a memorandum authorizing the formation of a Task Force. TMIA's argument is misplaced in two respects. First, the sequence is not as clear as TMIA suggests.22/ Arnold's testimony cited by TMIA

21/ We so find recognizing that Mr. Dieckamp no longer remembers his briefing by Keaten on the 30th. See Tr. 28,646-47 (Dieckamp).

22/ The sequence is material to TMIA's position that Dieckamp provided his views on core damage to Wilson at the time Dieckamp

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suggests that the core damage discussion with Dieckamp occurred after signing the memorandum. Arnold testified:

> "I believe we went over and talked with Dieckamp about 11:00 o'clock, before Wilson departed for the site, to review with Dieckamp the conclusions that Wilson and I had come to as to the scope and interface of the task force with the plant, and to have Dieckamp sign the letter which established the task group.
>
> Dieckamp and I at that time had some conversations about core damage. I think at that time, or very shortly thereafter, we talked about the possibility or the likelihood really that we had experienced some core damage and I think that at that time we were of the opinion that there probably had been some of what I would term in our perspective of that time period significant core damage.

Arnold deposition, ff Tr. 28,635, at 25. The Board also observes that, with respect to the understanding of "significant core damage" held by Dieckamp on March 29th, Arnold went on to testify "If someone wanted me to quantify it [significant core damage], I would say half a percent or a percent failed fuel type situation". Id. TMIA provides three citations to Arnold's testimony; two of these citations (JME 1-C (84), at 24-26, and Arnold deposition, ff Tr. 28,635) refer to the identical portions of Arnold's testimony found at separate places in our record, and the third citation simply is not relevant to the proposition set forth by TMIA. Dieckamp explained to our satisfaction what he meant on March 29th by core damage: "...a

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(Continued)

signed the memorandum appointing Wilson to head up the Task Force. See LIC REPLY 52, infra.

sense of local and limited fuel damage. At no time on March 28 or 29 did anyone mention to me core temperatures in excess of 2000°F, pressure spike, zirconium-water reaction, hydrogen, or core damage beyond failed fuel." Dieckamp, ff Tr. 28,316, at 5. TMIA's quoted text of Dieckamp's definition of "significant core damage" does not appear at the location cited by TMIA, but is found at page 121 of Dieckamp's deposition inserted following Tr. 28,632. TMIA there portrays Dieckamp as evidencing a degree of glibness when it states "Dieckamp claimed that 'significant core damage' meant little more than 'cracked fuel....'" TMIA PF 228. The context of this quoted portion does not support that attitude by Dieckamp. Further, Dieckamp supports the relevance of his interpretation of what he meant by core damage as being "consistent with the radiation observations." Id. TMIA, to bolster its argument that Dieckamp had reason to know of significant core damage the morning of March 29th, cites page 27 of JME 1(c)(84) (Arnold) for the proposition that "[i]t appears that Dieckamp was informed by Arnold on the morning of March 29 that HPI had been throttled the previous day." TMIA PF 228 n.24. TMIA would have the Board believe that Arnold had actual knowledge that HPI (high pressure injection) was throttled and so informed Dieckamp. However, in the same exchange with the interviewer on the very next page after that cited by TMIA, Arnold states just the opposite:

> I don't think it was a case of where we knew high pressure injection had been curtailed and therefore concluded that fuel damage had occurred, but we had other

> evidence that there was fuel damage and that without having had curtailment of high pressure injection that would seem to us to be very surprising.

JME 1(c)(84), at 28 (Arnold). Arnold and Dieckamp were apparently merely theorizing as an explanation of the known, high radiation levels, that if the ECCS had functioned correctly HPI must have been throttled. TMIA's contrary characterization of this evidence is flatly wrong.

REPLY 51. In TMIA's attempt to establish Dieckamp was aware of the hydrogen burn it sets forth two scenarios -- the evolution of Richard Wilson's appreciation of core damage leading to statements which Wilson made during a meeting in the afternoon of March 29th (TMIA PF 228-231), and the background for a memorandum from GPUSC vice president, Bud Cherry, to Mr. Dieckamp, dated March 29, 1979 (TMIA PF 232-235). TMIA's scenarios do not withstand scrutiny.

REPLY 52. Wilson has no recollection today as to what he specifically stated at the meeting regarding core status. Wilson, ff Tr. 31,504. However he does recall the sources of his information at that time and explained what they would have meant to him in terms of core damage. Wilson recalls that the latest information available to him was derived at a Congressional briefing conducted at the TMI Observation Center on March 29th, where he heard accounts of radiation levels. This information, together with general information he obtained the prior day from telephone conversations with the plant and with

Arnold formed the bases for his knowledge at the time of the 29th meeting. Tr. 31,519-20 (Wilson). Arnold did not give Wilson his assessment of the degree of core damage or fuel failure on March 28th; there were "simply general discussions throughout the day of the 28th about the accident at TMI." Tr. 31,513-14 (Wilson). See also Tr. 31,516-19, 31,521-22 (Wilson). During the morning of March 29th, Wilson recalls briefly discussing with Dieckamp his assignment to head up a Task Force but Wilson does not recall any assessment by Dieckamp of the degree of core damage or fuel failure. Tr. 31,514-15 (Wilson).

REPLY 53. Wilson testified that on March 28th and 29th he believed core damage to mean "something considerably above and beyond what was normal for operating reactors or reactors which had suffered some fuel pin damage...." Tr. 31,531 (Wilson). Further he stated "core damage can occur in discrete intervals from one pin all the way up to the totality [all the fuel pins]." Tr. 31,532 (Wilson). In response to Judge Wolfe's and Judge Smith's questions, Wilson testified (Tr. 31,538-40):

> THE WITNESS: I don't have an absolute or clear recollection of my exact words on anything that afternoon, but my understanding today and what I think transpired at that meeting would be that I had no basis to make such a statement, but would have had a technical feeling that a substantial number of fuel rods, fuel elements had breached their cladding integrity. And if somebody would interpret that as core loss or interpret it some other way, I just couldn't say.
>
> JUDGE WOLFE: And the radiation levels were not high enough on that date to indicate to you that there had been core damage?

THE WITNESS: Oh, the radiation levels on the 29th were clearly high enough to indicate fuel pins, large numbers of fuel pins of the core had breached their integrity.

JUDGE WOLFE: But not to the extent to indicate that the core was lost?

THE WITNESS: I don't think I would have come to the conclusion that the core was lost at that time, and my recollection of even a number of days after that meeting when the understanding had continued to develop was still not that the core was lost.

JUDGE SMITH: Mr. Wilson, if you had, as you perceived it to be, a substantial number of failed fuel pins, could that be an indication of two things; and I want an either/or of them.

One is that the plant would not be operated for a substantial amount of time? Answer that.

THE WITNESS: Yes, given the fact that the extent of the radiation problem that was described about the plant, clearly the plant would not be operative for an extended period of time.

JUDGE SMITH: And would that amount of failed fuel suggest the possibility that all of the fuel pins were lost, economically lost I mean, lost as far as their economic value or their ability to be used in the core?

THE WITNESS: I am speculating now, but my personal opinion would be that that determination could not be made until one looked at the thermal and other transients of the core and tried to assess whether just simple things like overtemperature or hydraulic problems would cause you to conclude that a fuel element which might even look like it had its integrity could reasonably be reused.

So I don't think you could come to that conclusion without a great deal of analysis and possibly even investigation of the fuel.

JUDGE SMITH: At least you held no such concept or appraisal in your mind at the March 29th meeting?

THE WITNESS: I don't believe so, no.

REPLY 54. The Board believes Wilson did form his opinion on the extent of core damage from the sources he stated, and not from Dieckamp or Arnold based upon information from the GPUSC engineers provided to corporate headquarters in New Jersey as TMIA proposes. (See LIC REPLY 49, supra, where we found that Broughton did not provide the information to headquarters until March 30th.) We further find in any event that Wilson's understanding of core status does not impute back to Dieckamp an awareness that a hydrogen burn had occurred or that TMI-2 had suffered serious core damage. See TMIA PF 231.

REPLY 55. TMIA's reliance on the content of the March 29th Bud Cherry memorandum is similarly flawed. The memorandum centers on communications generally following the initiation of the accident at TMI-2. TMIA Mailgram Exh. 5 (Cherry memorandum). It, however, is not of probative evidentiary value to support a conclusion that Dieckamp had been informed on March 28th of the high incore temperature readings and the hydrogen burn which would lead to a correct assessment that TMI-2 had suffered serious core damage, as proposed by TMIA. TMIA PF 235. As stated earlier (LIC REPLY 28, 49, supra), we find that Dieckamp did not receive this information on March 28th. The memorandum contains no mention of plant conditions which may have concerned Cherry, except for radiation levels. Cherry simply wanted to avoid a perpetuation of the weaknesses in communcations he perceived on the initial day of the accident

from going unaddressed for future events -- "to improve our ability to react. . . ." TMIA Mailgram Exh. 5, at 1 (Cherry memorandum).

REPLY 56. We find no support in the Cherry memorandum for the proposition that Dieckamp understood by the morning of March 29th that TMI-2 had suffered serious core damage much less that it demonstrates his awareness of the hydrogen burn.

II.A. What Evidence Existed on May 9, 1979, and What Conclusions Should Have Been Drawn From That Evidence, as to Whether Anyone Interpreted the Pressure Spike or Initiation of Containment Spray in Terms of Core Damage at the Time the Spike Occurred on March 28, 1979, or Withheld any Such Information?23/

(Response to TMIA PF 304-309)

REPLY 57. TMIA points to two statements -- the sole body of what TMIA claims to be "some evidence" in existence prior to the mailgram -- as indicating someone had interpreted the pressure spike in terms of core damage. These statements are a March 29, 1979 chronology of Hugh McGovern (JME 1(c)(1)) and an April 6, 1979 interview of Craig Faust (JME 1(c)(8)). TMIA PF 304-309.

REPLY 58. The McGovern-dictated chronology and the April 6, 1979 Faust interview are discussed in Licensee's Proposed Findings. See LIC PF 35-43. Neither of the statements

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23/ The Reply Findings in this section are intended to follow LIC PF 52 in Licensee's proposed findings of January 28, 1985.

mentions hydrogen; neither mentions core damage. Neither evidences an understanding of the pressure spike. In contrast, in a May 4, 1979 interview conducted by Licensee, McGovern stated "At the time we thought the spike on the recorder was an electrical spike and not an actual pressure spike." JME 1(c)(21), at 8. Faust, on the other hand, did not provide prior to May 9 a clear explanation of his understanding of the spike at the time it occurred.24/ However, the most that could be inferred from Faust's pre-mailgram interview is that he suspected the spike was caused by water flashing to steam and entering containment via the drain tank during an attempt to draw a bubble. See JME 1(c)(2), at 11 (Faust).

REPLY 59. TMIA argues, without support, that the only plausible explanation for the pressure spike was a hydrogen explosion. TMIA PF 307. TMIA continues that since these statements indicate awareness of a pressure increase, they must also evidence recognition of the pressure spike as a hydrogen explosion. TMIA PF 307, 309.

REPLY 60. The Board cannot accept such a syllogism. It assumes that both McGovern and Faust analyzed the pressure spike. TMIA does not show that either did; and given the circumstances under which they were operating on the 28th, the Board cannot assume they had the opportunity. Second, it

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24/ Faust's post-mailgram statements indicate that he too believed the spike was caused by an instrument malfunction. LIC PF 43.

assumes that they had a degree of knowledge that would preclude a wrong conclusion. This too TMIA does not show. In fact, the evidence demonstrates that operators were not trained to expect -- even to suspect -- hydrogen produced by a zirconium-water reaction. See LIC REPLY 67, 183, infra. Accordingly, the Board takes the statements of these individuals as evidence of no more than they state -- that they were aware of a pressure spike. The Board therefore finds that no evidence existed on or before May 9, 1979, that anyone interpreted the pressure spike or spray actuation in terms of core damage.

III.B. Whether Subsequent Statements By Anyone, Including Interviews and Testimony of Messrs. Chwastyk, Mehler and Illjes, Justify the Conclusion That One or More Individuals at the Time the Spike Occurred on March 28, 1979, in Fact Interpreted the Pressure Spik or Initiation of Containment Spray in Terms of Core Damage?25/

(Response to TMIA PF 15-169)

REPLY 61. TMIA asserts that the Dieckamp mailgram contained false information because control room operators and management understood the significance of the spike at the time it occurred. In support of this assertion, TMIA argues (1) that there was a general knowledge of the pressure spike and related events by TMI personnel (TMIA PF 21-25); (2) that the pressure spike was correctly interpreted by Joseph Chwastyk and

25/ The Reply Findings in this section are intended to follow LIC PF 119 in Licensee's proposed findings of January 28, 1985.

Brian Mehler (TMIA PF 26-70); (3) that the pressure spike was understood by Gary Miller and John Herbein (TMIA PF 71-101); (4) that the occurrence of the pressure spike and a hydrogen burn was common knowledge among site personnel on March 28th (TMIA PF 102-136); and, (5) that GPUSC engineers were aware of the pressure spike and hydrogen burn on March 28th and early March 29th (TMIA PF 137-167). But as discussed in Licensee's and Staff's proposed findings and as elaborated upon below, all of the persons to whom TMIA refers, with the exception of Chwastyk, have stated that they did not interpret the pressure spike in terms of core damage on March 28, 1979; and with respect to Chwastyk, the Board finds his present recollection uncorroborated and colored by post-accident learnings.

Awareness of Pressure Spike

REPLY 62. TMIA's first argument, that there was a general awareness of the pressure spike and related events by TMI personnel (TMIA PF 15-25), is by itself irrelevant. Dieckamp has never denied that some individuals were aware of the pressure spike. What is at issue is whether anyone interpreted the pressure spike in terms of core damage. Perhaps to overcome this infirmity in its argument, TMIA claims there was also general awareness of certain plant conditions (TMIA PF 16, 18-19, 26) -- presumably to imply that those aware of the pressure spike must have been aware of its significance. TMIA's proposed findings, however, contain inaccuracies and exaggerations, and do not support such inference.

REPLY 63. TMIA correctly states that at the time of the spike, some individuals heard a thud; but TMIA continues: "one person in the control room described it as 'shock waves'." TMIA PF 17. This proposed finding suggests that the individual (Craig Faust) heard the thud and described it as a shock wave, when in fact in the very interview which TMIA cites, Faust stated he did not hear the thud. JME 1(c)(8), at 5 (Faust). Rather, Faust's reference to shock waves appears to be a post hoc description of the shape of the spike on the reactor building pressure recorder strip chart. Id.

REPLY 64. In TMIA PF 21, TMIA lists fifteen individuals in addition to Faust who it claims were aware of one or more of the indications of the pressure spike. However, two of these individuals -- NRC Inspector Higgins and George Kunder -- stated quite clearly that they were not aware of any indications of the pressure spike on the 28th. JME 1(c)(37), at 50, 52 (Kunder); JME 1(c)(72), at 25 (Kunder); JME 1(c)(19), at 24 (Higgins). Another, Michael Benson, stated he did not know on what day he learned of the spike. JME 1(c)(126), at 4-11. Three of the individuals -- Gary Miller, Joseph Logan, and Leland Rogers -- indicated that they only heard a thud and were aware of no more; moreover, these three individuals did not characterize the noise as "an explosive sound caused by the hydrogen burn," as TMIA characterizes it.26/ With respect to the

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26/ LIC PF 45; JME 1(c)(23), Tapes 159-160, at 70-71 (Miller). LIC PF 108 (Rogers). LIC PF 52,109 (Logan). These individuals

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nine remaining individuals listed, not one stated he interpreted the pressure spike or any of its indications in terms of zirconium-water reaction or core damage.27/

REPLY 65. In total, TMIA identified some 30 individuals (accounting for redundancy by TMIA) who were aware of any indication of the spike (e.g. even just hearing a noise), although Licensee identified over 450 individuals who were related in some manner to the TMI-2 accident and surveyed them as to their knowledge of the spike. TMIA PF 21-23. The Board does not accept TMIA's characterization of this awareness as "general knowledge," particularly since NRC inspectors (Higgins and Neely) and several other individuals (e.g., Rogers and Logan) present in the control room stated that they too were unaware of the pressure spike. See LIC PF 113. As do all the parties, the Board recognizes that some people were aware of indications of the pressure spike, but will not impute such awareness to individuals who have stated they were not.28/

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indicated the thud was attributed to the closing of ventilation dampers. See LIC REPLY 109, infra.

27/ LIC PF 45; JME 1(c)(113), at 2-12 (Berry). LIC PF 46; JME 1(c)(109), at 38-41 (Flint). LIC PF 114 (Frederick). LIC PF 116 (Marshall). LIC PF 37-38 (McGovern). LIC PF 115 (A. Miller). LIC PF 118 (Ross). JME 1(c)(134), at 3-13 (Scheimann). LIC PF 51, 114 (Wright).

