

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of )  
 )  
METROPOLITAN EDISON COMPANY ) Docket No. 504289-SP P3:47  
 )  
(Three Mile Island Nuclear ) (Restart - Management Phase)  
Station, Unit No. 1) )  
 )  
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DOCKETED  
USNRC

OFFICE OF SECRETARY  
DOCKETING & SERVICE  
BRANCH

THREE MILE ISLAND ALERT'S OPPOSITION TO LICENSEE'S  
MOTION FOR PROTECTIVE ORDER AND  
MOTION FOR EXTENSION OF TIME

Intervenor Three Mile Island Alert opposes Licensee's Motion for a Protective Order, filed on August 15, 1984, on the ground that the information sought in TMIA's First Set of Interrogatories and First Request for Production to GPU is relevant to the issue before the Board concerning whether the false statements Mr. Dieckamp made in the mailgram he sent to Congressman Morris Udall on May 9, 1979, to rebut information reported in a New York Times article of May 8, 1979, reflects on GPU management's character and integrity.

Licensee has also requested an extension of over two weeks to reply to TMIA's First Set of Interrogatories. Because of the tight time schedule for discovery, TMIA opposes licensee's request for an extension of time, or, in the alternative, requests a lengthening of the discovery schedule by a time equivalent to any extension granted GPU.

I. BACKGROUND.

On July 31, 1984, TMIA filed its First Set of Interrogatories and First Request for Production to GPU concerning the issue of the

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Dieckamp mailgram and its reflection on GPU management integrity. TMIA requested in the interrogatories information about the knowledge of GPU and B&W personnel of the presence of hydrogen in the containment building and other conditions of the reactor on the first day of the accident. Under the rules governing proceedings before this Atomic Safety and Licensing Board ("Licensing Board"), GPU's response to TMIA's First Set of Interrogatories is due on July 19, 1984, and its response to TMIA's First Request for Production is due on September 4, 1984.

Discovery is currently scheduled to be completed by September 30, 1984, according to the Prehearing Conference Order of this Licensing Board. TMIA has informed GPU counsel that it intends to depose a number of GPU former and current employees and management concerning the Dieckamp mailgram and related issues concerning their knowledge of the pressure spike and the presence or explosion of hydrogen in the containment building and/or the reactor coolant system on the first day of the accident.

On August 13, 1984, at the offices of GPU's counsel, GPU and TMIA counsel negotiated for over four hours concerning TMIA's First Set of Interrogatories and First Request for Production in an attempt to reach agreement on the scope and timing of answering the discovery requests. As stated in GPU's Motion for Protective Order, TMIA has agreed to extend GPU's time for response to TMIA's First Set of Interrogatories to August 27, 1984.

II. DISCOVERY AS TO OTHER CONDITIONS OF THE REACTOR WHICH WOULD LEAD GPU EMPLOYEES AND MANAGERS TO BELIEVE THE PRESSURE SPIKE OBSERVED ON MARCH 28, 1979, WAS A REAL PRESSURE SPIKE, AND INDICATED THE PRESENCE AND EXPLOSION OF HYDROGEN AND CORE DAMAGE IS RELEVANT EVIDENCE AND REASONABLY CALCULATED TO LEAD TO THE DISCOVERY OF ADMISSIBLE EVIDENCE.

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Intervenor TMIA is entitled through discovery to information relevant to the issues in this proceeding, whether the information relates to TMIA's claim or defense or to a claim or defense of GPU. Further, TMIA is entitled to information which even though inadmissible at the time of hearing, appears reasonably calculated to lead to the discovery of admissible evidence." 10 C.F.R. 2.740(b)(1).

All objections raised by GPU, except those to the scope of Interrogatory Nos. 27 to 31, 38 and 39, are to information requests about the conditions of the reactor or events occurring at TMI-2 on March 28, 1979, the first day of the accident.<sup>1/</sup> The operators' knowledge and information about the conditions of the reactor prior to the hydrogen combustion or explosion at approximately 1:50 p.m. on March 28, 1979, is important to develop the context in which the operators understood and interpreted the pressure spike which occurred at that time. GPU management's knowledge of these conditions (or opportunity to become informed of these conditions) is relevant to their understanding, or opportunity to understand, that the pressure spike which occurred indicated a real increase in pressure within the reactor building, the presence or combustion of hydrogen, and core damage.

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<sup>1/</sup> The interrogatories to which GPU has made this objection as to scope are the following: Nos. 2, 3, 4, 5, 6, 7, 14, 15, 16, 17, 18, 19, 20, 21, 22, 34, 37, 40, 41, 48, 49, 50, 51 and 58. The document requests to which GPU has made this objection as to scope are the following: Nos. 1, 2, 3, 4, 5, 6, and 9.

GPU operators and management's understanding of the meaning and significance of the pressure spike is central to whether Mr. Dieckamp knew or should have known that GPU operators and management believed the pressure spike which occurred on March 28 indicated core damage or that GPU had withheld information about the pressure spike.

It has been widely argued that GPU operators' knowledge of other conditions of the reactor at or near the time of the pressure spike led them to believe the pressure spike indicated a real pressure increase, some kind of explosion had occurred, and the spike was not due to an electrical malfunction. Even a cursory review of the Majority Staff Report of the House of Representatives' Committee on the Interior and Insular Affairs entitled "Reporting of Information Concerning the Accident at Three Mile Island" (March, 1981) indicates the importance of the operators' knowledge of other conditions of the reactor to their understanding of the spike. See, e.g., Udall Report at 14, 17, 22, 32-36, 45, 54-88, 93-97, attached and incorporated herein as Exhibit 1.

TMIA has requested information on the following conditions of the reactor, all of which would tend to lead the operators to the conclusion that the pressure spike which occurred at approximately 1:50 p.m. on March 28 indicated a real pressure increase implying an explosion of some type, and core damage:

(a) The PORV had been open and/or leaking from approximately 4:00 a.m. to approximately 6:00 a.m.;

(b) The HPI had been throttled during the time the PORV had been open and/or leaking during the early morning of March 28, 1979;

(c) Hot leg temperatures in excess of 700 degrees F. had existed during the morning of March 28, 1979;

(d) Temperatures in excess of the saturation temperature indicated the core was or had been in a condition to be cooled by steam rather than water;

(e) The TMI-2 reactor was in a condition not covered by emergency procedures on March 28, 1979;

(f) The in-core thermocouple temperature readings for any part of the day of March 28, 1979;

(g) The neutron detectors mounted inside and outside the reactor pressure vessel indicated increased neutron levels on March 28, 1979; and

(h) The high radiation levels detected by the radiation monitor mounted at the top of the containment building during the morning of March 28, 1979.

For the same reasons, TMIA has requested information on GPU's knowledge of the following events occurring on the first day of the accident:

(a) The uncertainty of certain GPU and B&W personnel on-site on March 28, 1979, prior to noon on March 28, 1979, as to whether the reactor's core was being adequately cooled; and

(b) Whether Mr. Miller or any other GPU personnel gave directions not to activate any equipment in the reactor building because it might cause a spark and/or a hydrogen explosion.

Further, GPU is likely to defend on two grounds against the

argument that GPU employees and managers knew that the pressure pulse indicated a real increase in pressure implying an explosion of some sort and possible core damage:<sup>2/</sup>

(a) Operators and supervisors believed the pressure pulse was caused by an electric malfunction; or

(b) The operations did not interpret the pressure pulse properly because nothing in their training led them to believe such a hydrogen detonation would occur.

The first defense is not credible if one considers the plant design considerations and the simultaneous occurrence of pressure and temperature effects indicating a real pressure pulse. Similarly, the second defense is not credible if one considers the multiple indicators, in addition to the pressure spike, which indicate core uncovering and hydrogen detonation.

Thus the operators' perception of the conditions of the reactor other than the pressure pulse is critical evidence going to the credibility of GPU's expected defenses to the theory that GPU managers and employees were aware on March 28 that the pressure spike indicated a real pressure increase implying an explosion of some sort and possible core damage.

III. DISCOVERY ABOUT THE CHANGE TO A REPRESSURIZATION STRATEGY IS RELEVANT TO THE LIKELIHOOD THAT OPERATORS AND SUPERVISORS BELIEVED THE SPIKE INDICATED THE PRESENCE OF HYDROGEN OR CORE DAMAGE, AND THAT THE REACTOR WAS IN A MORE UNSTABLE CONDITION THAN PREVIOUSLY BELIEVED.

GPU has objected to responding to Interrogatory Nos. 27 through 31 on the ground that the decision to change from a depressurization

<sup>2/</sup> It is more likely that Mr. Dieckamp knew or should have known that CPU personnel believed the pressure spike indicated a real increase in pressure and core damage if GPU operators and supervisors believed this was the case on March 28, 1979, and took actions based on that belief.

to a repressurization strategy to bring the reactor under control shortly after the pressure spike occurred at 1:50 p.m. is not relevant to the issues before this Licensing Board.

Mr. Chwastyk is one of the two supervisors who has acknowledged he was aware of an explosion which occurred at the time of the pressure spike. Soon after the occurrence of the pressure spike he actively attempted to convince his supervisors to change to a repressurization strategy. It appears Mr. Chwastyk in fact succeeded in changing to such a strategy. If the reason he believed the strategy of bringing the reactor under control should be changed is related to the fact of a sudden pressure spike which indicated to him core damage, this information would be relevant to demonstrating operators and supervisors believed the pressure spike indicated core damage. Similarly, it is relevant information whether or not Mr. Chawstyk, in his efforts to change to a repressurization strategy, conveyed his belief that the pressure spike indicated a real increase in pressure implying an explosion of some sort to other operators and supervisors, including Gary Miller.