28/ TMIA asserts "there is also evidence that knowledge of the spike may have reached corporate headquarters in Parsippany, New Jersey, on March 28, although the individual who has so testified

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REPLY 66. TMIA asserts that at the time of the pressure spike operating personnel were also aware of incore temperatures in the range of 2500°F indicating the zirconium cladding was reacting with steam to produce significant amounts of hydrogen. TMIA PF 18. TMIA cites the [Modified] Stipulation of Parties on Mailgram Evidence and an August 1979 interview of John Herbein (JME 1(c)(67)) in support of this assertion. Neither is supportive. Licensee did not stipulate that operating personnel were aware of 2500°F incore temperatures. See Modified Stipulation of Parties on Mailgram Evidence, JME 1(A), ff Tr. 27,896, at 9. Nor does the Herbein statement cited by TMIA support its position. See JME 1(c)(67), at 39, which TMIA cites. In fact, as the record reveals, relatively few operating personnel were aware of incore thermocouple readings in the range of 2500°F and those who were aware of such readings largely discounted them as erratic and unreliable.29/

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attempts in the same interview to deny knowledge." TMIA PF 24. TMIA cites the NRC I&E interview of Donald Croneberger. In that interview, however, Croneberger stated only that Parsippany was asked when containment isolation would occur and what would be the significance. JME 1(c)(41), at 12-13. Croneberger specifically stated he did not recall the pressure spike being discussed. Id., at 14. TMIA's assertion is misleading.

29/ Incore thermocouple readings that were taken on the 28th are discussed at LIC REPLY 123-131, infra. TMIA makes no attempt to correlate those operating personnel aware of the pressure spike with those aware of high incore thermocouple readings. The testimony of the principal persons who TMIA claims understood the spike, however, clearly indicates that they either did not know of

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REPLY 67. TMIA also asserts that expert witnesses testified that flammable hydrogen is only reached when hydrogen reaches a volume of four percent of total containment, and this amount could only be produced within 10 hours through a zirconium-water reaction.30/ TMIA PF 18. The implication is that a massive zirconium-water reaction was therefore the only and obvious explanation for the spike. It ignores other explanations for a pressure signal, such as an erroneous signal or a steam

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the readings or were told and believed the readings were unreliable. Thus, Mehler has stated that he was not aware of incore thermocouple readings on the 28th. JME 1(c)(89), at 11. Chwastyk knew readings had been taken, but did not know specific temperatures and understood the readings to be unreliable. JME 1(c)(88), at 16; JME 1(c)(117), at 88.

TMIA again claims in TMIA PF 26 n.5 that incore temperatures were considered accurate and believed to be an indicator of core temperatures and possible core uncovery. In addition to Miller, whose belief is discussed at LIC REPLY 123, 126, 133, infra, TMIA refers to John Flint, William Zewe and three of the instrumentmen who on the morning of the 28th manually took incore thermocouple readings. Flint, however, was unaware that readings had been manually taken; he monitored only those readings that were printed out on the computer printout -- readings that printed out as "???" temperatures in excess of 700°F. JME 1(c)(56), at 25-26, 34-36. Zewe was also unaware of readings that had been manually taken. JME 1(c)(75), at 100. And while some of the instrumentmen may have believed the manual readings they took were accurate, it appears that they did not communicate their concerns to operating personnel; they were evacuated offsite shortly after the readings were taken, along with other nonessential personnel. See LIC REPLY 123 n.50, infra, and citations therein.

TMIA also asserts in TMIA PF 26 n.5 that concern over core damage and high incore temperatures reached corporate headquarters in Parsippany. TMIA's citations JME 1(c)(94), at 6 and JME 1(c)(74), at 37-38, simply do not support this assertion.

30/ In addition to testimony, TMIA cites JME 1(c)(6), at 195 to support the proposition. This citation, however, is nonsupportive.

excursion.31/ While it is apparent in retrospect that such other explanations could be ruled out through investigation and analysis (and indeed have been since the accident), it is equally apparent that a hydrogen burn was not intuitive to operators at the time. The operators were simply not trained to anticipate the occurrence of a zirconium-water reaction. Tr. 29,853-55 (Moseley); Tr. 30,069-70 (Kunder); Tr. 28,540-41 (Zebroski); JME 1(c)(124), at 51 (Ross); JME 1(c)(75), at 258-59 (Zewe).

REPLY 68. TMIA baldly asserts that operator awareness of incore thermocouple temperatures led them to a correct analysis of the reactor condition and a correct analysis of the pressure spike as a hydrogen burn at the time it occurred. TMIA PF 19. TMIA's lone citation, "See also, JME 1(c)(4), at 59-68, 73-74, 130," is nonsupportive. TMIA does not indicate which operators it claims were aware of both high incore thermocouple temperatures and the pressure spike -- operators who supposedly might have interpreted the pressure spike correctly as a result. See LIC REPLY 66 n.27, supra. The Board rejects TMIA's conjecture.

REPLY 69. TMIA also claims that "core uncovery and significant core damage was a major concern" early in the accident. TMIA PF 26. TMIA claims that this concern provides the

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31/ It also ignores the possibility of hydrogen from other sources (e.g., leaking from gas cylinders) or the possibility of a localized burn. See Zebroski, ff Tr. 28,441, at 7; Tr. 28,538-40 (Zebroski).

context in which to evaluate whether key people understood the pressure spike, and TMIA in its footnote 5 provides a string citation ostensibly to support its argument. TMIA's citations, however, do not evidence the type of concern TMIA implies. The "concern" for "core uncovery" was largely a concern to ensure the core was and remained covered, and not a recognition that the core was in fact uncovered. The concern was unfortunately allayed when attempts to flood the core suggested there had been little loss in inventory. JME 1(c)(87), at 35-38 (Rogers); JME 1(c)(79), at 44 (Higgins); JME 1(c)(93), at 5-7 10-12 (Miller); JME 1(c)(61), at 21-23 (Herbein).

REPLY 70. TMIA's reference to concern for "significant core damage" (TMIA PF 26) is similarly misleading. As is evident from the citations, the core damage feared on the first day of the accident was the damage made evident by the high radiation readings in containment -- some amount of failed fuel. It was this damage that was, by the standards of the time, perceived as significant. JME 1(c)(61), at 16-18, 20 (Herbein); JME 1(c)(72), at 17, JME 1(c)(37), at 52 (Kunder); JME 1(c)(121), at 4-6 (Arnold); JME 1(c)(123), at 9-10 (Dieckamp).

REPLY 71. Accordingly, the Board rejects TMIA's supposition. Contrary to TMIA's claim and speculation, the Board does not find key personnel were primed to appreciate the significance of the pressure spike.32/ In the same vein, while

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32/ TMIA claims control room operators understood the pressure spike and therefore changed the core cooling strategy. TMIA PF

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recognizing some persons were aware of the pressure spike, the Board will not infer that the spike was interpreted in terms of core damage.

REPLY 72. Much later in its findings (in concluding paragraphs), TMIA raises another argument and suggests that statements supposedly made by operators on the morning of the 29th indicate they recognized the pressure spike as a hydrogen explosion. TMIA PF 168-169. TMIA first asserts that site personnel being debriefed in the Observation Center spoke of the hydrogen explosion; TMIA bases its assertion on a statement by Gary Broughton.33/ TMIA PF 168, citing JME 1(c)(48), at 19 (Broughton). The debriefings Broughton refers to in the interview which TMIA cites are debriefings conducted on the night of March 29th and morning of March 30th. JME 1(c)(48), at 18-19.34/ These debriefings were conducted by members of the Events Analysis and Recovery Team. JME 1(c)(50), at 11 (Abramovici); JME 1(c)(43), at 17 (Wilson). See also Lowe, ff

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20. The finding is vague (identifying none of the operators to which it is purportedly referring), is conclusory, and is not supported by a single citation. With regard generally to repressurization, see LIC REPLY 99-105, infra.

33/ TMIA's entire argument is contained in one sentence which suggests the weight it is accorded by TMIA.

34/ In TMIA PF 168 n.18, TMIA refers to statements discussing debriefings on the evening of March 28/morning of March 29. The reference to these early debriefings, which were not conducted by the Events Analysis and Recovery Team and not referred to by Broughton, does nothing but obfuscate Broughton's testimony.

Tr. 28,151, at 3. Moreover, Broughton did not state that "operators coming off-site for debriefing in the Observation Center spoke of the hydrogen explosion," as TMIA alleges. What Broughton said was that some of the people who had been conducting interviews during the night of the 29th had learned of a possible hydrogen explosion. JME 1(c)(48), at 19. This statement is hardly surprising, since the night of the 29th was when Lowe recognized the pressure spike as a hydrogen explosion and informed other Team members. Lowe, ff Tr. 28,151, at 7, 11. Broughton did state, however, "That was I believe, that came out of a discussion in an interview. I believe it also came out of some of the data which had been plotted up during the night." JME 1(c)(48), at 19. It is apparent from this very statement that Broughton did not know exactly what the source of the information was. The Board observes that two operator interviews from the night of the 29th/30th are in evidence. JME 1(c)(2) (Faust); JME 1(c)(3) (McGovern). The pressure spike was mentioned in one of these interviews, but it was not characterized as either an explosion or a hydrogen explosion. JME 1(c)(2), at 11 (Faust).

REPLY 73. TMIA next refers to a September 1980 NRC interview of William Zewe as support for its assertion that hydrogen was discussed on the morning of the 29th. TMIA PF 168, citing JME 1(c)(119), at 42-43.35/ The Board has reviewed Zewe's

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35/ TMIA adds a string of citations not one of which provides support for the proposition that the pressure spike was correlated to hydrogen in the early morning of March 29th.

deposition. Zewe stated that he did not believe the pressure spike was real on the 28th. Zewe did recall some discussion of hydrogen explosion on the 29th, but had considerable difficulty remembering the time or substance of any particular discussion. He "guessed" that the discussion occurred on the morning of the 29th. JME 1(c)(119), at 42-43 (Zewe).

REPLY 74. Although Zewe "guessed" the time of the discussion was before noon on the 29th, he did recall Marshall, and perhaps Bensel, were participants. Id. Both these individuals were previously interviewed by the Special Inquiry Group. Bensel stated he learned of the spike on the evening of the 29th. JME 1(c)(107), at 54 (Rogovin/Frampton Memorandum). Marshall stated that his discussion of the pressure spike and hydrogen with Bensel and others occurred after 10 p.m. on the 29th. Id., at 55, 61. It is apparent, therefore, that Zewe was mistaken or intended to refer to the morning hours of the 30th.

Chwastyk's and Mehler's Interpretation

REPLY 75. TMIA argues at length that the Dieckamp mailgram is inaccurate because Chwastyk and Mehler correctly interpreted the pressure spike. TMIA PF 27-70. With respect to Mehler, this is indeed a remarkable assertion. Mehler has consistently indicated, in this proceeding and in past interviews, that he did not on March 28th recognize the pressure spike as a hydrogen explosion. See LIC PF 79-89. TMIA in effect proposes

that the Board ignore the direct testimony of this witness and instead accept TMIA's unsupported surmise. We refuse to do so.

REPLY 76. Chwastyk's testimony in this proceeding and in past statements, on the other hand, is evolutionary and not consistent, and reasonable men could indeed find support for differing conclusions. On balance the Board concludes that Chwastyk did not interpret the pressure spike in terms of core damage at the time of the spike. See LIC PF 59-78. Moreover, the Board notes at the outset that TMIA points to no evidence in existence on or before May 9, 1979 (the date when the mailgram was sent) to indicate Chwastyk understood the significance of the pressure spike. Chwastyk's statements cannot, therefore, make Dieckamp's mailgram inaccurate when sent.

REPLY 77. TMIA describes Mehler and Chwastyk's conclusions concerning core or fuel damage on the morning of the 28th. TMIA PF 27-28. As did everybody else who was aware of the radiation alarms, Mehler and Chwastyk recognized that there had been some fuel damage. However, with respect to Mehler, TMIA states by reference to a prior interview that he "determined that perhaps one-third of the core had been uncovered." TMIA PF 27. Mehler himself characterized his statement not as evidencing a conclusion that one-third of the core had been uncovered, but rather as a guess, a possibility he considered prior to core flood. Tr. 29,432 (Mehler).

REPLY 78. TMIA states that Chwastyk directed operations and reported directly to Station Manager Gary Miller. TMIA PF

29. TMIA cites Tr. 29,118 (Chwastyk). This statement is inaccurate. Chwastyk at the very page cited by TMIA stated that it was not a direct reporting line. Chwastyk in fact reported to Michael Ross, who Miller had placed in charge of operations to direct the shift supervisor. JME 1(c)(10), at 2 (Miller et al.). See also JME 1(c)(95), at 25 (Miller).

REPLY 79. After describing the observation of the pressure spike by Mehler and Chwastyk (TMIA PF 31-32), TMIA digresses and refers to statements by Walter Marshall and Hugh McGovern. TMIA PF 33-34. Neither Marshall nor McGovern gives any indication that Chwastyk or Mehler correctly interpreted the pressure spike. Both stated the spike was attributed to an instrument problem. See LIC PF 37-38, 116.36/

REPLY 80. TMIA also states that the steam generator and reactor coolant pressure indicators indicated a coincident but inverted pressure spike. TMIA PF 35. Viewed after the fact the reactor coolant pressure recorder strip chart does indicate an inverted spike, but there is no indication that anyone in the control room appreciated this at the time as substantiation of the containment pressure spike. On the other hand, the graphs of steam generator pressure to which TMIA refers in JME

36/ Marshall's statement regarding Miller's awareness of the spike is irrelevant to TMIA's argument that Chwastyk or Mehler correctly interpreted the pressure spike. Marshall's statement is addressed in the discussion of Miller's awareness below. See LIC REPLY 116, infra. Similarly, Mehler's impression of Miller's awareness of the spike, which TMIA discussed at TMIA PF 36, is addressed at LIC REPLY 115, infra.

1(c)(63) are derived from reactimeter data plotted after the accident. See JME 1(c)(63), App. TH, Figures TH4-TH7 (NSAC Report) (which state reactimeter channel at the bottom of each plot). See also JME 1(c)(63), App. PDS, at 1-3 (NSAC Report) (explaining the reactimeter and its channels). Chwastyk, whom TMIA questioned on the steam generator pressures, testified that he remembered an instantaneous steam generator pressure indicator, but could not recall there being a steam generator pressure chart. Tr. 29,407 (Chwastyk). As JME 1(c)(63), App. PDS, at 5-6 (NSAC Report) demonstrates, no such strip chart existed.

REPLY 81. TMIA correctly states that Chwastyk and Mehler discussed the pressure spike (TMIA PF 37), but incorrectly suggests by the order of its proposed findings that the conversation occurred before the spray pumps had been secured.37/ See TMIA PF 37-39. Chwastyk clearly stated that he discussed the pressure spike with Mehler after the spray pumps had been secured (i.e. six or more minutes after the pressure spike). Tr. 29,338 (Chwastyk). See also JME 1(c)(117), at 9-10. This conversation lasted perhaps one or two minutes. See Tr. 29,338 (Chwastyk).

REPLY 82. TMIA then recounts how Chwastyk ordered certain checks to verify containment integrity. TMIA PF 39. This fact

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37/ The sequence of events and conversations with Chwastyk is important in evaluating Miller's knowledge of the spike on the 28th. See LIC REPLY 85 n.39, infra.

does not indicate that Chwastyk believed the pressure spike to indicate a hydrogen explosion. It merely indicates Chwastyk perceived the pressure spike might reflect a real pressure increase. In fact, Chwastyk has previously stated that he ordered a containment check out of a concern that the pressure increase and decrease was caused by a steam leak followed by breach of containment. JME 1(c)(117), at 33. Chwastyk testified that he ordered valve positions checked and asked for an external check of containment (a visual inspection).38/ Tr. 29,127 (Chwastyk). Mehler only confirmed that valves and piping were checked. Tr. 29,486 (Mehler).