Therefore, Interrogatory Nos. 27 through 31 seek information tending to demonstrate not only Mr. Chwastyk's belief or understanding of the pressure spike at the time it occurred, but other operators and supervisors' understanding of the spike as well.

IV. DISCOVERY ON THE MILLER-TROFFER CONVERSATION IS RELEVANT AS TO WHETHER MR. MILLER BELIEVED THE REACTOR HAD SUFFERED CORE DAMAGE, AND THERE WAS HYDROGEN IN THE REACTOR BUILDING, AND WHETHER HE HAD WITHHELD INFORMATION FROM PUBLIC AUTHORITIES AT A TIME EARLIER THAN THE OCCURRENCE OF THE PRESSURE SPIKE.

Interrogatories 38 and 39 request information concerning the meaning of Mr. Miller's recorded conversation with Mr. Troffer of Met-Ed at approximately 9:30 a.m. on March 28, the first day of the accident. It appears that Mr. Miller believed the reactor was in a more unstable condition than he had represented to Commonwealth of Pennsylvania authorities and that the plant was in a condition that had not been totally analyzed. If, as appears from the plain words of the two statements which appear in these interrogatories, Mr. Miller did believe that there had been uncovering of the core and core damage, his belief and the basis for his belief are likely to have led him to interpret the pressure spike as an indication of a real increase in pressure implying an explosion of some sort and core damage. Further, it appears that Mr. Miller believed the conditions of the reactor were such at 9:30 a.m. that hydrogen could have been produced. Therefore, a clarification of Mr. Miller's statements made in this conversation is relevant to whether Mr. Miller believed at 9:30 a.m. that hydrogen had been produced and there had been core damage, which makes it more likely that he would believe at 1:50 p.m. that the pressure spike indicated a hydrogen explosion and core damage.

Moreover, if Mr. Miller, as appears from his statement, withheld information from the Commonwealth of Pennsylvania authorities as early as 9:30 a.m., it is more likely that he continued to withhold information about the worsening condition of the reactor later in the day, including information about the pressure spike, the hydrogen explosion, and core damage. Mr. Dieckamp, who talked to Mr. Miller shortly after the pressure spike occurred, may well have discussed these matters with him, including the worsening



condition of the reactor and whether or not the information about the pressure spike and other conditions of the reactor should be released to public authorities.

Therefore, GPU should be ordered to answer all TMIA discovery requests concerning Mr. Miller's statements to Mr. Troffer which indicate that he was withholding information from Pennsylvania authorities and that the reactor was in a more unstable condition that had apparently been communicated to these authorities.

V. GPU SHOULD NOT BE GRANTED AN EXTENSION OF TIME TO RESPOND TO TMIA INTERROGATORIES BEYOND AUGUST 27, 1984; IF AN EXTENSION OF TIME IS GRANTED, THE LICENSING BOARD SHOULD GRANT AN EQUIVALENT EXTENSION OF THE DISCOVERY SCHEDULE.

This Board has ordered that discovery, including all responses to discovery, be completed by September 30, 1984. In order to complete discovery on the two issues currently open for discovery, TMIA promptly after entry of the Board order served both the licensee and the NRC Staff with discovery requests on the two issues. GPU has asked for over a two-week extension to respond to TMIA's First Set of Interrogatories claiming that they are burdensome and will require a large expenditure of time.

TMIA attempted to reduce the burden on GPU by initiating and engaging in good-faith negotiations with GPU counsel to narrow the scope of certain interrogatory and document requests, and clarifying others. Second, TMIA has organized its schedule for discovery according to the schedule set by this Board and the time limits allowed by the NRC rules. Since TMIA wishes to depose a number of GPU former and current employees, it wishes to receive and review GPU's first set of responses prior to noticing the depositions. The only manner in which that will be possible is if the responses

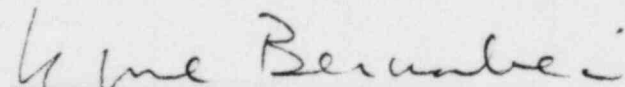
are served on TMIA by, at the latest, August 27, 1984. It is unfair to TMIA to allow GPU almost double the time to respond to TMIA's First Set of Interrogatories unless a similar lengthening of the discovery schedule is granted.<sup>3/</sup>

Therefore, TMIA opposes an extension of time to GPU to respond to TMIA's First Set of Interrogatories beyond August 27, 1984, unless an equivalent extension of the discovery schedule is granted to October 14, 1984.

VI. CONCLUSION.

In consideration of the foregoing arguments, TMIA respectfully requests this Licensing Board to deny Licensee's Motion for Protective Order in its entirety and Licensee's Motion for Extension of Time to Respond to TMIA's First Set of Interrogatories.

Respectfully submitted,



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DATED: August 20, 1984

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<sup>3/</sup> As this Board remembers, TMIA requested a six-month discovery schedule because it recognized that given the other litigation responsibilities of the parties, it might well take six months to propound and respond to discovery requests on the two issues currently before this Board.

TMIA is the lead intervenor on the Dieckamp mailgram issue and on most portions of the training issue as well.

EXHIBIT 1

97th Congress }  
1st Session }

COMMITTEE PRINT NO. 3

REPORTING OF INFORMATION CONCERNING  
THE ACCIDENT AT THREE MILE ISLAND

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A REPORT

PREPARED BY

THE MAJORITY STAFF

OF THE

COMMITTEE ON

INTERIOR AND INSULAR AFFAIRS

OF THE

U.S. HOUSE OF REPRESENTATIVES

NINETY-SEVENTH CONGRESS

FIRST SESSION



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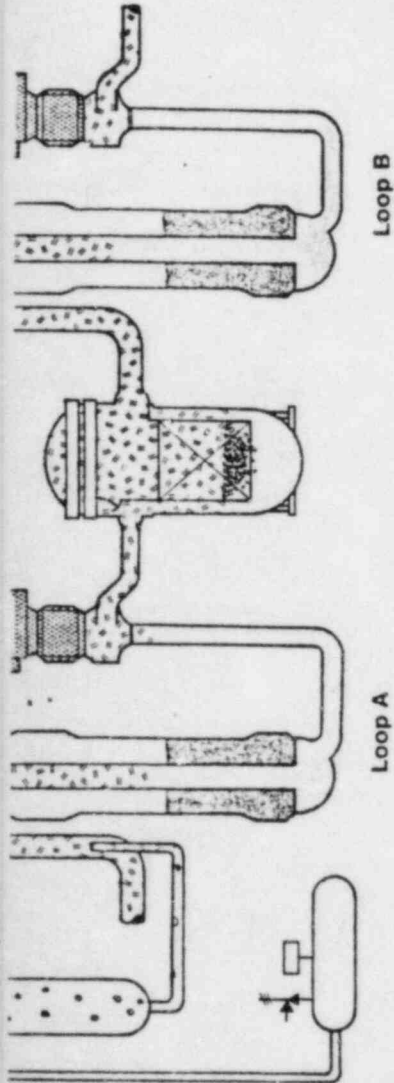
pulled Ross back into the shift supervisor's office where I could be alone with him and I told him in quite strong language that he should not turn it off without talking to me personally the rest of the day. That was the one thing that he couldn't do without seeing me.

(Miller, I&E, Tape #159, 5/7/79, p. 50.)

#### C. TEMPERATURE DATA

Primary system pressure and temperature data were the principal indicators of whether the TMI-2 core was being cooled adequately and whether the core had been damaged. This data indicated whether there were steam spaces within the primary system and whether the steam space extended into the reactor core. The temperature data also indicated whether core cooling had failed to the point where steam was reacting chemically with the zirconium fuel cladding, producing gaseous hydrogen and zirconium oxide.

The most significant temperature data was provided by temperature sensors located in the hot legs which normally carried water from the reactor pressure vessel to the steam generators, and by 52 temperature sensors placed above the reactor core. (The primary cooling system is depicted in Figures I-A and I-B.)



Core dryout and heatup continuing.  
Hydrogen generation by zirconium/water reaction in hotter regions.

FIGURE I-B

At approximately 6 a.m. on March 28, temperature data began to indicate clearly that portions of the reactor core had become uncovered. Between 8 and 9 a.m. in-core thermocouple data indicated the high likelihood of a substantial steam-cladding interaction.

Several questions exist with regard to the temperature data: to what extent were TMI managers aware of it; to what extent did they interpret it along with other data to mean that there was steam within the primary cooling system; to what extent did they infer from this data the existence of a steam-cladding reaction; and to what extent was this data reported to State and Federal authorities?

The following excerpts from the record of the TMI inquiries indicate the following: Control room personnel's general awareness of hot-leg temperatures in excess of 700 degrees, a clear indication of the presence of steam in the hot legs; some awareness that the temperatures in excess of 700 degrees meant that the steam space had extended into the core; limited awareness that data from the in-core thermocouples indicated temperatures in excess of 2000 degrees above the core; and no admission by those having managerial responsibilities as having made the connection between the very high temperatures and a steam-cladding reaction. One technician involved in taking the in-core measurements prior to 9:30 a.m. on March 28 said the temperatures were of a magnitude to suggest to him that, "You've got a meltdown coming." (See p. 29.) [At least one supervisor (who was unaware of the direct measurements made of the in-core thermocouple voltages) has stated he inferred on March 28 from the 1:50 p.m. pressure pulse that there had been a hydrogen explosion in the containment building, and this supervisor says that others were aware of this event and its significance. (See pp. 71, 75-76.)]

#### D. HOT-LEG TEMPERATURE

Hot-leg temperature data at TMI-2 were normally presented on a computer printout and on a strip chart recorder mounted in the reactor control room. The computer was programed to record data between 520 degrees F. and 620 degrees F.; when the temperatures were outside this range, the computer printed question marks. The strip chart was capable of recording temperatures up to 800 degrees F. (See Figure II.)

Were you aware that the instruments indicated temperatures of 700 to 800 degrees Fahrenheit?

A. I was aware they indicated temperatures around 700 degrees.

Q. What was your assessment of these temperatures? What did they mean to you?

A. They meant to me that I didn't have a cooling method for the core, is what it meant at the time. Today it means something different to me, as it does to any operator. But at the time it meant to me that I didn't have an adequate cooling method in the core.

Q. And you related it to method rather than coolant available?

A. I don't think I ever said, Oh, I've got a low level. I think I said, hey, I'm not removing the heat.

Q. Did you at any time on March 28th discuss the implications that you drew of these temperatures with Mr. Miller.

A. I think we did discuss them in the think tank.

(Ross, I&E, 9/24/80, p. 25-26.)

#### E. CREDIBILITY OF IN-CORE THERMOCOUPLE DATA

Other sources of temperature data were the 52 thermocouples installed inside the reactor pressure vessel above the fuel assemblies. These thermocouples sensed water (or steam) temperatures at particular points across the top of the core. Each thermocouple provided an indication of the temperature conditions above a particular fuel assembly while the hot-leg temperature sensing devices (discussed above) normally indicated the *average* temperature of water (or steam) leaving the reactor pressure vessel. There were, in fact, large differences between average temperatures as measured in the hot legs and the peak temperatures measured by the individual in-core thermocouples. It was these peak in-core temperatures that confirmed not only that the core was uncovered, but that the zirconium cladding was reacting with steam, producing hydrogen and zirconium oxide.

One or more TMI personnel showed an early and continuing interest in the in-core temperatures. They instructed the computer to print these temperatures at about 8:34 a.m., 8:47 a.m., 11:10 a.m., 12:40 p.m., 4:11 p.m., 6:30 p.m., 7:59 p.m., 8:56 p.m., and 9:56 p.m. Between 6 a.m. and 6 p.m. the temperature data for at least 40 percent of the thermocouples (EPRI, Fig. cl-11) were printed as question marks, indicating either that the thermocouples had failed or that the temperatures were in excess of 700 degrees F. Because some of the thermocouples alternated between indicating question marks and temperatures less than 700 degrees, it was more plausible that the readings were indicative of temperatures in excess of 700 degrees than indicative of instrument malfunction.<sup>5</sup> Moreover, if many had been damaged while others continued to function, this in itself would have been a reasonable indication that something major had happened in the core

<sup>5</sup> By approximately 12:45 a.m. on March 29 the thermocouples were mostly indicating temperatures less than 700 degrees and were apparently used thereafter as a prime indicator of core conditions.

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Ross. Thermocouple temperatures were brought up to Gary Miller, and I guess the bottom line they got out of that, was that they were not conclusive. It showed the core was hot, basically. I was going to say his range varied, very scattered. He had like . . . He was saying he had various temperatures scattered throughout. So, well, Gary and he discussed it, and basically I think the bottom line was yeah, the core is hot, or it is at least hot.

(Ross, I&E Tape 226, May 19, 1979, p. 42.)

That the in-core thermocouples had indicated temperatures in excess of 2,000 degrees (implying probable hydrogen production) was apparently not reported to the NRC during the first few days of the accident. Victor Stello (then NRC Director of Operating Reactors under Harold Denton) said he had not known of such measurements until the week of April 1. Roger Mattson (Director of Systems Safety under Harold Denton) stated to the E&E Task Force on May 9 that this was the first he had heard of such temperatures.

Stello, however, had been concerned on March 28 about data indicating superheated conditions in the hot-legs. He requested computer printouts of the in-core thermocouple data. There ensued the following dialog between Three Mile Island and the NRC's Incident Response Center in Bethesda:

VOICE. First of all, I can't get the in-core temperatures. Okay?

VOICE. You cannot get them?

VOICE. They print out question marks.

VOICE. They print out question marks?

VOICE. Yes.

VOICE. Okay, what's that mean?

VOICE. That means that either the computer point is messed up—okay?

VOICE. Yes.

VOICE. Or that the line—you know, the—where you sense it, that line's broken or something's messed up with that line. Okay? They were printing earlier. Yeah, the computer just won't—the computer won't spit out a good number for them. They're trying all of them to see if we can get any of them to print. Okay?

(01-033-CH 2/20-MEM-10.)

Based on the foregoing discussion, NRC I&E investigators stated that at approximately 4:10 p.m. on March 28: "Reported incore temperatures unavailable. Supervisor (at TMI) reports to NRC they (in-cores) are all printing question marks which means either the computer point or the sensor is malfunction (sic)."

(NUREG 0600, IA-101.)

Yet practically coincident with the conversation in which the NRC was told that the computer was printing out question marks, the computer was in fact displaying not only question marks but also two on-scale readings, one indicating that thermocouple 9-H was showing a temperature of 596.9 degrees F., and the other showing thermocouple 6-L indicating a temperature of 562.1 F. Both temperatures were indicative of superheated conditions in the core and

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the likelihood that the reason for the question marks was high tem- perature rather than a malfunction of the instruments.

A reproduction of the computer printout follows:

16:03:13	182.7	135.1	591.4	474.7	457.4	581.	471.6	376.3	284.5
16:10:13	182.5	128.9	597.5	476.0	456.6	585.	421.3	376.3	285.0
16:11:32	DATA	0493	IM	INCORE	T/C	8-H	TEMP	-???.?	
16:11:41	DATA	0494	IM	INCORE	T/C	9-H	TEMP	506.9	
16:11:49	DATA	0495	IM	INCORE	T/C	9-G	TEMP	-???.?	
16:11:57	DATA	0496	IM	INCORE	T/C	8-F	TEMP	-???.?	
16:12:06	DATA	0497	IM	INCORE	T/C	9-E	TEMP	-???.?	
16:12:14	GROUP TREND								
	OPERATOR GROUP C								
	1032	0386	0390	0389	0468	0388	0472	0488	0469
16:12:51	182.2	121.9	591.1	476.4	456.0	581.	420.8	376.3	285.0
16:13:44	DATA	0498	IM	INCORE	T/C	7-F	TEMP	-???.?	
16:13:53	DATA	0499	IM	INCORE	T/C	7-E	TEMP	-???.?	
16:14:03	DATA	0500	IM	INCORE	T/C	6-G	TEMP	-???.?	
16:14:12	DATA	0501	IM	INCORE	T/C	5-G	TEMP	-???.?	
16:14:22	GROUP TREND								
	OPERATOR GROUP C								
	1032	0386	0390	0389	0468	0388	0472	0488	0469
16:15:02	182.0	116.7	591.0	477.9	455.2	585.	420.5	376.3	285.1
16:15:54	DATA	0502	IM	INCORE	T/C	5-H	TEMP	-???.?	
16:16:03	DATA	0503	IM	INCORE	T/C	5-K	TEMP	-???.?	
16:16:13	DATA	0504	IM	INCORE	T/C	6-L	TEMP	562.1	
16:16:22	GROUP TREND								
	OPERATOR GROUP C								
	1032	0386	0390	0389	0468	0388	0472	0488	0469
16:17:03	181.8	110.6	591.1	478.2	454.3	585.	420.3	376.4	285.0
16:17:54	DATA	0505	IM	INCORE	T/C	7-H	TEMP	-???.?	
16:18:03	DATA	0506	IM	INCORE	T/C	8-N	TEMP	-???.?	
16:18:13	GROUP TREND								
	OPERATOR GROUP C								
	1032	0386	0390	0389	0468	0388	0472	0488	0469
16:18:54	181.6	107.0	591.2	478.9	454.1	585.	420.0	376.4	285.1
16:19:47	DATA	0507	IM	INCORE	T/C	9-N	TEMP	-???.?	

Although the in-core thermocouple data was printed at least 9 times between 8:00 a.m. and 10:00 p.m. on March 28 there appears to be no record of any set of such data having been transmitted to the NRC's Incident Response Center in Bethesda.

D. NEUTRON DETECTORS

TMI-2 instrumentation included neutron detectors mounted outside the reactor pressure vessel and 52 strings of detectors mounted inside. Both in-core and ex-core detectors are installed for the purpose of providing operational data; during normal operations, the in-core neutron detectors indicate power production at various locations within the core. During the TMI accident both in-core and ex-core detectors provided data indicating the core was uncovered.