REPLY 83. TMIA next refers to a radiation check that was logged as being conducted shortly after the pressure spike and cites a June 12, 1979 statement by Leland Rogers to suggest this radiation check was conducted in response to the pressure spike. TMIA PF 40. This suggestion is incorrect. Rogers did not state that a radiation check was conducted in response to the pressure spike. The relevant log entry is one of many

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38/ Chwastyk previously stated that he asked for "an inspection" of containment; he could not recall who he asked to perform the inspection, but stated it was not a health physics or radiation control person. JME 1(c)(117), at 34. Chwastyk could not recall who he asked to perform an external check of containment. Nobody has ever corroborated Chwastyk's statement that such a check was ordered or performed. See, e.g., JME 1(c)(122), at 122-123 (Miller); JME 1(c)(124), at 48-49 (Ross); JME 1(c)(126), at 11-12 (Benson); JME 1(c)(133), at 10 (Faust); JME 1(c)(134), at 5-7 (Scheimann); JME 1(c)(136), at 54-55 (Logan); and JME 1(c)(137), at 11-12 (A. Miller). Chwastyk himself could not remember receiving any results. Tr. 29,129, 29,187 (Chwastyk); JME 1(c)(117), at 35-36.

recorded radiation checks in the vicinity of TMI and states "West, at security fence, around Unit 2 reactor building." Tr. 31,342 (Mulleavy) (reading TMIA Mailgram Exh. 32B (Log of Radiological Checks)). Rogers in the June 12, 1979 statement indicated that monitoring team reports led to the conclusion that containment had not been breached by the pressure spike. JME 1(c)(51), at 22. However, as Rogers stated in a cover sheet accompanying the June 12, 1979 statement, the information and conclusion in his statement was based in part on post trip review of data and interviews. Moreover, in a September 2, 1980 NRC interview, Rogers stated that this very conclusion in his June 1979 statement was one he made in reviewing data during the days succeeding the accident. It was not a conclusion drawn on the 28th; Rogers was aware of no concern for containment integrity on the day of the accident. JME 1(c)(110), at 31-35. The log entry to which TMIA referred is probably the one noted by Rogers in his post accident review and on which he based his conclusion -- after the fact -- that containment had not been breached. TMIA's argument is simply a bootstrap.

REPLY 84. TMIA next states "[s]ome individuals in the control room recall an explosion at or near the time of the spike." TMIA PF 41. TMIA, however, refers to the statements of only one individual -- Craig Faust -- who stated ten days after the accident that they probably had some sort of explosion. See LIC PF 39. TMIA does not explain the relevance of this statement to Mehler's or Chwastyk's interpretation of the

pressure spike. Perhaps TMIA is attempting to tie this statement to Chwastyk's recollection that his understanding of the pressure spike was triggered by someone mentioning having heard a noise. Tr. 29,319 (Chwastyk); JME 1(c)(99), at 10 (Chwastyk). Faust, however, stated he did not hear any noise. LIC REPLY 63, supra.

REPLY 85. TMIA proceeds to recount Chwastyk's purported conversation with Gary Miller. TMIA PF 42. TMIA states that this conversation occurred "[w]ithin minutes after the spike." Chwastyk, however, indicates that the conversation occurred several minutes after the spray pumps had been secured (i.e., eight to ten minutes after the spike). Tr. 29,338-40 (Chwastyk).39/ TMIA also exaggerates the testimony of Chwastyk which it cites. In the testimony cited by TMIA (Tr. 29,131-32) (Chwastyk), Chwastyk stated that he impressed on Miller that he thought they had "a real pressure increase." He did not testify that he told Miller of a loud noise that had been reported to him, and he testified only that he "believes" but is not certain that he told Miller the pressure increase coincided with the cycling of the EMOV. Tr. 29,131-32 (Chwastyk). He did not recall mentioning hydrogen or hydrogen explosion. Tr. 29,141, 29,154, 29,280-81, 29,350-51, 29,358 (Chwastyk). These statements do not evidence an understanding that a hydrogen

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39/ The timing is important; Miller must literally have been on his way out the door to brief the Lieutenant Governor. See LIC PF 70.

explosion had just occurred and was due to a zirconium-water reaction.40/

REPLY 86. TMIA suggests that Mehler may have discussed hydrogen with Chwastyk. TMIA PF 45. This assertion contradicts the direct testimony of both Mehler and Chwastyk. LIC PF 67. See also LIC PF 84 n.17.

REPLY 87. TMIA refers to Mehler's October 11, 1979 statement, in which Mehler speculated that someone on the 28th must have connected the pressure spike with the opening of the EMOV because an instruction was given not to start electrical equipment. TMIA PF 46, citing JME 1(c)(89), at 15. Mehler, however, subsequently retracted his statement and he today states the instruction could have been given on March 29th. Tr. 29,503, 29,520-22, 29,574-78 (Mehler). See LIC PF 86-93. Moreover, Mehler stated that his belief that the instruction was given to avoid a hydrogen ignition was merely an inference he subsequently drew. Tr. 29,510-12 (Mehler).

REPLY 88. TMIA suggests that Mehler changed his statement about the timing of the instruction after an article concerning his testimony was published in the New York Times. TMIA PF 47. However, Mehler was shown the article to which TMIA referred (TMIA Mailgram Exh. 17) and stated that he had never before seen it. Tr. 29,516 (Mehler). Mehler did admit becoming

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40/ With regard to Miller's understanding, TMIA PF 42-44 are discussed at LIC REPLY 111-114, infra.

concerned about the accuracy of his testimony following news accounts (Tr. 29,518-19 (Mehler)), but stated that his change in recollection was due to his having thought about the matter, reviewed logs, and explored the issue with co-workers. See LIC PF 86-88.

REPLY 89. TMIA argues that Mehler connects the instruction with his operating lift and backstop pumps, and that he can now only specifically recall starting these pumps on the 28th. TMIA PF 48. The record clearly establishes, however, that these pumps were started on both the 29th and the 30th, when Mehler was also on duty. See LIC PF 86, 91. Mehler in fact identified a log entry at 9:14 p.m. on March 29, which stated: "Placed RCP Lift Pumps in off (minimize sparking potential in RB)." Tr. 29,530-33, 29,574 (Mehler). See TMIA Mailgram Exh. 16, at 4. This entry indicated to Mehler that the lift pumps had been started in case it were necessary to start another reactor coolant pump. Tr. 29,531-33 (Mehler). Mehler acknowledged that this could have been the event that occasioned the remarks he remembered, though he is not certain. Tr. 29,578 (Mehler).

REPLY 90. TMIA attempts to bolster Mehler's October 11, 1979 statement that an instruction not to start equipment was given on March 28th, by referring to two interviews of Theodore Illjes. TMIA PF 49. TMIA asserts that Illjes recalled a discussion on the 28th in which the cycling of the EMOV was correlated with the spike. TMIA's citation, however, does not

support this claim.41/ Illjes stated that he could not state that correlation of the spike with the EMOV was discussed on the 28th. JME 1(c)(36), at 9-10.

REPLY 91. TMIA also attempts to bolster Mehler's retracted statement by referring to Chwastyk's present testimony and past statements. TMIA PF 50. These statements, however, are fatally contradictory. Chwastyk was first asked in an October 30, 1979 NRC Special Inquiry Group (SIG) deposition if he remembered an instruction not to operate electrical equipment. He replied he did not believe such an instruction had been given on March 28th. JME 1(c)(99), at 15-16. He also told Mehler that the instruction had been given on the 29th. Tr. 29,567 (Mehler); JME 1(c)(98), at 15-16 (Mehler). See also JME 1(c)(117), at 36-40 (Chwastyk).

REPLY 92. When next questioned about the instruction, Chwastyk informed the NRC that he now remembered the instruction being given on the 28th; and he recalled that when it was given he could have kicked himself for not having thought of it first. JME 1(c)(117), at 16.

REPLY 93. Today, Chwastyk remembers three separate instructions on the 28th not to operate electrical equipment, the first of which he originated. Tr. 29,152, 29,154-55 (Chwastyk). That Chwastyk originated this instruction is

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41/ In JME 1(c)(12[7]), which TMIA miscites, the interviewer -- not Illjes -- states the spike was correlated with the EMOV. JME 1(c)(127), at 4.

implausible, given his first recollection occurred six years hence and his prior statement that he could have kicked himself for not thinking to give such an instruction.

REPLY 94. Choosing between a number of possible combinations, TMIA stresses a consistency between Chwastyk's present recollection and Mehler's October 11, 1979 statement. TMIA PF 51. TMIA ignores, however, the inconsistency in other combinations of their testimonies and as well the internal contradiction between Chwastyk's present testimony and his 1979 deposition testimony. It is quite plausible that Chwastyk's recollection was at some point unconsciously affected by review of post accident documents, in this instance Mehler's prior statement -- a trend the Board has perceived elsewhere in Chwastyk's various statements and testimony.

REPLY 95. TMIA states that others have testified "that an instruction was given after acknowledgment of the hydrogen burn," and cites statements by Zewe and Ross (JME 1(c)(119) and JME 1(c)(124) respectively). TMIA PF 52. However, the statements of both these individuals indicate the instruction was not given on the 28th, but rather on the 29th or 30th. JME 1(c)(119), at 46 (Zewe); JME 1(c)(124), at 66 (Ross). In the same vein, eleven other individuals who were present in the control room, including two NRC inspectors, recalled no such instruction on the 28th. See LIC PF 92.

REPLY 96. Finally, after some forty related proposed findings advocating the adoption of conjecture and surmise and

ignoring or rejecting direct, persuasive testimony and evidence, TMIA finally states the gravamen of its case -- that Chwastyk testified that he understood the pressure spike to be caused by a hydrogen burn and that the hydrogen had been produced by a zirconium-water reaction. TMIA PF 53. TMIA claims that the process by which Chwastyk supposedly reached these conclusions was "credibly explained" and that Chwastyk was "trained on the zirconium-water reaction at TMI and perhaps in the Nuclear Navy." Id.

REPLY 97. Chwastyk explained he used a process of elimination in reaching his conclusion. Tr. 29,374-76 (Chwastyk). But according to Chwastyk, after going through this thought process, he "really didn't know." Tr. 29,377 (Chwastyk). With respect to his training, Chwastyk could not remember if he had had training on hydrogen buildup under accident scenarios. Tr. 29,283 (Chwastyk). Nor did he know whether he had received training on the zirconium-water reaction while he was in the Navy. Tr. 29,310 (Chwastyk). As the testimony of other individuals in this proceeding makes clear, Chwastyk's training which was similar to others' (See Tr. 29,310 (Chwastyk)) would not have led him to expect a zirconium-water reaction or rapid hydrogen buildup. See LIC REPLY 67, supra.

REPLY 98. Nor does the Board find Chwastyk's present recollection particularly persuasive given the many inconsistencies and uncertainties in his prior statements. See LIC PF 59-78. The Board is particularly convinced that Chwastyk's

recollection is faulty given the fact that not one of the people with whom Chwastyk believes he discussed the significance of the pressure spike remembers Chwastyk mentioning a hydrogen explosion or discussing the significance of the pressure spike in terms of core damage. See LIC PF 66-76.

REPLY 99. TMIA then attempts to bolster Chwastyk's testimony by pointing to his attempt to draw a bubble as indicative of his interpretation of the pressure spike. TMIA PF 54-64. TMIA, however, ignores the fact that control room operators have stated in prior interviews that they were already attempting to draw a bubble when the pressure spike occurred. LIC PF 69. TMIA also apparently recognizes that drawing a bubble was not an action particularly responsive to the pressure spike. Indeed, Chwastyk himself has stated that he had sought permission to draw a bubble prior to the pressure spike. JME 1(c)(88), at 18; Tr. 29,322 (Chwastyk). Accordingly, TMIA tries very hard to equate drawing the bubble with repressurization. Chwastyk, however, testified that drawing a bubble is not the same as repressurization. Tr. 29,291 (Chwastyk). Chwastyk testified that repressurization occurred at 5:20-5:30 p.m. Tr. 29,151 (Chwastyk). Moreover, Chwastyk's prior statements indicate that when the order to repressurize was given, he resisted increasing high pressure injection -- the action most responsive to the pressure spike. JME 1(c)(88), at 43, 47; JME 1(c)(35), at 26.

REPLY 100. TMIA refers to the Nuclear Safety Analysis Center (NSAC) Report (JME 1(c)(63)) to suggest, contrary to Chwastyk's testimony, that repressurization occurred at 3:08 p.m. TMIA PF 57. The NSAC Report divides the accident into a number of phases, including what it calls a repressurization phase commencing at 3:08 p.m. when the block valve was closed. See JME 1(c)(63), App. TH, at 3. However, as the report makes clear, the selection of phases is somewhat arbitrary. Id., at 2. Furthermore, the NSAC report quite plainly states that the reactor was repressurized 13-1/2 hours into the event (i.e., at 5:30 p.m.) when sustained high pressure injection was initiated. JME 1(c)(63), Summary Description, at 7. See also JME 1(c)(63), App. TH, at 6 (stating that the primary system was repressurized at 5:23 p.m. -- 13:23 hours into the event -- with the start of makeup pump MU-P-1C).

REPLY 101. TMIA also refers to an interview of Mehler to suggest repressurization occurred before 5:30 p.m. TMIA PF 58. However, in the interview to which TMIA refers, Mehler was asked when the decision to go solid was made and responded that he did not know He then guessed that it was "between maybe 2 and 4 o'clock." JME 1(c)(68), at 11. This statement casts no doubt on the objective evidence. TMIA also states that in the same interview Mehler "confirm[ed] that the primary concern of site personnel after the pressure spike was recovering from a damaged core." TMIA PF 58. What Mehler stated, however, was that at the time of the pressure spike, plant personnel were

trying to recover from a damaged core; and because of this effort, consideration of the pressure spike "fell by the wayside." JME 1(c)(68), at 11. He did not intimate that anyone interpreted the pressure spike as indicating a damaged core.

REPLY 102. TMIA also attempts to obfuscate the time at which repressurization occurred by referring to deposition testimony of Michael Ross. TMIA PF 62. It was Ross' recollection that the think tank group had discussed repressurization and had decided to start a repressurization action when the order to repressurize was received from John Herbein. TMIA Mailgram Exh. 32J, at 22. Ross also clearly indicated, however, that the think tank discussion of repressurization occurred after Gary Miller returned from the Lieutenant Governor's briefing; Ross stated that Miller was part of the group discussing repressurization and was relaying information offsite when the order to repressurize was given. Id., at 22-24. Moreover, Ross clearly indicated that he could no longer remember the precise timing of these events and that he personally did not communicate with Herbein. Id., at 19.

REPLY 103. Ross' present recollection as to the timing of repressurization in no manner suggests that Chwastyk was attempting to repressurize the reactor coolant system earlier in the afternoon. Miller did not return to the site until about 4:00 p.m. or 4:30 p.m. (See LIC REPLY 39, supra), so any think tank discussion and decision regarding repressurization was made long after the closing of the block valve or purported

Chwastyk attempt to draw a bubble. Furthermore, it is clear that Ross did not know what Herbein had already told Miller before and during the think tank discussion; but Ross did know that Herbein gave the order to repressurize, at which point the plant staff did. See TMIA Mailgram Exh. 32J, at 22, 25. See also JME 1(c)(81), at 39-41, 46-47 (Ross).

REPLY 104. TMIA claims that Dieckamp's testimony concerning repressurization is contrary to the evidence. TMIA PF 59-61. TMIA's claim is incorrect, since it is quite apparent from objective evidence and testimony, including Chwastyk's own testimony, that drawing a bubble was not the same as repressurization and that repressurization occurred at about 5:30 p.m. The actions of the plant staff do not indicate the adoption of or change in strategy in response to the pressure spike. That Chwastyk may have attempted, unsuccessfully, to draw a bubble earlier in the afternoon -- a possibility not disputed -- is simply irrelevant.

REPLY 105. TMIA concludes that both Chwastyk and Mehler interpreted the pressure spike to indicate core damage. TMIA PF 65-67. With respect to Mehler, TMIA supports its claim by taking a statement in an early interview out of context (See LIC REPLY 101, supra), and ignores all of Mehler's statements and testimony to the contrary. With respect to Chwastyk, this Board concludes he is simply mistaken in his present belief. See LIC PF 59-78. TMIA states that Chwastyk testified that his immediate concern was to ensure the core was covered; but

ensuring core coverage was a concern held by many on the first day of the accident. Moreover, the Board finds that Chwastyk did not seek to repressurize the system; and when a decision to repressurize was made by other people, Chwastyk resisted the instruction to increase HPI. One cannot reconcile these actions with an understanding of the pressure spike.

REPLY 106. Nor does the Board agree with TMIA's claim that Chwastyk's account is corroborated by statements of Theodore Illjes and Charles Mell. TMIA PF 68-70. Neither of these individuals has ever recalled being informed by Chwastyk of the occurrence of a hydrogen explosion. Both individuals stated that during a turnover the afternoon of the 28th they were merely told there had been a pressure spike. See LIC PF 72-73. See also LIC PF 94-104.42/ It is, in fact, this consistent lack of corroboration which the Board finds most persuasive in not accepting Chwastyk's present recollection. Although Chwastyk states that he told quite a few people of his conclusion, not one of those people recall any such concern expressed by Chwastyk -- including Chwastyk's peers and subordinates and an NRC inspector. Given this lack of corroboration,

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42/ TMIA also refers to statements by NRC Inspector Plumlee supposedly to corroborate Chwastyk. Plumlee's statements, however, have very little to do with Chwastyk's recollection or belief. Plumlee's recollection concerning hydrogen related primarily to whether the NRC knew by 8:00 a.m. on the 28th about high hydrogen concentrations in containment. Plumlee's statement is effectively refuted by everybody Plumlee mentioned in connection with the matter. See JME 1(c)(142), at 29-31 (NUREG-0760). See also JME 1(c)(139) (OIA Interview Memos).

we do not believe that Chwastyk on the day of the accident understood and explained the significance of the pressure spike. To find otherwise would require concluding that Chwastyk understood but told no one or understood and told others, all of whom deny it.

Miller's and Herbein's Interpretation

REPLY 107. TMIA's third argument is that Gary Miller and John Herbein both correctly interpreted the pressure spike. TMIA PF 71-101. In making this argument, TMIA necessarily advocates rejection of the direct testimony of both these individuals in this proceeding and in a number of past statements. Miller testified that he heard a thud which was subsequently correlated to the time of the spike. Tr. 30,186 (Miller). He does not believe he was aware either of spray actuation or the spike. Tr. 30,190, 30,200 (Miller). Herbein testified that he too was unaware of the spike. Tr. 30,417-18 (Herbein). Their testimony is corroborated by many prior statements. See, e.g., JME 1(c)(27), at 26-27 (Herbein); JME 1(c)(29), at 298 (Udall Committee Task Force Hearing); JME 1(c)(39), at 57-59, 63 (Miller); JME 1(c)(67), at 19 (Herbein); JME 1(c)(83), at 31-32 (Miller); JME 1(c)(93), at 28-29 (Miller); JME 1(c)(95), at 18-22 (Miller); and JME 1(c)(122), at 111-23 (Miller).

REPLY 108. TMIA commences the argument by claiming, without supporting citation, that Miller was not only aware of the pressure spike, but that "his knowledge of plant conditions

including an awareness of superheated43/ temperatures enabled him to understand that a hydrogen explosion was the cause." TMIA PF 71.

REPLY 109. With respect to Miller's alleged awareness of the spike, TMIA states that Miller "acknowledges that he heard the 'thud'" and "recalls some discussion about a ventilation damper shifting." TMIA PF 72. TMIA does not explain the relevance of these statements. Miller has indeed consistently stated that he heard a thud. Perhaps TMIA is implying that the thud had to be recognized as an explosive sound. The noise, however, was attributed to the closing of ventilation dampers. See JME 1(c)(108), at 139 (Hart Report) (Richard Dubiel told Miller the noise was ventilation dampers closing). See also JME 1(c)(11), at 4 (Flint); JME 1(c)(56), at 12 (Flint); JME 1(c)(83), at 31-32 (Miller); JME 1(c)(93), at 29 (Miller); JME 1(c)(124), at 51 (Ross); JME 1(c)(87), at 47-48 (Rogers); JME 1(c)(100), at 49-50 (Rogers); JME 1(c)(25), at 72-73 (Rogers); JME 1(c)(136), at 53 (Logan). Moreover, after investigation, the Special Inquiry Group determined that the sound was probably a water hammer in the containment spray system. JME 1(c)(106), at 42.

43/ TMIA discusses Miller's alleged awareness of "superheated temperatures" in TMIA PF 86. TMIA's citation in TMIA PF 86 does not support TMIA's claim that Miller recognized superheated conditions. See LIC REPLY 126, infra.

REPLY 110. TMIA continues by stating that both Chwastyk and Mehler testified that they spoke with Miller about the pressure spike. According to TMIA, Chwastyk and Mehler also testified that Miller appeared to understand that the pressure spike, actuation of containment sprays, cycling of the EMOV, and the loud noise or thud, had all occurred simultaneously. As discussed below, TMIA's statements are inaccurate and unsupported.

REPLY 111. TMIA refers to a "moving conversation" Chwastyk had with Miller. TMIA PF 73. TMIA does not recount what Chwastyk supposedly told Miller, but TMIA states that Miller responded "let's not get everybody all excited about it." Id.

REPLY 112. As previously noted, Chwastyk testified that he told Miller that he thought there had been "a real pressure increase." See LIC REPLY 85, supra. TMIA states that during Chwastyk's "moving conversation" with Miller, it appeared to Chwastyk that Miller was looking at parameters to verify what Chwastyk was telling him. TMIA PF 43. Chwastyk also stated, however, that he thought that Miller was looking at parameters to prepare himself for the Lieutenant Governor's briefing. Tr. 29,280 (Chwastyk). Compare Tr. 29,169-70 (Chwastyk). Indeed, Chwastyk testified that Miller was preoccupied and that Miller gave no indication that he understood the spike was real or a hydrogen explosion. Tr. 29,321, 29,381-82 (Chwastyk).

REPLY 113. Miller remembers no such conversation with Chwastyk. Tr. 30,204 (Miller). See also JME 1(c)(122), at 122-123; JME 1(c)(95), at 22. Moreover, Miller would have expected Chwastyk to go to Ross more than himself, because Miller "pretty much that day stayed away from dealing directly with the shift supervisors." JME 1(c)(95), at 25.44/ Miller felt Ross controlled operations: "That is as simple as that, and I dealt with him." JME 1(c)(122), at 124. If Chwastyk's recollection is taken at face value, it is not surprising. Miller was already late for the Lieutenant Governor's briefing. Tr. 30,228 (Miller). If Chwastyk merely told Miller, just as Miller was rushing to leave for a late appointment with the Lieutenant Governor, that containment pressure increased when the EMOV was cycled, Miller could hardly have understood that a 28-pound pressure increase in containment had just occurred or that Chwastyk believed there had been a hydrogen explosion.

REPLY 114. TMIA infers from Miller's response that Miller understood the significance of what was being told him. However, as Chwastyk testified, Miller's statement -- "let's not get everybody excited about it" -- indicated Miller had much on his mind and did not have time to investigate the matter.45/

44/ Chwastyk, too, in describing whom he may have directed to check containment integrity after the spike, acknowledged an understanding of the concept of "chain of command." JME 1(c)(117), at 34.

45/ Chwastyk on his own initiative stated to the Board that he had a reputation at the time of the accident as the Shift Supervi-

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Tr. 29,424 (Chwastyk). The Board concludes that if Chwastyk did indeed say anything to Miller, Miller simply did not grasp its import.

REPLY 115. TMIA also claims that Mehler testified that Miller was aware of the pressure spike. TMIA PF 75. Mehler testified, however, that he had merely "assumed" Miller was aware of the pressure spike because of Miller's presence in the control room and Miller's remark about hearing a noise. Tr. 29,483 (Mehler). See also JME 1(c)(89), at 29 (Mehler). Moreover, Mehler's assumption hardly supports TMIA's claim that Mehler spoke to Miller about the spike. See TMIA PF 72. Mehler has in fact stated that he does not remember discussing the pressure spike with Miller. JME 1(c)(115), at 14. With regard to whether Miller was aware of spray initiation, TMIA is inaccurate in stating that "Mehler agreed that everyone in the control room knew about the sprays. . . ." TMIA PF 36. Mehler testified only that he would assume people at the console -- himself, Chwastyk, and the control room operators -- were aware of spray actuation. Tr. 29,483 (Mehler).

REPLY 116. TMIA next claims that other operators in the control room "agreed with Chwastyk and Mehler that Miller was

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sor, to basically jump in and get things done. Thus, Chwastyk believed that anything Ross or Miller said to him about not getting everybody excited was meant for him to remain calm. See Tr. 29,423-25 (Chwastyk).

aware of the pressure spike, or one of the events accompanying the pressure spike, such as actuation of the containment sprays, the alarms, or ES signal." TMIA PF 76. TMIA's reference to statements by Walter Marshall and William Zewe do not support this claim. Marshall stated that he did not know whether Miller was aware of the pressure spike; when pressed for speculation, he stated that he would think that Miller was aware of spray actuation because Miller was in the vicinity of the control panel. TMIA Mailgram Exh. 32G at 10, 15-16. Zewe only stated that he found it hard to believe that anyone in the control room missed the pressure spike or the spray pumps being turned off. JME 1(c)(75), at 260 (Zewe et al.).

REPLY 117. TMIA also claims that NRC Inspector James Higgins "testified that he believed Miller told him that he knew of the pressure spike on March 28." Inspector Higgins, however, stated that Miller said he had "heard" the spike. JME 1(c)(19), at 24 (Higgins). That Miller heard a thud has never been at issue. Furthermore, while Inspector Higgins stated that it was his impression that Miller had momentarily been aware of the pressure spike on Wednesday -- Inspector Higgins apparently equating Miller's hearing the thud with awareness of the pressure spike -- it was also Inspector Higgins' impression that Miller did not understand its significance until Friday, March 30. JME 1(c)(79), at 50-51 (Higgins); JME 1(c)(129), at 23-29 (Higgins).

REPLY 118. TMIA refers to an April 14, 1979 group statement in which, TMIA claims, Miller states he was aware not only of the thud but also of containment spray actuation. TMIA PF 77. That statement says:

> It should be noted that at approximately 1400 I heard a loud deep noise and at that time the Reactor Building spray pumps started and subsequent to the events of this day I learned that this was a 30 lb. pressure spike which occurred in the Reactor Building due to hydrogen.46/

JME 1(c)(10), at 21-22 (Miller et al.). Miller states only that he heard a noise. He does not state that he was aware of spray actuation. Nor can one accept such an inference when the statement is viewed in the context of all his statements. Miller stated in an NRC interview on May 7, 1979 -- long before the present controversy --

> I was aware of a loud noise in the reactor building, I heard it at the control panel, in fact, I asked what that was. To my knowledge the other people standing there didn't hear it. One operator tells me or one engineer tells me that when I said that

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46/ Prefatory language in Miller's group statement (JME 1(c)(10), at 2 (Miller et al.)) to the effect that the facts in the statement are "based on the knowledge we [the group of persons identified on page 1] had and the assessment we made" suggests to the Board that Miller may have attributed knowledge to himself when he really was conveying knowledge of the group. An example of the misuse of the pronoun "I" by Miller occurs at page 21 where Miller states that he was directed to stop steaming "because it was felt that I was releasing radioactive steam." Another example where the pronoun "I" was misused also occurred at page 21 where Miller states "I was making attempts to redraw vacuum and secure that steaming." Another example of the misuse of the pronoun "I" is "I was at this time attempting to get preparations underway to start the reactor coolant pump. I had lost some vital switchgear which disabled the lift and backstop oil pumps for the reactor coolant pumps." JME 1(c)(10), at 24 (Miller et al.).

> he looked over and the building spray pumps had turned on which means that we had over 28 pounds.

JME 1(c)(23), Tapes 159 and 160, at 70 (Miller). It is clear, therefore, that Miller's awareness that the thud coincided with spray actuation is the result of his being subsequently so informed by another person. Indeed, he has consistently explained that the April 1979 group statement reflects information derived from others. Tr. 30,191-92 (Miller); JME 1(c)(122), at 114-15 (Miller).

REPLY 119. TMIA also states that Miller, despite evidence to the contrary, claims he was unaware of both the alarms and the engineered safeguards (ES) signal at the time of the pressure spike. TMIA PF 78. TMIA then uses Gary Broughton's testimony as well as the alarm printer printout (TMIA Mailgram Exh. 21) as evidence of the various alarms that were activated by the pressure spike to challenge its own characterization of Miller's testimony. There are two problems with TMIA's argument. First, Miller only testified that he can no longer recall if he heard or observed the alarms. Tr. 30,199 (Miller). Second, according to Broughton, no more than eighteen or nineteen alarms were likely activated although it is impossible to determine in retrospect. Broughton, ff Tr. 31,225, at 1-2; Tr. 31,231 (Broughton). Furthermore, the ES signal and corresponding alarms actuate at four pounds containment pressure; if Miller did not observe that containment sprays had actuated, he might well have failed to realize that there had been a

30-pound signal. JME 1(c)(122), at 116-118 (Miller). See also JME 1(c)(124), at 55 (Ross). There had in fact been two previous ES signals that day. Tr. 30,195 (Miller). A large number of alarms had occurred throughout the day, making the activation of further alarms less noticeable. JME 1(c)(136), at 53-54 (Logan). The Board concludes that Miller probably did not understand the significance of the particular (albeit crucial in retrospect) alarms that actuated at the time of the spike, if in fact he saw or heard them at all.

REPLY 120. TMIA claims that Miller authorized Chwastyk to draw a bubble in the pressurizer. TMIA asserts that Miller therefore understood the significance of the spike. TMIA PF 79. As previously discussed, drawing a bubble was not particularly responsive to the spike. See LIC REPLY 99, supra. Nevertheless, Miller testified that he does not believe he gave such permission. Tr. 30,205 (Miller).

REPLY 121. TMIA points to Miller's instruction upon leaving47/ the control room that plant status should not be changed without his permission to support its view that Miller authorized Chwastyk to draw a bubble. TMIA PF 79. This instruction would contradict rather than support the proposition that Miller gave permission to draw the bubble. Ross, who was in charge of operations, has stated that he was unaware of

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47/ TMIA claims, without support, that Miller left in the 2:00-2:30 p.m. time frame. The evidence is that Miller left at or before 2:00 p.m. See LIC PF 70.

attempts to draw a bubble. JME 1(c)(96), at 13 (Ross). Unless Miller thought that drawing a bubble was an insignificant action, it would seem unlikely that Miller would tell Ross not to change plant status and yet tell Chwastyk to draw a bubble.48/

REPLY 122. TMIA then states, "similarly incredible is Miller's denial that he gave an instruction not to activate equipment in the reactor building for fear of causing a spark on March 28." TMIA PF 80. TMIA argues that the instruction could not have been given on the 29th, as some have theorized, because Miller left at about 7:00 p.m., before the time the instruction was noted in James Seelinger's notes. This argument is flawed. Miller did not give the instruction on the 29th; George Kunder did. Tr. 30,028-34 (Kunder).49/ See LIC PF 91.

48/ TMIA claims that Miller "admitted that shutting the block valve at 3:08 p.m. would lead to the kind of change in status which he expected to authorize." Miller, however, testified that closing the block valve for two hours and turning on the pressurizer heaters at the same time would be actions for which he would have expected to have been asked permission. Tr. 30,207-08 (Miller). The question has little relevance, since the block valve was opened twice during the two hour period after 3:08 p.m., and pressurizer heater operation was sporadic. JME 1(c)(63), Sequence of Events, at 48-50 (NSAC Report). See also JME 1(c)(142), at 28 (NUREG-0760).

49/ Contrary to TMIA's unsupported conclusion, Chwastyk and Mehler did not both testify that Miller gave the instruction on the 28th. Chwastyk could not recall who gave the instruction. Tr. 29,155 (Chwastyk). Mehler did not testify that the instruction was given on the 28th, and was uncertain who gave it; when asked, he replied "the best that I recall, yes, Mr. Miller did." Tr. 29,508 (Mehler). However, in his October 11, 1979 SIG deposition, Mehler testified that he did not know who gave the instruction. JME 1(c)(89), at 15 (Mehler). Given Mehler's equivocal present recollection and his prior lack of knowledge, his present testimony is not particularly probative.

REPLY 123. The second prong of TMIA's argument is that because of Miller's awareness of a complete set of incore thermocouple readings, Miller must have interpreted the pressure spike as a hydrogen burn. TMIA PF 81. Since it appears that Miller was unaware of the pressure spike, the argument is irrelevant. Nevertheless, Miller also testified that he was aware of only a few in core readings -- readings that he was led to believe were unreliable. Tr. 30,140, 30,151 (Miller).50/

REPLY 124. TMIA states that at Miller's request Ivan Porter reported computer printout readings to Miller, "including temperature readings greater than 700°F." TMIA PF 83. TMIA's citation, however, does not support the statement that Miller was initially informed of readings greater than 700°F. Miller stated that he did not know the computer program well enough to

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50/ Incore thermocouples were installed at TMI-2 to support the startup and test program. Although they were neither utilized by plant operating personnel nor relied upon in any procedures, incore thermocouple temperatures could be printed out on the control room alarm computer printout. The computer's range was limited to 700°F. Readings in excess of 700°F were printed out as question marks. On the morning of the accident, Miller, because of his experience with incore thermocouples in a prior Navy research setting, was prompted to ask for incore data. Several instrumentmen were dispatched to the cable spreading room to take manual readings off the analog input points in the computer multiplexer cabinet. Ivan Porter, the lead instrumentation engineer, was present while the first several readings were taken -- some of which were high and some of which were low. Porter reported these readings to Miller, but told Miller the readings were erratic and unreliable. See generally JME 1(c)(106), at 898-902 (SIG Report); JME 1(c)(107), attachment at 1-7, 14-16, 36-42, 68-72 (Rogovin/Frampton Memorandum).

interpret a question mark in terms of either an off-scale reading or a non-functioning thermocouple. Tr. 30,133-34 (Miller). Miller did, however, ask that readings be taken off the computer inputs. Tr. 30,138 (Miller).

REPLY 125. TMIA states correctly that readings were taken and that one of the instrumentmen who took the readings stated that he perceived the readings as real. TMIA PF 84. Porter, however, did not believe the readings were accurate, and so testified in this proceeding. Tr. 31,484-85 (Porter).