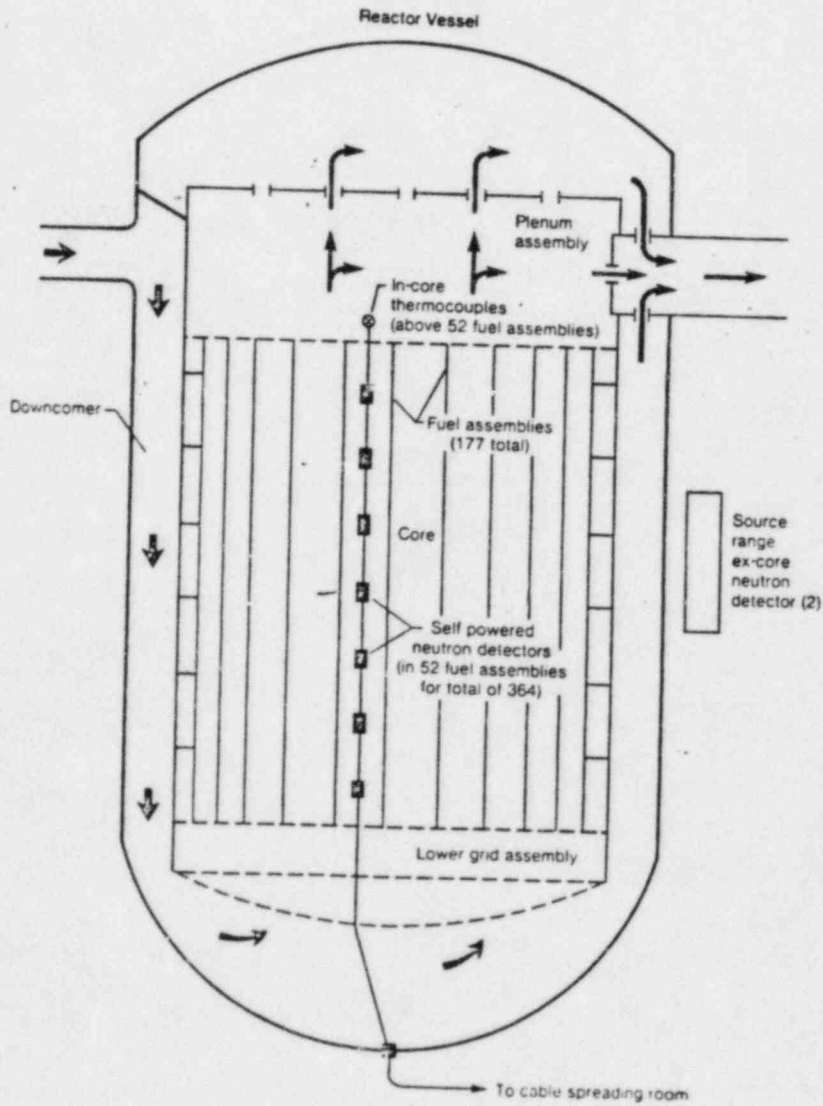
The ex-core instruments indicated increased neutron levels. These were interpreted initially as indicating that the reactor was near the critical point where a self-sustaining chain reaction might be occurring. The operators believed that this might happen as a result of insufficient boron concentration in the primary system coolant. In actuality the apparent increase in neutron flux resulted from the fact that neutrons—produced at small rates in a reactor core even when the reactor is subcritical—because of voids in the core, were more likely to be leaked from the pressure vessel and were therefore reach-



ing the ex-core instruments in greater numbers. In short, the increased neutron flux was due to the pressure vessel having lost water and not to a restart of the chain reaction.

The in-core neutron detectors also yielded data indicating that the core was uncovered and the depth of the uncovering. Once the water level went below the neutron detector and the temperature of its surroundings rose, the detector responded to the higher temperatures and became, in effect, a temperature sensitive device which provided indirect indication of water level in the core. (See figure IV.)

FIGURE IV



Basic reactor configuration and instrument locations

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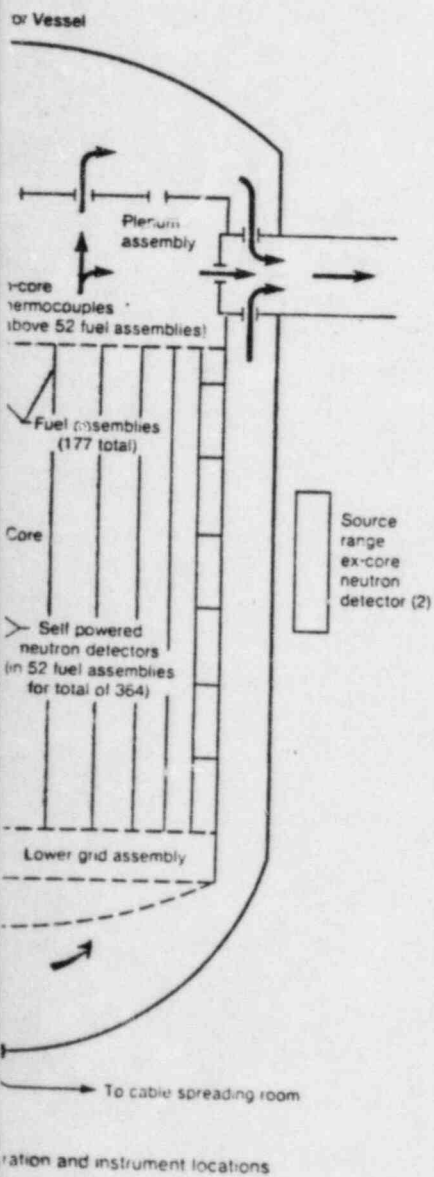
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also yielded data indicating that the top of the uncovering. Once the water level dropped and the temperature of its surroundings to the higher temperatures and the sensitive device which provided data in the core. (See figure IV.)

FIGURE IV



The record is unclear as the extent to which the TMI supervisors used the neutron detector data as an indication that the core had been uncovered. The record shows that increased counting rates were initially interpreted as an indicator of the reactor going critical. As a result, additional boron was injected into the primary cooling system. During the morning of March 28, B&W engineer John Flint looked at the neutron detector data and concluded that in all probability the increased counting rates were due to a change in the leakage path. Flint told the I&E inspectors:

Indications for the source and intermediate range (neutron detectors) appeared to be normal, for this period of time following a shutdown condition. I did notice, however, that there were several blips on the recorder for source/intermediate range and in conversation with Ed Fredericks he informed me that they thought at the time that they were going critical and that they had added additional boron to the system. At this time, I informed them that in all probability this was not the case, that there had been a change in leakage flux path from the reactor core to the detectors and it was not in fact the case the reactor going critical again. (Flint, I&E Tape 58 & 59, May 23, 1979, p. 4.)

#### E. HIGH RADIATION LEVELS IN REACTOR COOLANT SYSTEM AND IN CONTAINMENT BUILDING

At 6:35 a.m. a radiation monitor mounted at the top of the containment building indicated radiation levels of about 0.1 Roentgen (R) per hour. By 7:30 a.m. this monitor was indicating levels in excess of 10,000 R per hour<sup>6</sup> in the vicinity of the monitor due to fission product gases near the top of the dome. (Approximately 50 percent of persons exposed to this dose rate would receive a lethal dose in about 4 minutes.) These radiation levels implied that radioactive fission product gases had been released from a significant fraction of the fuel rods; the only way such a release could have occurred would have been through development of cracks or perforations in the cladding.

At approximately 8:50 a.m. on March 28, a reactor coolant sample was obtained by technicians who, in order to obtain it were required to enter a room where radiation levels approximated 200 R/hour. Analysis of the sample and knowledge of the procedure by which it had been obtained would have indicated fuel rod failure much more extensive than that publicly reported on March 28. The record is unclear as to who among the TMI managers was aware of the sample or the conclusions reached from analyzing it. It is also unclear as to the time at which the NRC was informed of the analysis. The taking of the sample (but not the circumstances of its analysis) is discussed at length in Section II of NUREG 0600.

#### F. UNCOVERING OF THE CORE

As the primary cooling system continued to lose water, the water level in the pressure vessel dropped below the tops of the fuel rods. The fuel was then cooled by steam rather than water, and as the water

<sup>6</sup> Miller recalled that at about 7 a.m. the dome monitor was indicating on the order of 50,000 R/hour.

[Miller, Tape No. 158, 5/7/79, p. 26.]

level dropped further, cooling became inadequate. The temperature of the zirconium tubes holding the uranium fuel pellets rose to a point where the zirconium reacted chemically with the steam, producing the hydrogen and zirconium oxide.

The manifestations of the core being uncovered have been discussed in previous sections: superheated conditions in the hot-legs and above the fuel, high radiation levels in the reactor containment building, and high neutron fluxes outside the pressure vessel. Several of those present interpreted this information to mean the core had been uncovered. Others recall being unsure as to whether it had been uncovered or not. The recollections in this regard as presented to TMI investigators are as follows.

As is indicated above, the technicians who measured the in-core thermocouple voltages concluded that the high temperatures they observed implied that the core had been uncovered. (Supra, p. 25.)

John Flint, the B&W engineer stationed at the site told I&E investigators (9/2/80, p. 4) that it had been his impression on March 28 that the PORV had been open for 12 to 15 minutes and that it was not until 2 days later that he "found out that it had been open for several hours." He was also apparently unaware of the throttling of the high-pressure injection and of the direct measurements of the in-core thermocouple voltages indicating temperatures in excess of 2,000 degrees. On the basis of temperature and neutron data, Flint did conclude, however, at 10:30 a.m. or thereabouts that the core had been uncovered earlier, even though it appeared to him that by 10:30 a.m. it was again covered. Flint engaged in the following dialog with the Kemeny Commission interviewers. The answers are Flint's:

Q. When you reached the conclusion that the core had been uncovered approximately an hour to an hour and a half after you arrived, which would be something in the order of 10 to 10:30, did you tell anyone?

A. Yes, I did. I believe I mentioned it to Lee Rogers at the time.

Q. What was his reaction?

A. I believe he went to discuss it with Gary Miller and George Kunder.

Q. Were you present during that discussion?

A. No, I was not.

Q. Did he report back to you?

A. I don't remember him addressing that specific question, no.

Q. Did you ever find out what discussion he had with Kunder and Miller with respect to core uncovering?

A. Not that I can remember, no.

Q. Did you tell anyone else that you had reached the conclusion that the core had uncovered?

A. Bell Zewe, Ed Fredericks.

Q. What was their reaction?

A. I would say surprised.

Q. It was news to them?

A. Yes.

think we thought back about coverage as much as we thought is didn't discuss boiling water in the

her members of that group have called over the morning you got me, okay, now do we all think the number that?