REPLY 126. Porter obtained and reported to Miller several readings which ranged from 0 to 2500°F. Tr. 30,139-40, 30,143-44 (Miller). Porter informed Miller the readings were unreliable. Tr. 30,144-51 (Miller). TMIA claims, however, that Miller stated he relied on these readings and "used the 2500 degree figure as a 'gross indicator,' of superheated conditions."51/ TMIA PF 86, citing JME 1(c)(23), at 56 (Miller). This statement is inaccurate. In the interview TMIA cites, Miller stated that he asked Porter to obtain incore thermocouple readings because, although not extremely accurate devices, they would provide an indicator [of core temperature

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51/ Superheated conditions refers to the presence of superheated steam in the reactor coolant system. Superheated steam is steam that is heated further after becoming steam; it is therefore at temperatures exceeding the boiling point of water at system pressure. Steam becomes superheated at temperatures well below the temperatures needed to have a zirconium-water reaction (i.e., about 620° compared to about 2200°). See generally JME 1(c)(108), at 108 (Hart Report); JME 1(c)(142), at 18 (NUREG-0760).

-- not of superheated conditions]. JME 1(c)(23), Tapes 159 and 160, at 55. After Porter obtained the readings, Miller concluded that the core was "hot" based upon Porter's belief that the thermocouple junctions had melted. Id., at 56. Miller did not state that he picked 2500°F as a gross indicator of core temperature. Rather, he stated that the incore thermocouple readings ranged to "2500 or so" -- and he indicated he was picking 2500°F in responding to the question. Id. In addition, Miller did not state that he recognized superheated conditions. What he stated was: "I know we were superheated and all that sort of thing, I don't think we tumbled to that kind of lo[gic]. . . ." Id. TMIA's citation indicates that Miller believed the core was "hot." It does not indicate that Miller accepted the incore thermocouple readings as accurate and understood core temperatures were in fact 2500°F or anywhere near that figure.

REPLY 127. TMIA asserts that in addition to the several erratic readings which Porter obtained and relayed to Miller, Porter and Miller were also aware of a complete set of incore thermocouple readings taken on March 28.52/ TMIA PF 90. TMIA seeks to support this assertion by referring to its depositions of Richard Lentz and William Yeager.

52/ TMIA claims that the complete set of readings indicated that the core was uncovered, the zirconium-water reaction was occurring, and that there was no assurance that the ECCS would function. TMIA PF 89. TMIA provides no support for this statement. See LIC REPLY 161 n.57, infra with respect to TMIA claims regarding ECCS.

REPLY 128. TMIA asserts that Lentz stated that a few days after the accident Porter showed him a complete set of incore thermocouple readings. According to TMIA, Lentz stated that Porter told him that Porter had shown this complete set of readings to Miller on March 28. TMIA PF 90.

REPLY 129. TMIA's assertions are inaccurate. Lentz did not state that Porter showed him a complete set of readings. Rather, Lentz stated that several days after the accident his investigative team got hold of a complete set of readings that Porter "had taken" (i.e., readings that Porter had his instrumentmen take). Lentz did not see these readings himself for several weeks. TMIA Mailgram Exh. 32I, at 118-119. Lentz did refer to a conversation he had with Porter several days after the accident during which, according to Lentz, Porter stated that readings had been taken off the computer inputs on the day of the accident. Lentz stated that Porter told him that the readings had been passed on to Miller, but it appeared that the thermocouples had failed. Id., at 122. Lentz stated, however, that he did not discuss the number of readings that had been taken and had no way of telling what information was passed to Miller. Id., at 128. Accordingly, Lentz's deposition statements (which are multiple hearsay) do not establish that either Porter or Miller were aware on March 28 of a complete set of incore thermocouple readings.

REPLY 130. TMIA's reference to Instrumentman Yeager's deposition also fails to indicate that either Porter or Miller

were aware on March 28 of a complete set of incore thermocouple readings. Yeager recalled taking no more than nine to eleven readings. TMIA Mailgram Exh. 32D, at 31, 77-82. TMIA therefore implies that Porter personally took the readings. TMIA PF 92. TMIA, however, makes no mention of the prior statements of Nelson Bennett, the foreman who was in charge of instrumentmen, including Yeager, taking the readings. Bennett has stated that after the instrumentmen took the first couple of readings, Bennett himself decided to have the instrumentmen take a complete set of readings; Bennett also recorded the readings in a computer point identification book. JME 1(c)(53), at 12, 17 (Bennett). Bennett has also stated that Porter had only directed that a few readings be taken, not a complete set. JME 1(c)(128), at 11 (Bennett). He also stated that Porter was only present for a few readings. Id. TMIA's implication that Porter personally took a complete set of incore thermocouple readings is, therefore, unfounded.

REPLY 131. Accordingly, the Board rejects TMIA's assertion that Miller had a full set of incore thermocouple data on March 28 (TMIA PF 93). TMIA's assertion is unsupported and contrary to the uncontradicted direct testimony in this proceeding of both Miller and Porter.

REPLY 132. TMIA also asserts that George Kunder's prior testimony indicates he knew Porter had relayed incore temperature readings greater than 2200°F to Miller on March 28. TMIA PF 94. Kunder testified in this proceeding, however, that he

was not aware of incore temperature readings in that range until weeks after the accident. Tr. 30,060 (Kunder). Kunder testified that his knowledge concerning what information Porter had relayed to Miller was derived from having heard testimony on this point in hearings before the Kemeny Commission. JME 1(c)(59), at 13 (Kunder). See also Tr. 30,065-68 (Kunder).

REPLY 133. Finally, TMIA asserts that incore temperatures were known in the think tank. TMIA PF 95. TMIA's citation, however, does not indicate that any high incore thermocouple readings were accepted as accurate. TMIA cites two prior statements by Ross, both of which indicate that the incore thermocouple readings were believed to be inaccurate. JME 1(c)(81), at 23-26 (Ross); JME 1(c)(124), at 46 (Ross). TMIA also cites statements by Leland Rogers, who also indicated that incore thermocouple readings were disbelieved. JME 1(c)(87), at 29-30 (Rogers).53/ In addition, TMIA cites six prior statements by Kunder, which indicate quite clearly that Kunder was not aware of high incore thermocouple readings on the 28th. See JME 1(c)(18), at 49-50; JME 1(c)(30), at 44; JME 1(c)(37), at 52-53; JME 1(c)(59), at 10-11 (which discussed hot leg temperatures and is irrelevant); JME 1(c)(72), at 20-22; and JME 1(c)(118), at 27 (Kunder). Similarly, TMIA cites from prior statements by Miller. Three of these indicate that Miller did

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53/ TMIA also cites irrelevant sections of two other statements by Rogers. See JME 1(c)(20), at 10; JME 1(c)(100), at 63-65.

not believe incore thermocouple readings were reliable. JME 1(c)(95), at 49-50; JME 1(c)(122), at 66-67, 77-78; JME 1(c)(138), at 147-49 (Miller). TMIA's fourth citation (JME 1(c)(23), at 37, 75 (Miller)) is irrelevant.54/

REPLY 134. TMIA next claims that John Herbein was aware of incore thermocouple temperatures in excess of 2400°F. TMIA PF 96. TMIA advocates rejecting as incredible Herbein's direct testimony that he did not know of incore thermocouple readings in the range of 2400°F on March 28. Tr. 30,301 (Herbein).

REPLY 135. TMIA refers to a July 29, 1979 interview of Herbein before the Kemeny Commission. One could infer from that interview that Herbein had been informed of widely varying thermocouple temperatures up to 2400°F. JME 1(c)(61), at 15 (Herbein). Herbein, however, did not state that this information was relayed to him on March 28, nor did he intend to imply that he knew on March 28 of 2400°F incore temperatures. Tr. 30,304 (Herbein). See also TMIA Mailgram Exh. 26, at 28-34 (Herbein).

REPLY 136. TMIA also suggests that Herbein would have learned of such temperatures in a "briefing" of GPUSC engineers by Richard Bensel at about 5 p.m. on March 28. Herbein, however, testified that he did not remember this briefing and that

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54/ TMIA also cites two interviews of John Herbein -- JME 1(c)(61) and JME 1(c)(82). Herbein was not part of the think tank. His knowledge of incore thermocouple readings is discussed at LIC REPLY 134-137, infra.

he was probably in his office. Tr. 30,334-35 (Herbein). No evidence was adduced in this proceeding to indicate that Herbein listened to Bensel's briefing.

REPLY 137. In conclusion, the Board finds that neither Miller nor Herbein were aware of the pressure spike, as evidenced by their direct testimony and many consistent prior statements. See LIC REPLY 107, supra. The Board rejects TMIA PF 99-100. The weight of the evidence indicates that Miller was only aware of a thud that occurred at the time of the spike (see LIC REPLY 107-122, supra) and that Chwastyk did not enlighten him (see LIC REPLY 111-114, supra). The Board finds illogical TMIA's argument that since Herbein would have wanted Miller to inform him of any information Miller had concerning the pressure spike, or incore thermocouple temperatures, it follows that Miller did inform Herbein of the occurrences. TMIA PF 98, 101. The argument is a non sequitur.

Questionnaire Responses

REPLY 138. In an effort to show that the pressure spike and hydrogen burn were common knowledge among site personnel on March 28th, TMIA called as witnesses individuals who had checked "yes" that they were aware or informed on March 28th of the hydrogen burn on a questionnaire sent out by Licensee during the discovery phase. The questionnaire had been sent to 456 individuals, identified as having been related in some manner to the TMI-2 accident, to assist Licensee in responding to

TMIA discovery requests. TMIA Mailgram Exh. 32A, at 1; id., attachment 2. Those who received the questionnaire were asked whether they were aware or informed on March 28, 1979 that there had been a hydrogen burn in the TMI-2 containment on that day (Question 3a). Id., attachment 1, at 5. Twenty-one individuals responded affirmatively. Id., at 3. If accurate, these affirmative responses constituted new information, diametrically opposed to Licensee's understanding regarding appreciation of the significance of the pressure spike on March 28, 1979. Thus, Licensee undertook to investigate these responses.

REPLY 139. Licensee attorneys attempted to contact all twenty-one individuals who answered affirmatively. Id., attachment 3. All accounts of these contacts and of the discussions which followed paint a picture of a good faith effort by Licensee to gain additional information. Contrary to TMIA's assertions (TMIA PF 111, 116, 120, 127, 129, 134), the record does not evidence that these attorneys suggested to those individuals that their responses to question 3(a) were inaccurate, let alone evidence that pressure was exerted to obtain modifications of their responses. See, e.g., Tr. 31,334-35 (Mulleavy); Tr. 31,379-80, 31,382-91 (Conrad); Tr. 31,411 (Zeiter); 31,444-47, 31,450-55 (Rochino); Tr. 31,557-62 (Boyer).

REPLY 140. Upon being asked about the basis for their responses to question 3(a), twenty of these individuals acknowledged that their responses were in error and explained that

they had no knowledge on March 28th that there had been a hydrogen burn. TMIA Mailgram Exh. 32A, attachment 3. See also Tr. 31,334 (Mulleavy); Tr. 31,385-87, 31,389 (Conrad); Tr. 31,445-46 (Rochino); Tr. 31,560 (Boyer). One ex-employee, J. Riggenbach, could not be contacted. The individuals' explanations were later confirmed in letters sent to each of them by Licensee's Manager of Licensing J. Thorpe. Foreseeing a potential challenge to the reliability of those letters, Licensee attorneys asked each recipient to personally acknowledge the Thorpe letters. TMIA Mailgram Exh. 32A, attachment 3.

REPLY 141. TMIA called six of these twenty-one individuals to explore the circumstances surrounding their questionnaire responses, the discussions with Licensee's attorneys and the Thorpe letters confirming their explanation of their question 3(a) responses. The six witnesses were Thomas Mulleavy, Joseph DeMan, Curtis Conrad, David Zeiter, A.P. (Lee) Rochino and Robert Boyer.

REPLY 142. TMIA would have us find that Thomas Mulleavy understood the hydrogen burn to be a significant event and took steps to deal with it. TMIA PF 105. Mulleavy testified he was in the control room at the time of the spike, heard a "thud", saw the pressure recorder rise and heard someone exclaim that the thud sounded like an explosion. But as to the cause of the explosion, Mulleavy stated unequivocally that he did not know on March 28th that it had been hydrogen. Tr. 31,323-24, 31,334 (Mulleavy). Mulleavy explained that he had overlooked the word

"hydrogen" in the questionnaire. Tr. 31,334 (Mulleavy). There is no evidence which supports TMIA's implied conclusion set forth in TMIA PF 105 that Mulleavy or anyone he saw in the control room understood that the pressure spike had been caused by a hydrogen explosion or "took steps to deal with it." Indeed, TMIA cites nothing to support this conclusion.

REPLY 143. TMIA has observed and attempted to attach some significance to Mulleavy's informing B. Good of the spike, the same person who recorded a radiation check made at 1405 on the 28th, and to the fact that three of the individuals who answered the questionnaire affirmatively were supervised by Mulleavy. TMIA PF 106-107. See Tr. 31,335-37 (Mulleavy). This amounts to nothing more than irrelevant coincidence.55/

REPLY 144. There is no support for TMIA's conclusion that "it is reasonable to suspect that if Mulleavy were aware of the hydrogen burn, others in his Health Physics group would also have become aware. . . ." TMIA PF 107. Mulleavy's testimony is that he discussed the spike with no one except Good. Tr. 31,328-30, 31,335-37 (Mulleavy). No evidence was adduced which contradicts that testimony.

REPLY 145. TMIA would have us find that Joseph DeMan was noncredible in that he was aware on March 28th of a hydrogen burn. TMIA PF 111. DeMan testified that he first learned that

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55/ We have also observed earlier (See LIC REPLY 79) that the 1405 radiation check was not done in response to the pressure spike.

there had been a hydrogen explosion from reading various reports. Tr. 31,351 (DeMan). No evidence other than DeMan's bare questionnaire response was adduced which conflicts with this statement and DeMan explained that the questionnaire response was based on hindsight and not on what he knew on March 28, 1979. Tr. 31,357 (DeMan).

REPLY 146. TMIA attacked DeMan's credibility. TMIA PF 109-110. TMIA states that he could not remember whether he was in the control room at the time of the spike; however, DeMan merely stated that he could not be certain that he left the control room prior to 2:00 p.m. on the 28th. There is no reference to his leaving before or after the spike in his testimony. We find it unsurprising that DeMan could not remember the exact time he left the control room on March 28, 1979, almost six years ago. As to TMIA's claim that DeMan disavowed earlier deposition testimony (TMIA PF 109), DeMan explained he had been confused by the questioning. Tr. 31,352-53 (DeMan). DeMan's testimony that he learned about the pressure spike from an individual who mentioned it in passing is not inconsistent with his testimony that he learned of the hydrogen explosion from reading reports. His testimony that he learned about the pressure spike before he moved to the training department (in 1981) is consistent with his testimony to a Senate Committee on October 16, 1979, wherein he stated he learned of the spike within the three days following the accident. Tr. 31,356-57 (DeMan). We do not find it surprising that DeMan has

forgotten, with the passage of time, when he learned of the spike.

REPLY 147. TMIA would have us find that Curtis Conrad's testimony is non-credible and that he was aware of the pressure spike and hydrogen burn on March 28th. TMIA PF 115. Conrad testified at the hearing that he was at the Observation Center at the time the pressure spike occurred. Tr. 31,367 (Conrad). TMIA's unsupported proposed finding, that Conrad's questionnaire response that he was in the vicinity of TMI-2 at the time of the spike is at variance with his testimony on this point, is silly. TMIA PF 113. Conrad's consistent testimony was that he considered the Observation Center to be in the vicinity of TMI-2. Tr. 31,374-75 (Conrad).

REPLY 148. Conrad had apparently confused the March 30th concern with the hydrogen bubble in the reactor vessel with the March 28th hydrogen burn in the containment building when he answered the questionnaire. He understood the difference between the spike and bubble only recently during preparation for appearing before this Board. What appear to be inconsistencies in his testimony at the hearing arise out of this misconception. Tr. 31,378-80, 31,386-87 (Conrad). Conrad also explained that he had misread the questionnaire and had interpreted it as asking whether he knew about events which occurred on March 28, not about what he knew on that date. Tr. 31,387 (Conrad). In any case, Conrad's uncontroverted testimony at the hearing was that he had no knowledge on the 28th of the hydrogen burn. Tr. 31,367, 31,378-80 (Conrad).

REPLY 149. TMIA would have us find that David Zeiter was also aware of the hydrogen burn on March 28th. TMIA PF 120. Zeiter said in his discussion with Licensee's attorney, as confirmed in the Thorpe letter, that he had learned of the hydrogen burn on March 30th and that he had misread the questionnaire (TMIA Exh. 32A, attachment 3), however in preparing for the hearing he realized he never knew there had been a hydrogen burn or spike. He had confused the March 30th concern over a hydrogen bubble in the reactor with the containment hydrogen burn. Tr. 31,402-03 (Zeiter). His explanation to Licensee's attorney as confirmed by Thorpe was therefore not technically correct as he explained. See Tr. 31,409 (Zeiter). These facts do not support TMIA's proposed finding that all of Zeiter's testimony is not credible and we decline to so find.

REPLY 150. TMIA would have us find that Lee Rochino was aware of the hydrogen burn on March 28th. TMIA PF 127. Rochino testified consistently that his first knowledge that the spike had been caused by a hydrogen explosion came during a "vigil" session which he explained was an open telephone line between Mountain Lakes, New Jersey and the TMI site. Tr. 31,427, 31,431-34 (Rochino). Rochino placed his initial participation in the vigil on Friday evening, March 30th. Tr. 31,427, 31,449 (Rochino). Other than Rochino's questionnaire response which he testified was filled out upon return from a vacation, no evidence was adduced which controverted his testimony. See Tr. 31,429-30 (Rochino). TMIA's discussion of

various reports regarding the pressure spike which Rochino received years after the accident adds nothing to TMIA's argument. See TMIA PF 125. The date of the spike or even of the accident was not a relevant part of those reports. See TMIA Mailgram Exhs. 35, 36, 37. TMIA has also completely mischaracterized Rochino's connection with those reports. He did not participate in the containment shock wave study as TMIA has stated, he merely reviewed it. Tr. 31,418-24 (Rochino).

REPLY 151. TMIA would have us find that Robert Boyer was non-credible and was informed on March 28th of the hydrogen burn. TMIA PF 132. Boyer testified that he did not remember when he first learned that there had been a hydrogen explosion. Tr. 31,556-58 (Boyer). Boyer, as did others, simply misread the questionnaire. Tr. 31,558 (Boyer). No evidence other than Boyer's bare questionnaire was adduced which conflicted with his testimony.

REPLY 152. We find that the live testimony of these six witnesses in the presence of the Board, under oath and subject to cross examination is more reliable than their questionnaire responses. TMIA's only attack on these witnesses was on their credibility, however we find their explanations of their questionnaire responses to be reasonable and credible. None testified that he was aware on March 28th that there had been a hydrogen burn. Further, we find that TMIA adduced no evidence which calls into question the veracity of the letters from the remaining 14 individuals who answered their questionnaires

affirmatively, explaining that they were not aware of the hydrogen burn on the 28th.

REPLY 153. There is not evidence which supports TMIA's position that these six witnesses (or the other 14 individuals) were "pressured" into changing their questionnaire responses. We do not accept the assumption implicit in TMIA's proposed findings that all of those witnesses perjured themselves and that the twenty individuals who acknowledged Mr. Thorpe's letters did so inappropriately.

REPLY 154. The Board also observes that TMIA's various allegations with regard to the 3(a) witnesses amount to allegations of perjury and with regard to the attorneys who talked with them subornation of perjury. Inasmuch as there is no evidence which supports these allegations, the Board finds that paragraphs 103, 111, 116, 120, 127, 129, and 134 of TMIA's Proposed Findings are scurrilous and specifically rejects them.

GPUSC Engineers' Knowledge

REPLY 155. TMIA's last argument regarding the accuracy of the mailgram is that the mailgram is false because GPUSC engineers who had been sent to the site on the first day of the accident were aware of the pressure spike and interpreted it as a hydrogen explosion.56/ TMIA PF 137. As discussed below,

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56/ TMIA gratuitously mentions in its introduction (TMIA PF 137) and conclusion (TMIA PF 167) to this argument that the GPUSC engineers learned of noncondensible gases in the primary reactor coolant system on the 28th. TMIA cites no evidence, and there is none.

this argument is unfounded.

REPLY 156. TMIA states that Gary Broughton, who was GPUSC's Control and Safety Analysis Manager, was given the responsibility to obtain data to put together a sequence of events and to address the question of whether the core was uncovered. TMIA PF 139. Broughton testified, however, he did not know whether the question "was the core covered" was a specific assignment. Rather, he suggested that it was the type of question that they would have been able to answer after the data was collected and subsequently analyzed. Tr. 31,708 (Broughton).

REPLY 157. While TMIA points to Broughton's testimony that "they might collect strip chart recordings to evaluate the transient" (TMIA PF 139), that statement alone creates a false impression of the materiality of strip charts to GPUSC engineers. Broughton testified: "[g]enerally when we looked at a transient like this we didn't rely on strip charts...In some cases we had to fall back on the strip charts because that information wasn't available through some other source." Tr. 31,081 (Broughton).

REPLY 158. TMIA asserts that "[a]lthough Broughton denied that Keaten emphasized the urgency of his task, [Keaten] testified during a previous interview that he understood early in the morning that the incident at TMI was serious and that GPUSC engineers needed to travel quickly to the site and report back immediately to GPUSC headquarters." TMIA PF 140. This

proposed finding contains a number of inaccuracies. First, Keaten's prior statement indicates that it was about 11:00 a.m. when he learned the accident might be more serious than originally known. JME 1(c)(45), at 5 (Keaten). See also LIC REPLY 45, supra (as to Keaten's growing knowledge of the seriousness of the accident on the 28th, 29th and 30th). Second, Broughton did not "deny that Keaten emphasized the urgency of his task" but merely did not recall a particular discussion about trying to complete the analysis quickly. Tr. 31,083 (Broughton). Third, Keaten's prior statement did not state that "GPUSC engineers needed to report back immediately to GPUSC headquarters." See JME 1(c)(45), at 5-6 (Keaten), cited in TMIA PF 140.

REPLY 159. TMIA commences its argument by attempting to attribute generally to the GPUSC engineers knowledge of incore thermocouple temperatures greater than 2500°F. TMIA PF 142-146. Notes taken by the first GPUSC engineer to arrive at TMI -- James Moore -- indicate that Moore was told at approximately 5 p.m. on March 28th by Richard Bensel about incore thermocouple readings greater than 2500°F. TMIA Mailgram Exh. 32K, deposition Exhibit 2, at 6. TMIA continues, however, claiming that "Mr. Moore stated that after being briefed about temperatures greater than 2500°F he understood that there had been some core damage." TMIA PF 142, citing TMIA Mailgram Exh. 32K, at 126. The citation indicates that Moore concluded that there was core damage based on a 1000 R dome reading -- information also provided to Mr. Moore by Mr. Bensel at 5 p.m.

Moore's statement only indicates he reached a conclusion regarding core damage after the 5 p.m. briefing, and does not indicate that he based his conclusion on high incore thermocouple readings as TMIA suggests. Moore in fact testified that he did not know that core temperatures in excess of 2200°F indicated that a zirconium-water reaction would occur or that hydrogen would be produced. Id., at 87-88.

REPLY 160. TMIA next asserts that Moore has stated he subsequently informed Broughton of all relevant information including the incore thermocouple termperature readings greater than 2500°F. TMIA PF 143. Not one of TMIA's citations, however, supports this claim. Moore has not stated that he informed Broughton of the incore thermocouple readings. Moore only recalled having informed Broughton of what he had learned as a whole. Moore could not remember if he showed his notes to Broughton, although Moore added that it would be reasonable for him to have provided the notes to Broughton. Id., at 13, 107.

REPLY 161. TMIA observes that Broughton stated he has no way of disagreeing with James Moore's memory. TMIA PF 144. Since Broughton testified that he does not today recall Moore briefing him or showing him notes (Tr. 31,092 (Broughton)), this statement has little significance. Broughton, however, as early as a June 11, 1979 NRC I&E interview, stated that he did not have any knowledge of incore thermocouple readings on the 28th.57/ JME 1(c)(48), at 29 (Broughton).

57/ TMIA claims that Broughton states that at temperatures greater than 2200°F one knows that the ECCS had failed to perform

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REPLY 162. TMIA proposes that the Board conclude "It is clear ... that Broughton was aware of superheated temperatures...." TMIA PF 146. The Board cannot accept this conclusion -- a conclusion TMIA bases on witnesses' lack of memory. The only affirmative piece of evidence before the Board -- Broughton's I&E interview -- indicates that Broughton was not informed of incore thermocouple temperatures. The Board also rejects TMIA's claim that "GPUSC engineers were also aware that a significant amount of hydrogen had been produced by a zirconium-steam reaction." TMIA PF 146. TMIA cites not one whit of evidence in support of this claim.

REPLY 163. TMIA next attempts to attribute to the GPUSC engineers knowledge of the pressure spike. TMIA first refers to a briefing of the engineers by George Kunder at about 6 p.m., but TMIA does not claim that any mention was made of the pressure spike. TMIA PF 147.

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in accordance with ECCS criteria. TMIA PF 145 n.16. TMIA misstates Broughton's testimony. Additionally, TMIA apparently fails to realize that the ECCS criteria set forth in the Commission's regulations at 10 C.F.R. § 50.46 are design criteria. See Tr. 31,097-103, 31,177 (Broughton).

In any case, realization that temperatures in excess of 2200°F exceeded ECCS criteria is not necessary to understand how serious the existence of such temperatures is. Had the report of such temperatures been believed or understood when it was first made, Licensee does not dispute that there might have been a much greater appreciation of the seriousness or extent of potential core damage. See JME 1(a), ff Tr. 27,896, at 9.

REPLY 164. TMIA then refers to the data gathering efforts of one of the engineers -- Richard Lentz -- the evening of March 28th. TMIA PF 148. TMIA asserts that Lentz testified to the NRC in 1979 that he had gathered 12 hours of alarm printout. TMIA PF 149. TMIA acknowledges that Lentz has since denied photocopying twelve hours worth of data, but counters (incorrectly) that Lentz has also denied gathering any of the alarm printout. TMIA PF 149. TMIA advocates ignoring Lentz's present testimony on the theory that the earliest statement is the most reliable. TMIA PF 151. TMIA ignores the basis for Lentz's present belief that he could not have photocopied twelve hours worth of alarm printer data. Lentz explained that he simply could not physically have photocopied that amount of material during the time he was at Unit 2. Tr. 33,026 (Lentz); LIC Mailgram Exh. 2, at 55, 56. Furthermore, Lentz testified that he does not deny and has not denied bringing back some portion of the alarm printer. Tr. 33,025-26 (Lentz). Lentz's present testimony does not therefore appear inconsistent with the information provided during discovery -- that about several hours worth of data was provided. Licensee Mailgram Exh. 3. Nor is Lentz's testimony inconsistent with Julien Abramovici's notes, which TMIA showed to Lentz to indicate that a three-hour portion of the alarm printout was obtained. Tr. 33,025 (Lentz). Accordingly, the Board finds that the preponderance of the evidence indicates approximately three to four hours of the alarm printout were collected by Richard Lentz.58/

58/ The Board notes that even if twelve hours of data had been brought back, it would not demonstrate that GPUSC engineers were

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REPLY 165. TMIA also claims that Lentz photocopied the strip chart. TMIA PF 152. TMIA ignores Lentz's present testimony and prior statement. Lentz testified that he did not obtain a photocopy of the pressure spike on the evening of the 28th. Lentz, ff Tr. 32,972, at 2. Lentz previously stated in an NRC interview on June 1, 1979 that he photocopied no analog output. JME 1(c)(47), at 9 (Lentz).

REPLY 166. TMIA cites no evidence indicating that Lentz photocopied the strip chart. Instead, TMIA refers to Theodore Illjes' NRC I&E interview (TMIA PF 152), in which Illjes stated that someone (whom Illjes could not remember) asked for a copy of the strip chart. See JME 1(c)(36), at 9 (Illjes). Illjes stated that he could not remember if the person was an NRC inspector or a B&W representative. Id. Even if the Board were to accept Illjes' statement in his I&E interview, the Board could not accept TMIA's assertion that "it must have been Lentz who made the photocopy." See TMIA PF 153.

REPLY 167. Illjes' NRC I&E interview cannot, however, be accepted at face value -- particularly with regard to whether

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aware on March 28th of the pressure spike. First, TMIA states that Lentz remained in the Unit 2 control room until about midnight. TMIA PF 148. The alarm printout would therefore not have been available to the GPUSC engineers in the Observation Center on the 28th. Second, no evidence indicates that any GPUSC engineer reviewed or was interested in reviewing the period of the accident around the time of the spike. Broughton's initial analysis on the 28th covered only the first eight minutes of the accident. Tr. 31,198 (Broughton); TMIA Mailgram Exh. 28, at 7-8.

the strip chart was photocopied on the 28th. Illjes' statement has been widely discredited. The possibility that the strip chart was photocopied on March 28 was examined and rejected in NUREG-0600 and in the SIG Report. See LIC PF 99-100. Illjes now believes that the discussion of hydrogen, which he remembered in conjunction with the chart being photocopied, occurred on Friday, March 30. See LIC PF 95. In addition, other testimony and physical evidence strongly indicates that the pressure chart was not removed on the 28th. See LIC PF 102-03.59/

REPLY 168. TMIA claims added support for its conclusion by alleging that Lentz "was responsible for preserving analog data, including strip charts on March 28." TMIA PF 161. But Lentz testified that this responsibility was not assigned to him until a day or two after the accident. Tr. 32,997 (Lentz).60/

59/ TMIA claims that a portion of the chart was cut from the remainder without disrupting the recording trace. TMIA PF 155-159. TMIA claims that "[s]ince Licensee has provided no reason whatsoever for the cutting of the pressure spike strip chart, it is a reasonable inference that the chart was cut at some time before the strip chart paper ran out at about noon on March 29." TMIA PF 158. This argument is nonsensical. Further, Richard Brill testified that he had reviewed strip charts covering the period of the accident and "found that of the seventeen [,] fourteen of those were cut in two places to preserve the accident information. One was not cut. And two were cut in one place." Tr. 31,650 (Brill).

TMIA also advocates rejecting as speculative Brill's testimony that the strip chart did not show signs of retaping that would be necessary had a portion been cut. TMIA PF 159. His testimony was uncontroverted and reasonable; his observations were sensible and appropriate for lay opinion. See Brill, ff Tr. 31,610, at 4; Tr. 31,640-46, 31,661-64 (Brill).

60/ In TMIA PF 161, TMIA claims that there are other indications that GPUSC engineers had information available to them that could

(Continued Next Page)

REPLY 169. TMIA also observes that one GPUSC engineer in Parsippany and one GPUSC engineer who was at TMI indicated in response to Licensee's discovery questionnaire that they were aware of spray actuation. TMIA PF 163-164. TMIA then seeks to imply that their questionnaire responses indicate that the alarm printout was brought to the Observation Center. The Board finds this claim no more than speculation. Even assuming the questionnaire responses were accurate in this respect, there is no evidence that the alarm printout was the source of their information.61/

REPLY 170. TMIA credits Richard Bensel with being "able to understand the significance of the spike upon seeing" the alarm printout. TMIA PF 165. TMIA then attempts without

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(Continued)

only have come from the alarm printout or strip chart. TMIA refers to Abramovici's notes for March 28th. These notes, however, give no indication that the strip chart had been copied; and with respect to the alarm printout, the notes only indicate that GPUSC engineers had available a portion corresponding to three hours in the morning of the 28th (before the pressure spike). Tr. 33,025 (Lentz). In TMIA PF 162, TMIA makes a similar claim with respect to data plotted by Broughton. Broughton, however, only plotted data for the first eight minutes of the accident. Tr. 31,198 (Broughton); TMIA Mailgram Exh. 28, at 7-8. The ES, the time for which TMIA claims was necessarily derived from the alarm printout, occurred at the outset of the accident, between 4:02 and 4:03 a.m. Broughton's plot, therefore, gives no indication that GPUSC engineers had availability to the strip chart or the portion of the alarm printout corresponding to the pressure spike -- ten hours worth of data later.

61/ Abramovici, for example, could have heard this information from Hugh McGovern during the chronology McGovern dictated to Walter Marshall in the early morning of March 29th. See JME 1(c)(1) (McGovern Chronology).

support to attribute this ability to GPUSC engineers. In fact Bensel did not state that. Bensel responded "yes" to the question by TMIA "[i]f someone with the proper experience such as yourself (Bensel) had reviewed the alarm printout on its own, could he have or she have determined that the containment sprays had been actuated?" TMIA Mailgram Exh. 32E, at 27. It is a far cry from being able to recognize by reviewing the alarm printout that containment spray actuated, to TMIA's proposition that Bensel understood the significance of the spike. Even if GPUSC engineers had the portion of the alarm printout corresponding to the pressure spike -- and we find they did not -- they would not have automatically understood the significance of the spike.

REPLY 171. TMIA's last point is that Mr. Keaten's notes "confirm this hypothesis" that GPUSC engineers understood the pressure spike. TMIA PF 166. This point rests on the faulty premise that Keaten's notes were written on March 29th. As discussed above, they were not. See LIC REPLY 46-48, supra.