I remember the core coverage was I could—you know, the single than the emergency plan, which me.

not convinced that you had flow I thought that the high pressure passing the core or parts of the

could be done. I think the temperature indications told us that some I think we discussed that. Okay. I am trying ourselves what the level in

Miller, SIG, 9/20/79, pp. 17-19.)

19, Miller said:

I periodically throughout the objectives, re-reviewed the emergencies. Our concerns became one of re-circuiting the core to the Reactor possibly the core might not be if having RCV-2 fail (open or did not convince us that water any firm decision was to always ion. The group discussed and I pressure and attempt to use the ourselves that the core was covered mechanism we might get the plant

E, TMI-2, 5/7/79, p. 269.)

Investigators on May 7, 1979, Miller said:

they cavitated. We knew we had had to pull (sic) pressurizer, I not secure HP injection withheld. *We were not in our minds covered.*

7, 1979, p. 23, italic added.)

conditions after Miller had issued injection flow was to be maintained since Miller expressed doubt as to covered with high pressure injection to believe the core was being cooled vessel and out the hot-leg, he would core was covered earlier when the

high pressure injection had been turned off, heat was not being removed via the steam generators, and the temperature sensors were indicating superheated conditions above the fuel assemblies and in the hot-legs.

G. UNCERTAINTY AS TO ADEQUACY OF CORE COOLING AND RECOGNITION THAT PLANT WAS IN A CONDITION NOT COVERED BY WRITTEN PROCEDURES

After the last of the reactor coolant pumps was shut down at approximately 5:40 a.m. on March 28, the TMI operating and emergency procedures no longer applied to the conditions existing in the plant. Until a reactor coolant pump was started at approximately 8 p.m., the principal path for heat removal was via the PORV block valve at the top of the pressurizer. During this period a relatively small amount of heat was removed via the reactor letdown system and by reflux cooling in the steam generators. The method of cooling (involving pumping water into the pressure vessel with high pressure injection (HPI) pumps, through the hot-leg and pressurizer, and thence through the PORV block valve) was known as "feed and bleed," a procedure for which the operators had not been trained, and one for which there were no written procedures. The following excerpts from interviews indicate the plant managers were in fact aware they were using a cooling procedure for which they had no training and one for which there were no written procedures. They were so uncertain as to the effectiveness of the strategy at high pressure that they switched at about 11:30 a.m. to a strategy involving depressurization of the system. The latter, if successful, would have allowed cooling by the decay heat removal system which was one in whose use the plant personnel were schooled.

TMI-2 Technical Superintendent, George Kunder, has provided extensive comments to TMI investigators with regard to his perception on March 28 as to the cooling procedures and adequacy thereof:

KUNDER. OK. I believe, as I indicated on the previous date, somewhere around 45 minutes to an hour after declaring the site emergency and getting the emergency plan fairly underway we—we being Gary Miller, Jim Seelinger and Mike Ross, Lee Rogers, and myself—met generally as a small group to discuss strategy and our perceptions about where we were and where we thought we should be going. Because it was pretty clear based on the hot leg temperatures existent in the core at that time that we were into a very serious problem, that we did not yet have the cooling of the reactor well under control. I think the general perception at the time was that we intuitively thought that we had the core covered. I think by that time we felt that we were getting water into the core, but there was no indication that hit you in the head and said

\* Operators indicated that at this time they believed that pressurizer heaters were unavailable and concerned that EMOV block valve might fall open. Didn't appear to be getting anywhere so the group decided to drop pressure to get core flood tanks (CFT) to float on core.

\* Operators were controlling pressure with the HPI and EMOV. The staff was concerned that the HPI flow might be bypassing the core; since  $T_h \sim 620$ ,  $T_c \sim 220$  and the pressurizer water since RTD was relatively constant at 350° F. They wanted to make sure the core was covered; so they decided to depressurize in an attempt to get Core Flood initiation and ultimately to initiate DHR below 400 psig." (Quote from NUREG, 0600, p. IA-74, 75.)

have oil pumps for some of the RC pumps; couldn't get in some of the rooms; the readings were horrendous.

(Miller et al, GPU, 4/12/79, pp. 24-25.)

. . . Our major concern was that the fuel didn't degrade any more than it had degraded from thereon, and to somehow figure out how to prevent that and how to stop this. I didn't really feel that we were stopping at the initial stages; I was scared of running out of water. The outside pressure that I was getting indicated that you could just pump this thing solid—and I couldn't get it solid. You could have pumped all day—but I'm convinced without pumping water up the hotlegs—because you had to collapse those bubbles. We didn't have a 4000 pound system. It was a hell-of-a scenario.

(Id., pp. 28-29.)

#### H. HYDROGEN COMBUSTION

During the morning and early afternoon on March 28, a significant portion of the hydrogen produced in the zirconium steam reaction was released from the reactor cooling system into the containment building via the pressurizer relief valve. At approximately 1:50 p.m. the hydrogen ignited.<sup>8\*</sup> What is probably more accurately described as a fire than an explosion caused several effects including a 28-pound-per-square-inch (psi) pressure pulse in the containment building.<sup>9</sup> This pulse was recorded on the strip chart that recorded containment building pressure. It was also recorded on a series of other pressure measuring devices which used the containment pressure as a reference.<sup>10</sup> The fire raised temperatures in the containment from about 125 degrees to 175 degrees F, an increase of 50 degrees dissimilar to any other temperature changes observed that day; these temperature data were recorded on strip charts in the control room.<sup>11</sup> The increased temperatures triggered several alarms. The containment pressure pulse also actuated various emergency systems, most notably the equipment that caused water and sodium hydroxide to be sprayed into the containment building.

\* See footnote 2, p. 1.

<sup>9</sup> See figure V-A, p. 55.

<sup>10</sup> See figure V-B, p. 56.

<sup>11</sup> See figure V-C, p. 57.

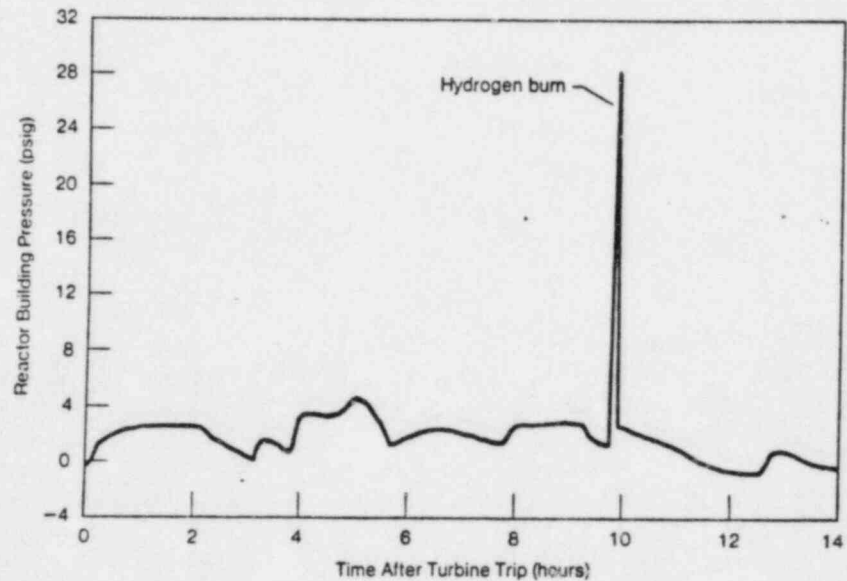
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#### N COMBUSTION

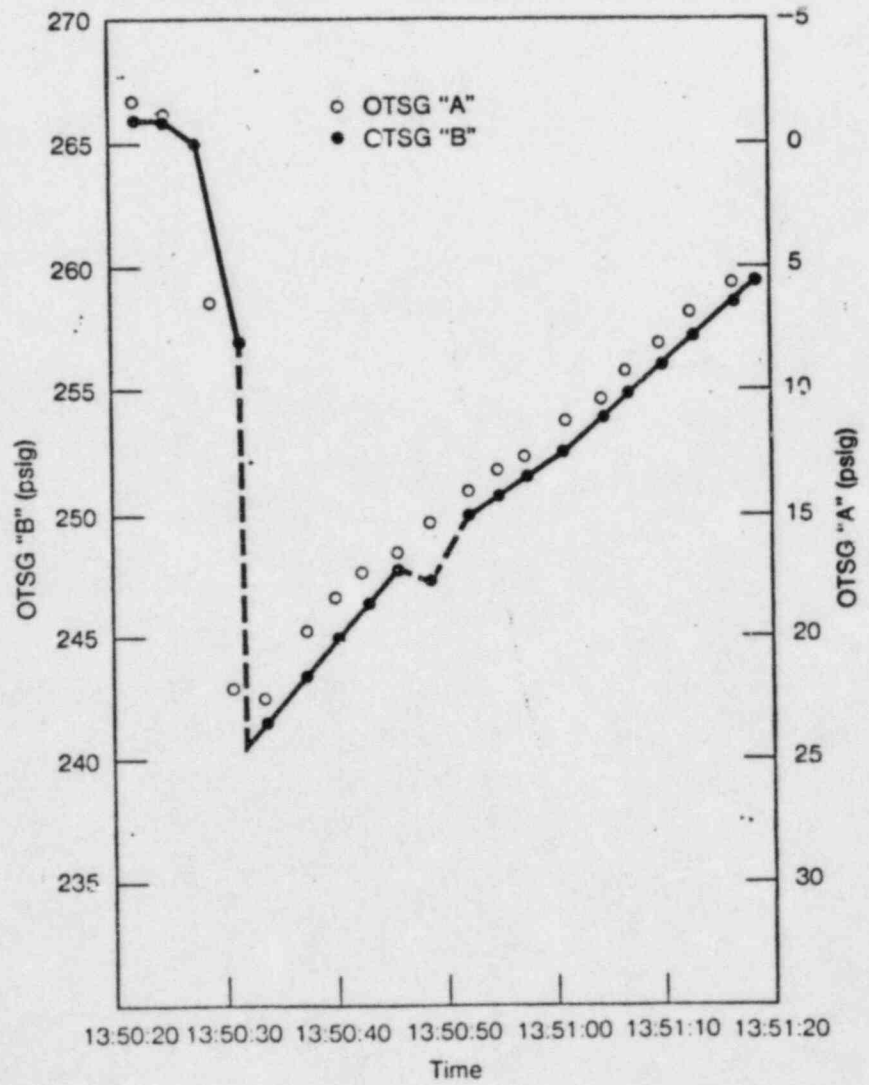
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FIGURE V-A



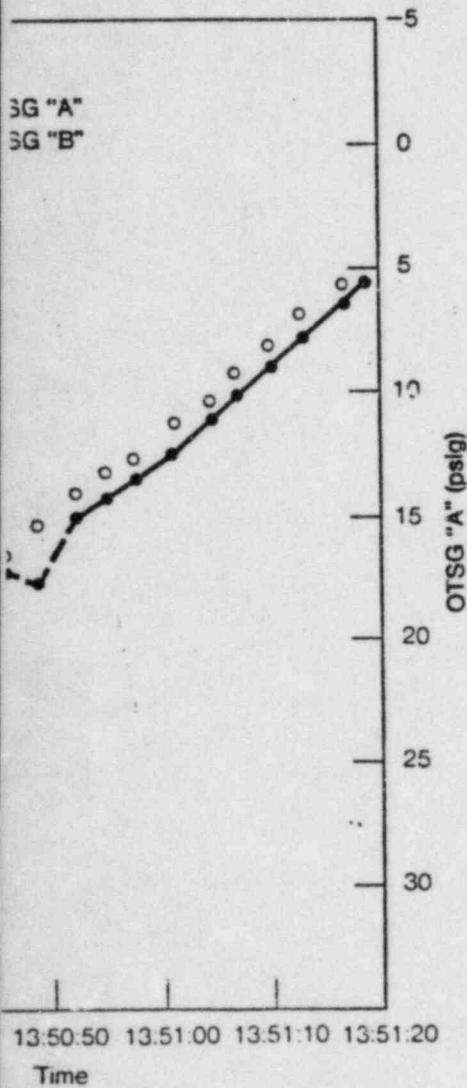
Reactor Building Pressure Versus Time

FIGURE V-B



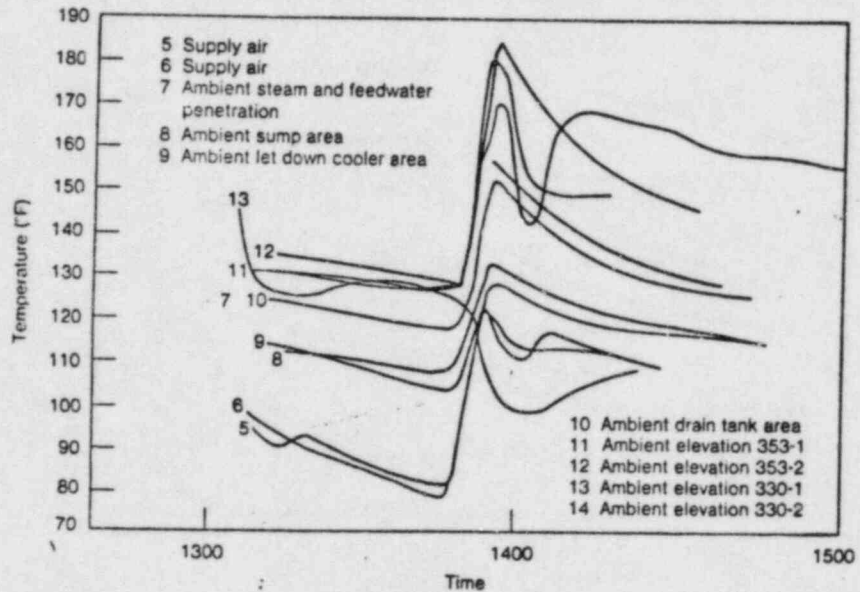
Effect of H<sub>2</sub> ignition on measured steam pressures.

FIGURE V-B



tion on measured steam pressures.

FIGURE V-C



Reactor building temperatures during hydrogen ignition.

Officials at NRC headquarters in Washington and Bethesda did not become aware of the hydrogen detonation until March 30.<sup>11a</sup> State officials, including Lieutenant Governor Scranton, who were briefed in Harrisburg within 1 hour of the detonation were not told about it then, and they apparently did not learn of its occurrence until 2 days later, on March 30. At least one TMI supervisor has testified that he informed an NRC inspector in the TMI-2 control room that the pressure spike on the containment building pressure recorder represented a real pressure increase. The NRC inspector has denied that he was so informed, and whether informed or not, he apparently did not report it to his superiors. The most likely reason for the inspector's failure to report the spike, assuming he was aware of it, is that he did not understand its significance. It is also possible, but unlikely, that the inspector was aware of the pressure pulse and its significance, but did not report it through an oversight or through intent.

Statements made to TMI investigators indicate the following: most of those present in the control room were aware on March 28 of the pressure spike<sup>11b</sup> and associated actuation of containment sprays; several of those present were aware on March 28 that a detonation possibly involving hydrogen, had occurred; and Station Manager Gary

<sup>11a</sup> Appendix H contains a transcript of discussion at a March 30 Commission meeting where the Commissioners were informed of the discovery of the reactor building pressure pulse and its possibly indicating a hydrogen explosion.

<sup>11b</sup> Four Commissioners subsequently stated they had been unaware until May 1979 that the persons in the control room knew of the pressure spike in the containment at the time it occurred. One Commissioner stated he was not sure when he learned that the pressure pulse had been observed by persons in the control room at the time it occurred, but that in any event he did not know this during the critical time of the accident.

(E&E, TMI-2, pp. 190-193.)



Miller (notwithstanding his failure to recollect being aware on March 28 of the pressure pulse, actuation of containment sprays, discussions of hydrogen production, and the need to take certain actions based on the existence of hydrogen) was more likely than not aware of the detonation and its significance.

The hydrogen detonation was a clear indication that the accident was much more severe than Federal and State officials believed at the time it occurred. Chairman Hendrie answered "Yes, clearly," to the question of whether the fact of a hydrogen explosion would suggest the possibility of deformations in the core that might block flow of cooling water. (E&E, TMI-2, pp. 195.) He elaborated by noting, "A flammable hydrogen concentration in the containment could only have resulted from substantial zirconium-water reaction, and that would have meant core overheating and substantial damage to fuel cladding that could cause flow blockage." (Ibid.) He stated also in response to the question as to whether it would be important that he know of such deformation in order that he might develop appropriate plans for dealing with the situation: "Yes, very important: lack of this knowledge at the time it occurred delayed our understanding of the actual condition of the reactor for almost two days." (Ibid., p. 196.)

The question thus arises as to why TMI managers failed to clearly inform the NRC and State of Pennsylvania of the event and its significance as soon as they themselves understood what had happened.

The following discussion supports the conclusion that on March 28, the TMI Station Manager and some of his subordinates were more likely than not aware of the detonation and its potential significance. The discussion that follows is based on excerpts and inferences from the record of the TMI investigations conducted by the President's Commission, the NRC, and the Senate Subcommittee on Nuclear Regulation.

TMI supervisors, who have said they did not believe the pressure pulse to have been real, have given any of three explanations in support of their statements as to why they had not recognized that the pressure pulse and associated actuation of safeguards systems had in fact been an indication of a real increase in containment building pressure.

1. The explosion manifestations were caused by spurious electrical signals.

2. Because the pressure did not remain at a high level, the cause of the pulse was not important, and the operators were too engrossed with establishing a stable cooling configuration to pay attention to it.

3. They did not think it could have been real because nothing in their training led them to believe such a detonation might occur.

The first of these explanations should be considered in light of plant design considerations and the simultaneous occurrence of pressure and temperature effects indicative of a real pressure pulse. The second and third explanations should be considered, on the one hand, in light of the TMI supervisors' training and multiple indications of core uncover and hydrogen production, and, on the other hand, that their training did not prepare them for situations in which significant quantities of hydrogen would be produced.

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The following excerpts from the record concern whether the electrical malfunctions could have caused the pressure pulse. TMI-2 Reactor Operators Ed Frederick and Craig Faust engaged in the following dialog with the E&E TMI Task Force:

MYERS. What could have had two of those three sensing devices sense high pressure and lead them to think the pressure was high, other than high pressure, real high pressure, actual high pressure? Is there anything that decides the pressure is going up that could have led those sensors to think the pressure was high?

FREDERICK. A test signal.

MYERS. Would a test signal go to two of them at the same time?

FAUST. No. In fact, you would have to hook it up.

FREDERICK. It would have to be a lengthy manual action to get it to do it, other than actual building pressure.

MYERS. Is there anything that you can think of other than excess building pressure that could have simultaneously led the meter to read 28 pounds per square inch and to turn on the spray tanks or turn on the containment spray?

FREDERICK. No; it had to be high level pressure.

FAUST. There had to be a pressure surge in the building for it to happen.

(E&E, TMI Part 1, May 9, 10, 11 & 15, 1979, p. 147.)