REPLY 172. For the reasons discussed above, the Board rejects as unsupported and contrary to evidence TMIA's claim that GPUSC engineers interpreted the pressure spike as a hydrogen explosion and in terms of core damage on the 28th. See TMIA PF 167.

REPLY 173. Accordingly, having considered all of TMIA's arguments with regard to the accuracy of the Dieckamp mailgram, the Board finds that no one interpreted the pressure spike or

spray actuation in terms of core damage at the time of the spike.62/

IV.B. Whether Mr. Dieckamp Had a Reasonable Basis to Continue to Believe That No One Interpreted the Pressure Spike or Initiation of Containment Spray in Terms of Core Damage?63/

(Response to TMIA PF 170, 239-283)

REPLY 174. TMIA devotes considerable argument in its findings to respond to four arguments of TMIA's own wording, but which it attributes either to Licensee or to Dieckamp. See generally TMIA PF 239-283. First, TMIA attacks what it alleges is Dieckamp's unduly restrictive definition of the issue before the Board. See TMIA PF 239-240, 243-247. Second, TMIA attacks what it alleges is Licensee's argument that a complex technical

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62/ In one lone paragraph in a proposed conclusion, TMIA raises a different attack on the accuracy of the Dieckamp mailgram. TMIA argues that since the NRC in Washington and Bethesda and the Commonwealth of Pennsylvania did not become aware of the hydrogen detonation until March 30th, information was withheld and thus the mailgram contains "significant, false information." TMIA PF 170. "Withholding", however, connotes a conscious act and at the very least knowledge of the information not reported. If plant management did not realize that there had been a hydrogen detonation, they simply could not have reported the fact, and such non-reporting cannot constitute withholding of information. Such has always been Mr. Dieckamp's belief. Dieckamp, ff. Tr. 28,316, at 18. As the Board has found that the significance of the pressure spike was not understood, it concludes that there was no withholding of such information. The Board observes that once the significance of the spike was understood, the information was reported. JME 1(c)(107) at 55 (Rogovin/Frampton Memorandum). See also JME 1(c)(62), at I-4-49 (NUREG-0600).

63/ The Reply Findings in this section are intended to follow LIC PF 132 in Licensee's proposed findings of January 28, 1985.

analysis is needed to determine that the pressure spike was caused by a hydrogen burn. See TMIA PF 241, 248-256. Third, TMIA attacks what it contends is Dieckamp's analysis of prior statements by Chwastyk, Mehler, and Illjes. See TMIA PF 241, 257-270. Fourth, TMIA attacks the support that NUREG-0760 provides to Dieckamp's conclusion. See TMIA PF 241, 271-283. TMIA claims that these four arguments in support of Dieckamp's position have eroded under close scrutiny in this hearing. TMIA PF 241.

Absolute Proof

REPLY 175. TMIA's first point is difficult to understand, but it appears that TMIA assigns to Dieckamp the tenet that only information that has been absolutely proven need be reported to the NRC. See TMIA PF 239-240. TMIA then argues that it is not Licensee's responsibility to determine what information is reported to the NRC, and that "all potentially useful information about critical reactor parameters was required to be disclosed to the agency during the accident."64/ TMIA PF 240.

REPLY 176. Neither Dieckamp nor Licensee has ever advocated restricting disclosure of information to that absolutely proven. In the testimony contorted by TMIA to support its position, Dieckamp only stated:

64/ TMIA provides no support for its standard of disclosure. The Board notes that the Commission's reporting requirements are a matter of regulation. See e.g., 10 C.F.R. § 50.72.

> My reading of post-mailgram statements does not provide me with absolute proof of the state of knowledge on the day of the accident but neither does it undermine my belief in the accuracy of the judgment expressed in the mailgram.

Dieckamp, ff Tr. 28,316, at 15. He does not state that information should not be disclosed unless absolutely proven; nor does he state, as perhaps TMIA seeks to imply, that only absolute proof can render the mailgram inaccurate. What Dieckamp states, in simple English, is that he still believes that no one interpreted the pressure spike in terms of core damage, though he cannot provide absolute proof that his belief is correct.

REPLY 177. TMIA attempts to show, by reference to an April 12, 1979 interview of TMI personnel by Dr. Robert Long, that Dieckamp subscribes to a practice of restricting disclosure to proven or documented material. TMIA PF 244-245. TMIA refers to a statement by Robert Long in that interview indicating that Dieckamp ordered that "no report was to be issued prior to his review and approval." TMIA PF 244. TMIA also suggests this instruction applied to operator interviews. See TMIA PF 245.

REPLY 178. If one reads the entire page of the cited transcript, however, it is quite apparent that Dr. Long was referring only to an accident chronology that Licensee was preparing in the days following the accident. TMIA Mailgram Exh. 12, at 3-4. See also Tr. 28,666-67 (Dieckamp). There is

nothing particularly remarkable about the fact that Dieckamp would have wanted to review such a chronology of events and ensure its accuracy prior to its release. As Mr. Dieckamp explained, the concern he and others had was to ensure the chronology was accurate; they therefore sought to base the chronology on objective facts and avoid conjecture. Tr. 28,667 (Dieckamp). Moreover, the operator interviews themselves, which contained factual data on which the chronology was being based, were neither reviewed nor approved by Dieckamp prior to public release. Tr. 28,661 (Dieckamp). See also Tr. 28,951-52 (Dieckamp). In no way does this address Licensee's reporting responsibilities of plant status as it became known during the accident; Dieckamp was simply insisting that a post-accident assessment of the accident should be soundly based and accurate before it was released.

REPLY 179. Accordingly, the Board determines that TMIA mischaracterizes both Dieckamp's testimony and conduct. Moreover, during his testimony in this proceeding, Dieckamp was open and forthright. The answers that he gave to questions demonstrated to the Board that Dieckamp did indeed accept the necessity for full disclosure and reporting. See e.g. Tr. 28,940-41 (Dieckamp). TMIA's unwarranted suggestion (TMIA PF 246, 247) that Dieckamp is unconcerned by the withholding of potentially useful information is unsubstantiated and is rejected.

Complex Analysis

REPLY 180. TMIA asserts next that one of Licensee's arguments is that a complex analysis, beyond the training and capabilities of TMI-2 operators was required to determine the pressure spike was caused by a hydrogen burn and demonstrated core damage. TMIA PF 241, 248-256.

REPLY 181. TMIA does not cite, nor can the Board find in Licensee's Proposed Findings, any argument by Licensee that a complex anaylsis was required to determine the pressure spike was caused by a hydrogen burn and demonstrated core damage. Notwithstanding the fact that Licensee does not take this position in its Proposed Findings, TMIA contends that testimony by Licensee's witnesses Van Witbeck, Lowe and Zebroski on the necessity for a complex analysis in order to understand the extent of core damage creates an inference that a complex analysis was also necessary to understand the significance of the pressure spike. TMIA PF 248-256. TMIA goes on to state that Dieckamp among others recognized on March 30th and 31st "core damage at TMI as very serious." According to TMIA, "This was apparently based on a proper analysis of the pressure spike, which Dieckamp himself characterized as the Rosetta stone of deducing the degrees of core damage." TMIA PF 255, citing Tr. 28,364 (Dieckamp). This argument, which TMIA itself generates by citing Chwastyk's testimony "that site personnel were most interested in stabilizing the reactor and not in

making fine analyses of the amount of core damage," is simply not Licensee's position. TMIA PF 253.

REPLY 182. Although Licensee has not argued that such a complex analysis was necessary to understand the significance of the pressure spike, Licensee has argued that the operators at TMI-2 on the day of the accident did not have sufficient training or experience to render obvious the significance of the pressure spike. LIC REPLY 67, supra.

REPLY 183. The Board has previously addressed the point that an understanding of the significance of the pressure spike was beyond the training and experience of those aware of the pressure spike on March 28. See LIC REPLY 67, supra. In addition, operators in the control room at the time of the pressure spike have testified that although they were aware of the pressure spike on March 28, they did not understand it. LIC PF 114. Further, the Board has heard testimony in this proceeding that training received by operators prior to the accident did not encompass the concept of vast amounts of hydrogen being produced in the first hours of a loss of coolant accident. Tr. 30,016 (Kunder); Tr. 29,852-54 (Moseley); JME 1(c)(75), at 258 (Zewe); JME 1(c)(124), at 51 (Ross). The training that operators received on the concept of hydrogen generation as a result of a loss of coolant accident was related to long-term generation of hydrogen from chemical reactions in the reactor building. Tr. 30,075-77 (Kunder). Indeed, testimony adduced in this hearing suggests that the Final Safety Analysis Report for

TMI-2 analyzed the post-accident generation of combustible gases in the reactor building which did not contemplate the rapid generation of hydrogen. Tr. 29,852-54, 29,934-35, 29,937 (Moseley); Tr. 30,016, 30,075-80 (Kunder). Accordingly the Board concludes that, in light of typical operator training at TMI-2 coupled with the Final Safety Analysis Report evaluation of post-accident generation of hydrogen, an operator at TMI-2 on March 28, 1979, could not have been expected to correctly interpret the validity of the reactor building pressure recorder strip chart indication as a real pressure spike resulting from a hydrogen explosion where the hydrogen had been produced by a zirconium-steam reaction in the reactor core.

Dieckamp's Analysis of Chwastyk, Mehler and Illjes Statements

REPLY 184. TMIA claims that Dieckamp's analysis of the interviews of Chwastyk, Mehler, and Illjes is "misleading." TMIA PF 257. It is nothing of the sort. Dieckamp's analysis is straightforward and reasonable.

REPLY 185. TMIA claims that Dieckamp's testimony is misleading insofar as it suggests that Mehler has always been uncertain of the date of the "instruction not to activate equipment in the reactor building. . . ." TMIA PF 258. Dieckamp made no such statement. Dieckamp quite properly stated simply that Mehler "is uncertain about the timing of equipment limitations." Dieckamp, ff Tr. 28,316, at 13 (emphasis added). This uncertainty is reflected in Mehler's October 30, 1979

deposition, in his September 4, 1980 interview, and in his present testimony.65/ See LIC PF 86-88. See also LIC REPLY 87-89, supra.

REPLY 186. TMIA also attacks Dieckamp's analysis of Illjes' prior statements; TMIA contends that contrary to an assertion it attributes to Dieckamp, Illjes' recollection of discussing a hydrogen explosion on the 28th was not associated with his recollection of photocopying the strip chart. TMIA PF 259. The contention is frivolous. In Illjes' May 1979 interview, when asked when in the evening of the 28th he remembered a discussion of a hydrogen explosion, he stated:

> ... [W]e were discussing [a hydrogen explosion] with, I can't remember if it was one of our engineers. But we did have a pressure spike. We pulled it out and I don't know who wanted a copy but we made a couple of copies of the chart."

JME 1(c)(36), at 7 (Illjes). The interviewer left no doubt as to the association:

> A. ... [W]hen it was turned over it was mentioned that we did have a pressure spike, when we turned over. That was the only thing that was mentioned, and that they had recovered from reactor building isolation.
>
> Q. So a pressure spike was discussed at the turn over, when you first came in, about 3:45. And then somewhere about 8:00 further discussion and also xerox copies?
>
> A. Right

65/ The Board in fact noted the basis for Dieckamp's statement during TMIA's cross-examination. Tr. 28,796-806. See also Tr. 28,835-36.

Id., at 8-9 (emphasis added). Illjes further stated:

> We didn't really have that much time to do a lot of discussion, but we talked about it and when I walked away from the panel, the guy that wanted the copy, you know, he wanted it now, and I had to walk away from the panel to make sure that the other guy, my shift supervisor, was there while I walked, away, so ...

Id., at 10. Illjes clearly connected the discussion of hydrogen with request for photocopies of the strip chart -- and Illjes' present testimony, the statements of many other individuals, and the physical evidence demonstrate that neither occurred on the evening of the 28th. See LIC PF 94-104.

REPLY 187. TMIA states that Dieckamp "fails to mention that Illjes reaffirmed his early testimony in a September 24, 1980 NRC interview, stating three times that he recalls a discussion of hydrogen or noncondensible gas on March 28." TMIA PF 260. TMIA's characterization of Illjes' September 1980 statement is inaccurate. Illjes would not confirm that hydrogen was discussed:

> Q. Is it still your recollection that hydrogen was discussed on March 28, 1979, as a possible cause of the pressure spike?
>
> A. To my recollection, we discussed the pressure spike.
>
> * * *
>
> Q. Was hydrogen a part of those discussions, do you recall?
>
> A. I don't remember.
>
> Q. When you said "pressure spike," you used that intentionally? You were talking about the pressure spike?

A. Yes.

Q. And not necessarily hydrogen?

A. It's hard for me to separate all the discussion that was made on that night. I can't really say, because it was discussed how many times thereafter, and that far apart, I can't relate the difference.

JME 1(c)(127), at 6-7 (Illjes). Similarly, in this interview, Illjes remembered a problem with a bubble in the reactor vessel, but did not confirm that the bubble was a hydrogen bubble. Id., at 10.

REPLY 188. With respect to Chwastyk, TMIA again accuses Dieckamp of demanding absolute proof. TMIA PF 261-64. This accusation is simply a distortion of Dieckamp's testimony. See LIC REPLY 176, supra. Dieckamp reviewed Chwastyk's statements. Dieckamp noted that in Chwastyk's initial May 21, 1979 interview, Chwastyk referred to the pressure spike only as being the result of "some kind of explosion" and that Chwastyk stated he did not understand its cause. He did not even mention the word hydrogen. Dieckamp, ff Tr. 28,316, at 14. See LIC PF 61. Dieckamp traced the evolution in Chwastyk's recollection, and noted that it was not until September 1980 that Chwastyk indicated that he deduced from the pressure spike that a zirconium-water reaction had occurred. Id., at 15. Even then, Dieckamp noted a lack of any meaningful discussion evidencing Chwastyk's understanding of the phenomenon. Id., at 15-16, quoting JME 1(c)(117), at 95-96 (Chwastyk). Dieckamp also noted that Chwastyk left the block valve open for more than an hour after

the spike and subsequently resisted the instruction to increase high pressure injection, actions which demonstrate a lack of appreciation for the cause of the spike. Tr. 28,719-20, 28,821-22, 28,829-42, 28,936-37 (Dieckamp). Based on this reasoned analysis, Dieckamp could not conclude that Chwastyk correctly interpreted the pressure spike. The Board finds, contrary to TMIA's characterization, that Dieckamp's analysis was not only reasonable, but well substantiated.

REPLY 189. TMIA also argues that "it reflects poorly on Dieckamp's integrity that he refuses to acknowledge the Chwastyk, Mehler and Illjes' interviews as 'some evidence.'" TMIA PF 265. Dieckamp, however, did in fact acknowledge post-mailgram interviews as some evidence and indicated that if he were drafting the mailgram today, he would delete the phrase, "no evidence." Tr. 28,757, 28,357 (Dieckamp). See also LIC PF 134.

REPLY 190. TMIA's final attack on Dieckamp's belief that no one interpreted the pressure spike in terms of reactor core damage is an attempt to somehow impeach that belief by reference to an "untitled piece" written by three Licensee employees and addressing Licensee's knowledge of core damage. See TMIA PF 266-270. This untitled piece, however, is not as TMIA characterizes it, the findings of an internal company investigation. It was an incomplete draft summarizing prior statements -- the same statements available to the Board as evidence in this hearing. See TMIA Mailgram Exh. 15. See also Tr. 28,878-88 (Dieckamp).

REPLY 191. TMIA does not assert that Dieckamp was aware of this draft prior to this hearing; he was not. Tr. 28,887 (Dieckamp). Rather, TMIA argues that Dieckamp should now defer to the conclusions of this draft. But TMIA gives no reason why Dieckamp should abandon his own reasoned analysis. This incompleted product is hardly a weighty or conclusive product and is in fact much less significant than the investigative reports of which Dieckamp was previously aware. Compare, for example, JME 1(c)(106) (SIG Report), JME 1(c)(107) (Rogovin/Frampton Memorandum), and JME 1(c)(142) (NUREG-0760). See also LIC PF 100, 128, 130.

REPLY 192. TMIA also argues that the Board should assign particular weight to the conclusions of this draft. The Board rejects this suggestion. TMIA Mailgram Exh. 15 was not admitted for the truth of the matter asserted therein. Tr. 30,883-906. Moreover, even had it been, the Board would find its incomplete analysis and lay opinion to be hearsay evidence of little probative value.

Dieckamp's Consideration of NUREG-0760

REPLY 193. TMIA's next point decribes Dieckamp's reliance on NUREG-0760. TMIA PF 271-283. TMIA argues that, on the basis of the testimony of David Gamble, the Board should give no weight to the conclusions in NUREG-0760.