At a later date (on September 11) Frederick told interviewers from the NRC's Special Inquiry Group that he did not believe the pressure spike to have reflected a real increase in pressure because his training had not informed him as to the possibility of such a spike. Frederick stated that none of the persons present thought it plausible that the pressure in a 2-million-cubic-foot building could rise and fall so rapidly. Frederick stated:

That's why none of us considered it plausible. It's impossible to do that.

SIG interviewer Ron Haynes responded:

I wouldn't say it was impossible. I thought it actually occurred.

Frederick then stated:

Based on our training, it was impossible. It was completely foreign. If you look back through everybody's training and the FASR and safety analysis and the building construction, you will not see a paragraph that projects that type of transient. Nor will you see it in anybody's training so far as—that is so particularly foreign and unbelievable that it has absolutely no significance. That's why nobody did anything about it for two days.

(Faust, et al., SIG, September 11, 1979, pp. 264-265.)

Hugh McGovern, a TMI operator, made a statement to Met-Ed's Bubba Marshall at approximately 3 a.m. on March 29 wherein Marshall's notes show McGovern stating that at 2 p.m. on March 28 there had been ". . . an RX building pressure spike that went off scale on narrow range meter—definite spike straight up, straight back

down—had meter—definite spike straight up, straight back down—had full Rx building (Spray pumps & BS-VPS, DH-V8's) isolation and cooling. Someone secured spray pumps, shut BS-Vi's and DH-V's (Hugh did) and unisolated equipment for building."

These notes are a contemporaneous record (prepared some 30 hours before NRC officials in Bethesda knew about the spike) confirming that control room personnel were aware of the spike at the time it occurred. These notes do not suggest, as did some personnel in subsequent interviews, that the control room personnel ascribed the spike to anomalous electrical signals. (Control room logs, presumably prepared on March 28, are a further contemporaneous confirmation of control room personnel awareness of the spike at the time it occurred although these logs indicate respectively that the pressure pulse was 4 and approximately 5 psi. See p. 89.)

On October 9, 1980, Joseph Scheimann, who was on duty as a control room foreman at the time the accident began, engaged in the following dialog with NRC investigators regarding Scheimann's recollection as to what he saw when the pressure pulse occurred.

Q. Could you describe your recollection of what you saw when the spike occurred?

A. Okay. At the time the spike occurred, I was controlling pressure in the RCS by throttling on the electromatic block valve. At the time the spike occurred I had just gone to open on the electromatic.

Q. What evidences did you personally observe and hear of the spike?

A. Essentially what I heard amounted to something along the line of "Look at that pressure." That is all because I was over minding the pressure control.

Q. Were you aware that the SFAS had come in?

A. I had heard somebody say something to the effect that the building spray pumps had started.

[I&E, Scheimann, 10/9/80, p. 4.]

Instrument Engineer Ivan Porter was asked by NRC investigators whether Porter thought the pressure spike could be explained by any form of instrument malfunction. Porter responded:

I would think not. It did look like a real spike to me. That was when I was specifically asked if it could be real.

(Porter, I&E Tape 237, May 21, 1979, p. 35.)

With regard to whether he saw the pressure pulse on March 28, Porter said:

But somehow I have a feeling, I didn't look at those charts until the next day. I'm not specifically sure that I was aware of it that day. I know that I very specifically remember a discussion where we looked at the chart, was asked if it could possibly be real, and I also look at the wide ranged pressure chart and saw that [the pulse] showed up as a decrease in pressure on the wide range reactor coolant system pressure, but I sincerely believe that that was the next day that I looked through the stuff.<sup>12</sup>

(Ibid., p. 34.)

<sup>12</sup> Even if Porter is correct, that the spike was not perceived to be real until the "next day", i.e. March 29, there remains the question as to why the NRC was not informed until March 30, a question which has not been addressed by the TMI investigations.

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Page 237, May 21, 1979, p. 35.)

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It is not clear, if Porter's feeling about not having looked at the data on March 28 is correct, what it was that caused the delay in examining the data, and if the delay did occur, what it was that led to the examination of it on March 29. Lending support to his conclusion that the spike was real was Porter's finding a similar negative spike in the reactor coolant system pressure history. Such a negative spike would be expected since reactor coolant system pressure was measured using the containment building pressure as a reference; when the containment pressure went up, the reactor coolant system pressure would appear to go down. As noted above, a similar negative pressure pulse was observed in other pressure histories.<sup>13</sup>

Shift Supervisor William Zewe said that he had observed the pressure spike to occur at the moment the pressurizer relief valve was cycled, but that he did not associate the spike with an explosion. He said that he had not been aware of temperatures in the core of sufficient magnitude for the cladding-steam chemical reaction to have occurred. Zewe was apparently unaware of the in-core thermocouple measurements that implied production of hydrogen. Zewe said, not knowing what the spike could have been, that he ascribed it to an electrical malfunction associated with the operation of the valve. While Zewe may have considered the pressure pulse to have been an electrical anomaly, others seemed concerned that it was real.

TMI Supervisor Joseph Chwastyk said:

. . . I actually saw the recorder, the pressure recorder on the building, spiked upward. I didn't know what caused it but the fact that the spray valves started indicated to me that we actually had some kind of pressure spike, either on the sensors or in the building itself. I was not sure. The spike of course started all the building spray pumps, decay heat pumps, etc. The pressure spiked up and it was only up briefly, as a matter of fact, a couple of heart beats. I know because I missed those heart beats. It came right back down again."  
(Chwastyk, I&E, 5/21/79 p. 9.)

Chwastyk (who arrived in the control room between 11 a.m. and 12 noon, and who was apparently not aware of the direct measurements of the in-core temperatures) also referred to an explosion in describing how it was that he came to realize that the reactor core might have been significantly damaged:

It was like I said, everybody was pretty busy and I didn't want to stop anybody from what they were doing so I just tried to get a feel for what was happening by looking around and asking the operators at the panel what they were doing. Up until the time or sometime after the explosion and it dawned on me what it was, I didn't know how much core damage we had."<sup>14</sup> (Italics added) (Ibid., p. 18.)

The following discussion and excerpts from the TMI investigations relates to Station Manager Gary Miller's awareness of the symptoms of the hydrogen detonation and the manner in which the symptoms

<sup>13</sup> See Figure V-B, p. 56.

<sup>14</sup> See p. 66.

were diagnosed. Miller wrote that while in the control room on March 28:

I heard a noise at approximately 1:50 p.m., however I did not associate it with the burning of hydrogen or the actuation of the safeguards system at that time. I was first aware of the recorded pressure pulse and associated actuation of the safeguards system on Friday morning, March 30, 1979.

(E&E, TMI, Part 2, May 12 & 24, 1979, p. 298.)

Miller told I&E investigators on September 5, 1980 that:

The spike in the building, I am sure, was never, or its attendant actuation was not discussed with me.

(Miller, I&E, 9/5/80, p. 134.)

Miller engaged in the following dialog with I&E investigators in which he sought to explain why he had not been aware of the pressure pulse and associated actuation of safety systems:

Mr. STELLO. Why didn't you recognize it [the actuation of safety systems caused by the pressure pulse in the reactor building] that day? That is a conflict I have a very, very difficult time with. The one thing that all of us are aware of, sensitive to, everybody in this industry, is if we get a safety injection signal, an ECC signal, that is important and we are all trained to recognize we just got it. How could you be standing there having had one and not know it?

The WITNESS. The only answer I can come up to with that is, you know, I was on the way out of there and was relieving the post and heading for the state [to brief the Lieutenant Governor]. I feel that if I had stayed there, you know, my recognition might have been better. I am not trying to get over that question, but I just feel the sequence I was in at the same time, you know, cause me, you know, to be exiting the site and, you know, I wasn't concentrating at that time on that particular set of parameters. If the people there concluded it was an instrument error, for instance, it might not have gotten to me in a timely manner.

Mr. STELLO. You are missing my point. I didn't care what anybody else was doing. I am just visualizing you standing there when it happened and you were there. Now, the whistles and the bells go. Equipment starts that was originally shut down. You are standing there. Is this not something that you were very sensitive to if you got an SI signal?

The WITNESS. The only answer I can come up to with that sensitivity that day was already heightened to the crisis we were in. It isn't like I was standing in the control room on an operating day and I heard a noise. It is like I had been in that control room for five hours under a crisis situation and I can't answer your question why didn't the noise thing cause me to provide new emphasis on the situation because I already was putting the maximum emphasis on it. I just can't answer, you know, the question that you are asking me without considering the situation I was in.

(Miller, I&E, 9/5/80, pp. 126-127.)

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that while in the control room on

approximately 1:50 p.m., however I did not see any actuation of hydrogen or the actuation of the associated actuation of the safe-shutdown system on March 30, 1979. (Miller, I&E, 9/5/80, p. 298.)

On September 5, 1980 that:

I am sure, was never, or its actuation was discussed with me.

(Miller, I&E, 9/5/80, p. 134.)

During dialog with I&E investigators in the control room he had not been aware of the presence of safety systems:

Do you recognize it [the actuation of the pressure pulse in the reactor] as a conflict I have a very, very difficult time understanding that all of us are aware of in this industry, is if we get a safety signal, that is important and we are not sure we got it. How could you be standing there and not know it?

In answer I can come up to with that I was sitting out there and was relieving the duty of the state [to brief the Lieutenant Governor] who had stayed there, you know, my duty was to be better. I am not trying to get the sequence I was in at the time, you know, to be exiting the site and concentrating at that time on that. If the people there concluded in that instance, it might not have gotten

to my point. I didn't care what I was just visualizing you standing there and you were there. Now, the whistles start that was originally shut down. Is this not something that you got an SI signal?