REPLY 194. The Board does not believe, however, that Gamble's testimony discredited the findings or conclusions

contained in NUREG-0760. For the reasons cogently set forth in the NRC Staff proposed finding 4 (proposing paragraphs 57A-57P be inserted in Licensee's proposed findings), the Board determines that NUREG-0760 was not an inadequate investigation as alleged by Gamble and, in turn, by TMIA.

REPLY 195. The Board also observes that TMIA misperceives Licensee's case and argument. Licensee has not advocated that the Board defer to the findings and conclusions in NUREG-0760. Rather, Licensee points to NUREG-0760 for two purposes which are independent of the truth of the matter asserted therein. First, NUREG-0760 evidences that a reasonable man, after review of the evidence and facts, could reach the same conclusion as did Dieckamp. See LIC PF 126, 130. Second, NUREG-0760, along with the other investigatory reports, demonstrates that all evidence subsequently adduced was widely and publicly known. See LIC PF 123. The Board's consideration of NUREG-0760 with respect to these points is perfectly appropriate.

IV.C. Whether There is Evidence That Mr. Dieckamp Expected the NRC to Rely on the Mailgram For Any Regulatory Purpose?66/

(Response to TMIA PF 174-178)

REPLY 196. TMIA asserts that the Dieckamp mailgram was intended to be a statement by Licensee to the Nuclear

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66/ The Reply Findings in this section are intended to follow LIC PF 133 in Licensee's proposed findings of January 28, 1985.

Regulatory Commission to convince agency officials that Licensee had not withheld information. See TMIA PF 174-178. However, as discussed below, the Board finds TMIA's assertion to be conclusory and unsupported.

REPLY 197. TMIA states that "Dieckamp claimed that the mailgram was not intended to have any official regulatory purpose." TMIA PF 174. What Dieckamp stated at the transcript page cited by TMIA was that the mailgram was not intended to be a communication to the Nuclear Regulatory Commission. Tr. 28,752 (Dieckamp). Nevertheless, the gist of TMIA's statement is true. Congressman Udall was the primary addressee; and copies were sent to at least two NRC Commissioners for their information. The mailgram was written in the first person. It stated Dieckamp's personal views. It neither requested nor advocated any agency action whatsoever. See Dieckamp, ff Tr. 28,316, attachment. Dieckamp testified that he sent the mailgram because he was disturbed by what he believed to be misinformation and wished to inform Congressman Udall and others that he took exception to the implications of the New York Times article. See LIC PF 133.

REPLY 198. TMIA proposes that the Board reject the direct testimony of Dieckamp on the subject of his intent, and states that Commissioner Kennedy "used" the mailgram "to answer certain questions posed by the House oversight committee." TMIA PF 174. Commissioner Kennedy's use of the mailgram, however, is irrelevant to Dieckamp's intent. It provides no basis for

rejecting Dieckamp's testimony -- testimony that is certainly the most probative indication of the purpose of the mailgram. Furthermore, the Board notes that Commissioner Kennedy's use was no more than to inform the House Committee that he had received a copy of the mailgram. There is no indication that Commissioner Kennedy used it to "answer questions." JME 1(c)(29), at 190 (Udall Committee Task Force Hearings).

REPLY 199. TMIA attempts to discredit Dieckamp by stating that he "denied" sending the mailgram to any Commissioner other than Commissioner Gilinsky "until confronted" with a copy he sent to Commissioner Kennedy. TMIA PF 175. Dieckamp did not "deny" sending the mailgram to any Commissioner other than Commissioner Gilinsky. When asked whether he remembered sending a copy to other Commissioners, Dieckamp replied: "The only thing that I know today is what the mailgram itself says. I know of no action on my part to distribute it separate and apart from what is indicated on the mailgram itself." Tr. 28,962 (Dieckamp).

REPLY 200. The Board does not find it surprising that Dieckamp did not remember that a copy had been sent to Commissioner Kennedy or whether copies had been sent to Commissioners other than Gilinsky. The mailgram was addressed to Congressman Udall. Dieckamp believed that Commissioner Gilinsky was sent a copy because he too had been present during the Congressional tour of TMI on May 7, 1979. Tr. 28,752 (Dieckamp). Apparently, Dieckamp decided that if he were to send a copy to one

Commissioner, other Commissioners should also receive a copy. That Dieckamp no longer remembers sending copies to other Commissioners indicates the insignificance of this action to Dieckamp. They were true copy addressees.67/

REPLY 201. TMIA also argues that the fact that Dieckamp was questioned in an October, 1981 Commission meeting on the mailgram indicates the mailgram was submitted to the Commission for regulatory purposes. TMIA PF 177. In so stating, TMIA refers to facts not in evidence and violates the Board's ruling striking (at TMIA's request) reference to the subject matter of the very same Commission meeting. See Tr. 28,889-91. In addition, the argument is illogical. Dieckamp's intent in sending the mailgram cannot reasonably be determined by the fact of his being subsequently questioned.68/

REPLY 202. Accordingly, the Board rejects TMIA's conclusion that the Dieckamp mailgram was intended to be an official regulatory submission by Licensee to the Commission. See TMIA PF 178. TMIA's conclusion is unsubstantiated by the evidence and testimony. The Board accepts Dieckamp's uncontradicted testimony regarding his intentions.

67/ The mailgram copies of the Udall mailgram necessarily show the Commissioners as addressees; however, the first sentence states: "This is a copy of a mailgram sent to the Honorable Morris K. Udall, Washington, D.C. 20515." JME 1(c)(142), App. B at 117-1 (NUREG-0760). See also TMIA Exh. 14.

68/ Had the Board accepted the transcript of the Commission's October 14, 1981 Commission meeting into evidence, we would note that no Commissioner mentioned having used or relied upon the mailgram in the course of this questioning.

IV.D Whether it Would Have Served Any Public or Regulatory Purpose for Mr. Dieckamp to Report the Subsequent Statements to the Extent They Constitute Some Evidence That Such an Interpretation Had Been Made at the Time the Spike Occurred on March 28, 1979, or That Any Such Information Was Withheld?69/

(Response to TMIA PF 312-315)

REPLY 203. TMIA's proposed findings regarding the purpose to be served by correcting the mailgram (TMIA PF 312-315) are unsupported by a single citation. TMIA first asserts, in conclusory manner, that Dieckamp knew that Licensee properly interpreted the pressure spike on the first day of the accident. TMIA PF 313. Since the Board has rejected this claim (see LIC REPLY 28-56, supra), it provides no basis for a duty to correct.

REPLY 204. TMIA next claims that irrespective of Dieckamp's knowledge, persons such as Mehler, Chwastyk, and Illjes properly interpreted the pressure spike at the time it occurred. TMIA PF 314. Mehler and Illjes, however, certainly never correctly interpreted the pressure spike on the day of the accident. See LIC REPLY 75, supra; LIC PF 94-104. With respect to Chwastyk, the Board concludes that the preponderance of the evidence indicates that Chwastyk also did not interpret the pressure spike in terms of core damage at the time of the spike. See LIC PF 119. See also LIC REPLY 75-106, supra.

69/ The Reply Findings in this section are intended to follow LIC PF 134 in Licensee's proposed findings of January 28, 1985.

REPLY 205. Even if the Board had reached a contrary conclusion with respect to Mr. Chwastyk, however, the Board would not impose upon Mr. Dieckamp a duty to correct. In the Board's opinion that duty would only arise if Mr. Dieckamp knew his conclusion was inaccurate. The Board finds a reasonable man could evaluate the evidence and conclude -- as did Mr. Dieckamp -- that the spike was not correctly interpreted. Since Mr. Dieckamp's conclusion is reasonable, he is entitled to it; his defense of his belief casts no aspersion on his integrity and he is not required to disavow that belief.

Respectfully submitted,

SHAW, PITTMAN, POTTS & TROWBRIDGE

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David R. Lewis

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Dated: February 25, 1985

APPENDIX A

Index to Licensee, NRC Staff and TMIA Proposed Findings and Licensee Reply Findings

1. Licensee Proposed Findings (Dated January 28, 1985)

2. NRC Staff Proposed Findings (Dated February 15, 1985)

3. TMIA Proposed Findings (Dated February 8, 1985, as amended)

TMIA PF	Page	TMIA PF	Page
1	1	158-159	59
2-4	2	160-163	60
5-6	3	164-165	61
7-9	4	166-168	62
10-12	5	169-170	63
13-14	6	171-173	64
15-17	7	174-177	65
18-19	8	178-180	66
20-21	9	181-182	67
22-25	10	183-187	68
26	11	188-191	69
27-29	12	192-193	70
30-32	13	194-195	71
33-36	14	196-198	72
37-39	15	199-200	73
40-42	16	201-202	74
43-46	17	203-206	75
47-49	18	207-209	76
50-52	19	210-212	77
53-54	20	213-215	78
55-57	21	216-219	79
58-59	22	220-222	80
60-61	23	223-225	81
62-64	24	226-228	82
65-67	25	229-231	83
68-69	26	232-234	84
70-72	27	235-236	85
73-76	28	237	86
77-78	29	238-241	87
79-80	30	242-243	88
81-84	31	244-245	89
85-87	32	246-249	90
88-90	33	250-251	91
91-92	34	252-254	92
93-95	35	255-258	93
96-99	36	259-261	94
100-101	37	262-264	95
102-103	39	265-267	96
104-106	40	268-270	97
107-109	41	271-274	98
110-111	42	275-276	99
112-114	43	277-279	101
115-117	44	280-281	102
118-120	45	282-285	103
121-123	46	286-288	104
124-125	47	289-290	105
126-128	48	291-293	106
129-132	49	294-295	107
133-135	50	296-298	108
136	51	299-302	109
137-138	52	303-304	110
139-140	53	305-306	111
141-143	54	307-309	112
144-146	55	310-312	113
147-150	56	313-315	114
151-153	57	316-318	115
154-157	58	319	116

4. Licensee Reply Findings (Dated February 25, 1985)

APPENDIX B

INDEX

Licensee Reply to TMIA Proposed Findings

TMIA PF	LIC REPLY
1	
2	
3	
4	
5	5
6	
7	
8	6
9	7
10	8
11	
12	9
13	
14	
15	62
16	62
17	62, 63
18	62, 66-67
19	62, 68
20	62, 70 n.32, 71
21	61, 62, 64-65
22	61, 62, 65
23	61, 62, 65
24	61, 62, 65 n.28
25	61, 62, 71
26	61, 62, 66 n.29, 69, 70
27	61, 75, 77
28	61, 75, 77
29	61, 75, 78
30	61, 75
31	61, 75, 79
32	61, 75, 79
33	61, 75, 79, 116
34	61, 75, 79
35	61, 75, 80
36	61, 75, 79 n.36, 115
37	61, 75, 81
38	61, 75
39	61, 75, 82
40	61, 75, 83
41	61, 75, 84
42	61, 75, 85, 111-114
43	61, 75, 85, 111-114
44	61, 75, 85 n.40, 111-114
45	61, 75, 86
46	61, 75, 87
47	61, 75, 88
48	61, 75, 89
49	61, 75, 90
50	61, 75, 91-94
51	61, 75, 91, 94
52	61, 75, 95
53	61, 75, 96-98
54	61, 75, 99
55	61, 75, 99
56	61, 75, 99
57	61, 75, 99, 100
58	61, 75, 99, 101
59	61, 75, 99, 104
60	61, 75, 99, 104
61	61, 75, 99, 104
62	61, 75, 99, 102-103
63	61, 75, 99
64	61, 75, 99
65	61, 75, 105
66	61, 75, 105
67	61, 75, 105
68	61, 75, 106
69	61, 75, 106
70	61, 75, 106
71	61, 107, 108, 126
72	61, 107, 109, 110, 115
73	61, 107, 111-114
74	61, 107
75	61, 107, 115
76	61, 107, 116-117
77	61, 107, 118
78	61, 107, 119
79	61, 107, 120-121
80	61, 107, 122
81	61, 107, 123
82	61, 107
83	61, 107, 124-126
84	61, 107, 125
85	61, 107
86	61, 107,108 n.43, 126
87	61, 107
88	61, 107
89	61, 107, 127 n.52
90	61, 107, 127, 128-129
91	61, 107, 130
92	61, 107
93	61, 107, 131
94	61, 107, 132
95	61, 107, 133
96	61, 107, 134-136
97	61, 107, 136
98	61, 107, 137
99	61, 107, 137
100	61, 107, 137

TMIA PF	LIC REPLY
101	61, 107, 137
102	61, 138-141
103	61, 154
104	61
105	61, 142
106	61, 143
107	61, 143-144
108	61
109	61, 146
110	61, 146
111	61, 139, 145, 154
112	61
113	61, 147
114	61
115	61, 147-148
116	61, 139, 154
117	61
118	61
119	61
120	61, 139, 149, 154
121	61
122	61
123	61
124	61
125	61, 150
126	61
127	61, 139, 150, 154
128	61
129	61, 139, 154
130	61
131	61
132	61, 151
133	61
134	61, 139, 154
135	61, 152-153
136	61
137	61, 155, 155 n.56
138	61
139	61, 156-157
140	61, 158
141	61
142	61, 159
143	61, 159-160
144	61, 159, 161
145	61, 159, 161 n.57
146	61, 159, 162
147	61, 163
148	61, 164
149	61, 164
150	61

TMIA PF	LIC REPLY
151	61, 164
152	61, 165-166
153	61, 166
154	61
155	61, 167 n.59
156	61, 167 n.59
157	61, 167 n.59
158	61, 167 n.59
159	61, 167 n.59
160	61
161	61, 168, 168 n.60
162	61, 168 n.60
163	61, 169
164	61, 169
165	61, 170
166	61, 171
167	61, 155 n.56, 172
168	72, 73-74
169	72, 72 n.34
170	174 n.62
171	
172	
173	
174	196-198
175	196, 199-200
176	196
177	196, 201
178	196, 202
179	
180	
181	
182	
183	
184	
185	
186	
187	
188	
189	
190	
191	40 n.19, 40
192	30-35
193	30, 32 n.15
194	30, 30 n.13
195	
196	
197	28-29, 36
198	37
199	37
200	28-29, 38

TMIA PF	LIC REPLY
201	28, 29, 38-39
202	28, 29, 37-39
203	36 n.17
204	36 n.17
205	32 n.15
206	
207	41, 42
208	44-45
209	44-45
210	44-45
211	41, 43
212	44-45
213	46-48
214	46-48
215	46-48
216	46-48
217	46
218	
219	
220	
221	47, 48
222	41
223	46
224	41
225	41
226	41
227	
228	50, 51
229	51-54
230	16, 51-54
231	51-54
232	51, 55-56
233	51, 55-56
234	51, 55-56
235	51, 55-56
236	50
237	
238	
239	174-176
240	174-176
241	10, 174, 180
242	174
243	174
244	174, 177-178
245	174, 177-178
246	174, 179
247	174, 179
248	174, 180-183
249	174, 180-183
250	174, 180-183

TMIA PF	LIC REPLY
251	174, 180-183
252	174, 180-183
253	174, 180-183
254	174, 180-183
255	174, 180-183
256	174, 180-183
257	174, 184
258	174, 185
259	174, 186
260	174, 187
261	174, 188
262	174, 188
263	174, 188
264	174, 188
265	174, 189
266	174, 190-192
267	174, 190-192
268	174, 190-192
269	174, 190-192
270	174, 190-192
271	174, 193-195*
272	174, 193-195*
273	174, 193-195*
274	174, 193-195*
275	174, 193-195*
276	174, 193-195*
277	174, 193-195*
278	174, 193-195*
279	174, 193-195*
280	174, 193-195*
281	174, 193-195*
282	174, 193-195*
283	174, 193-195*
284	11
285	11
286	11
287	11, 14
288	11, 15
289	11, 15
290	11, 16
291	11, 16, 17
292	11, 18-20
293	11, 18-20
294	11, 21
295	11, 21
296	11, 21
297	11, 22-24
298	11, 18, 26-27
299	11, 18
300	11, 18, 20 n.10

*STAFF PF 4 (proposing additional findings 57A-57P to Licensee proposed findings)

TMIA PF	LIC REPLY
301	11
302	11
303	11
304	57
305	57-58
306	57-58
307	57,59-60
308	57-58
309	57-58
310	
311	
312	203
313	203
314	203-205
315	203
316	
317	
318	

February 25, 1985

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
METROPOLITAN EDISON COMPANY	)	Docket No. 50-289
	)	(Restart Remand
(Three Mile Island Nuclear Station, Unit No. 1)	)	on Management)

CERTIFICATE OF SERVICE

I hereby certify that copies of "Licensee's Proposed Findings in Reply to Proposed Findings of Fact and Conclusions of Law on Dieckamp Mailgram Issue Submitted by TMIA and NRC Staff," dated February 25, 1985, were served upon those persons on the attached Service List by deposit in the United States mail, postage prepaid, this 25th day of February, 1985.

David R. Lewis

Dated: February 25, 1985

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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