In answer I can come up to with that I was ready heightened to the crisis we were in the control room on an emergency. It is like I had been in that under a crisis situation and I can't say I didn't this new thing cause me to be in the situation because I already was on it. I just can't answer, you are asking me without consider-

(Miller, I&E, 9/5/80, pp. 126-127.)

Others who were present say that Miller was aware of the pressure pulse at about the time it occurred. When Reactor Operator Frederick was asked whether others in the control room had reacted to the pressure spike, Frederick stated:

I think Mr. Marshall tried to figure it out, and Gary Miller was particularly interested in it.

(E&E, TMI Part 1, May 9, 10, 11, & 15, 1979, p. 145.)

An NRC inspector made the following notes based on a statement made to him by Donald Raymond. Raymond is an NRC inspector who was at TMI on March 30, when the pressure pulse and the possibility of a hydrogen explosion became general knowledge. These notes concern Raymond's perception of Miller's knowledge on March 28 of the pressure pulse and associated events.

In an additional interview NRC Inspector William Raymond conducted at approximately 11:15 a.m. on May 8, 1979, Inspector Raymond stated his notes reflect a meeting conducted on March 30, 1979 in which Mr. Gary Miller, section superintendent, was asked to comment on the March 28 activation of the containment spray system. Inspector Raymond states that Miller, in discussing the event, recalled hearing a thump at his location in the Unit 2 control room, concurrent with the activation of an EMOV valve in the containment by one of the CROs, and concurrent with the activation of the containment spray system. Inspector Raymond recalls Miller's postulation of the association between these three events and the possibility that a hydrogen burn may have occurred.

(Excerpt from May 8, 1979 Raymond Statement reproduced in Raymond, I&E, 10/7/80, p. 4.)

In the course of the October 7, 1980 interview with I&E, Raymond implied at one point that he was no longer certain that the foregoing excerpt referred to Miller's knowledge on March 28, but when pressed he engaged in the following dialog with NRC investigators:

By Mr. HOEFLING.

Q. Okay, Bill. Do you have any reason to believe that Miller heard a thud at approximately 2 p.m. on March 28th?

A. Yes, I do, based on the conversation that I heard on Friday. As Gary spoke about things that occurred in the Unit 2 control room on Wednesday, the way he said it would appear to show objectively that Gary knew about the thud on Wednesday.

Q. Can you recall what he said?

A. I'm going to very loosely, if I could summarize his words, it's something to the effect of, "Do you remember when we heard the thud on Wednesday?"

Q. Okay. Now let's go to actuation of the containment sprays, which we all now know occurred on Wednesday at approximately 2 p.m., March 28th.

Do you have any reason to believe that Gary Miller knew at or close to the time of the actuation of the sprays that they had actually actuated?

A. As I recall, in the same statement where Gary talked about hearing the thud, he may have also mentioned the actuation of the building spray, which again, thinking back on it, would seem to indicate he knew of both of those events at the same time.

Q. You say he may have mentioned it. You're not certain?

A. I'm not certain, based upon what I remember now, and I'm probably relying upon the statements made back in May—on May 8th of 1979.

Q. You're referring now to the draft statement?

A. That's correct.

Q. You recognize that draft statement was a reconstruction of an oral interview?

A. That's correct. I recognize that, but again, after thinking about this, and talking about what I recall, I would—I would—I seem to—I'm not being very positive here. I will state that he appeared to have known about the actuation of the containment spray system, as well as the thud, on the 28th.

Q. Okay. Now let's turn to the pressure spike indication which again, as we all now know, was recorded at the time of the hydrogen burn on 3/28, approximately 2 p.m.

Do you have any reason to believe that Gary Miller knew of that recording at or close to the time it was actually made on the 28th?

A. No. In the conversations that I overheard on Friday morning, there is nothing that I remember in hearing that would indicate that Gary positively knew about the pressure spike.

Q. Was the pressure spike discussed?

A. On Friday morning, the pressure spike, together with the building spray activation, together with the thud, were all mentioned as—were all mentioned during the discussion in support of the conclusion that, yeah, that was probably a hydrogen burn on Wednesday.

Q. But to your recollection, there was no indication by Miller that he knew of a pressure spike on the 28th?

A. To my recollection, there was no indication that he knew of the pressure spike.

Q. Okay. Turning to the actuation of the EMOV valve on 3/28 at approximately 2 p.m. when the hydrogen burn occurred, do you have any reason to believe that Miller knew of that on 3/28, in the timeframe of the hydrogen burn?

A. In regard—I can be least positive in my statements regarding the EMOV, because I cannot recall that at all now, so I'll—

Q. You cannot recall that at all, looking at this draft document, which indicates you speaking to that point to the I&E interviewer? This does not help you refresh your recollection on that point?

A. That's correct.

(Raymond, I&E, October 7, 1980, pp. 12-15.)

James Higgins, an NRC inspector who arrived at TMI at about 10:05 a.m. on March 28 and remained at the site or vicinity thereof

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I&E, October 7, 1980, pp. 12-15.)

spector who arrived at TMI at about  
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had the following recollection concerning Miller's awareness and in-  
terpretation on March 28 of the pressure spike and associated events:

By Mr. CRAIG.

Q. I believe the question before we went off the record was,  
was Gary Miller aware that the containment spray pumps had  
come on on Wednesday, the day of the accident?

A. From reviewing my previous notes and depositions now  
to refresh my mind on my discussion with Gary Miller on  
Friday, it appears to me that on Friday, Gary Miller was  
piecing this all back together, and that really on Wednesday  
he was aware of these—the fact there had been a spike, the  
spray pumps coming on, and a thud, but had never really  
connected them or even given much of a second thought to any  
of them on Wednesday. But now I guess I got the impression  
from my discussion with Gary Miller on Friday, that it was  
the first time he was really tying these things together and at-  
taching any significance to them.

Q. Let's go over these one at a time.

A. Okay.

Q. Was Gary Miller aware on Wednesday of the thud?

A. Yes.

Q. Was he aware that containment spray pumps came on?

A. I believe so.

Q. Was he also aware of the pressure spike as indicated by  
the recorder?

A. I believe so, but again the only reason I say that is from  
reviewing what I said when I made my depositions, and right  
now I cannot say for certain.

(Higgins, I&E, 10/7/80, pp. 25-26.)

Zewe stated in a deposition for the Special Inquiry Group that Mr.  
Miller was in the control room when the pressure pulse occurred (Zewe,  
*et al.*, SIG, 9/11/79, p. 257). Zewe also stated that:

I found it so hard to believe that anyone<sup>15</sup> who was in the  
control room observing anything would have missed that (the  
spike) or turning off the pumps or any of the discussions at  
all. [Ibid., p. 260.]

Mike Ross, who was TMI-1 Operations Supervisor, but acting as  
second in command to Miller at TMI-2 on March 28 stated when asked  
whether he was present when the pressure spike occurred:

Yes. I was near the console at that time and if we are talk-  
ing about the same time was around 2:00, sometime in the  
area. And at that time we got an ES signal and some of the  
components restarted, decay heat, what have you. We got  
building isolation again and we took care of that and we  
looked back and the control room operator said "Jeese the  
spray pumps are running" and we looked back at the charts

<sup>15</sup>TMI-2 Superintendent for Technical Support George Kunder has stated that on  
March 28, he was unaware of the pressure spike. (Kunder, I&E, 3/23/79, p. 50.) This  
recollection appears inconsistent with Zewe's statement that it seemed to him that the  
spike could not have been missed by anyone in the control room. The seeming inconsistency  
may be explained by the fact that at about the time the spike occurred, Kunder was in  
Unit 1 gathering information to be used in briefing the Lieutenant Governor.  
(Kunder, I&E, 4/25/79, p. 53.)



at that time. We saw a fairly large spike on the chart and the exact pressure at this time I don't know, . . . it was around 30 pounds. *My thought at the time and Miller was out there with us and he questioned he said, "jeese you know I thought I heard something, too."* We are moving down the road there 100 miles an hour and we looked at it and we said "Jeese the spike was so short it must have been an instrument." That was our reasoning at the time. We reached over and we said you can shut the spray pumps off now because the pressure came right back to 0, . . . almost very, very rapid return and we shut the spray pumps off. I now know that spray pumps were on about five minutes when looking back because I did look back on that particular one. I personally didn't associate it at the moment with any kind of explosion in the building. *I associated it with an instrument problem perhaps and I think so did Miller at the time* because we just went on to something else. It wasn't until the next day that we thought about anything like that and started looking back. (Ross, I&E Tape 226, May 19, 1979, pp. 3-4.) [Italics added.]

Shift Supervisor Chwastyk who had observed the pressure spike but did not hear the noise referred to by Gary Miller told the NRC investigators of a suggestion made to Miller on the basis of the spike having occurred upon operation of the pressurizer relief valve:

CHWASTYK. No, I did not hear the noise. But that was the point at which I had assumed that we did have some kind of explosion in the building. And that is when I suggested to Gary Miller we no longer cycle the electromagnetic relief valve because it had . . . the explosion . . . or rapid rising pressure in the reactor building corresponded to opening the electromagnetic relief valve.

(Chwastyk, I&E Tapes 232-233, May 21, 1979, p. 18.)

Chwastyk stated in subsequent interviews with the SIG that he recalled informing Gary Miller of his concern that an explosion had occurred. On October 11 he said that on March 28 he had been concerned even prior to the explosion that water should be pumped into the primary at a higher rate and that:

It was right after the hydrogen explosion and I mentioned that I correlated the opening of the valve with the detonation period that I again went to Gary Miller and explained what I thought had happened as far as the hydrogen detonation and the simultaneous opening of the valve, and it was shortly after that, Gary Miller got back to me and said go ahead and draw the bubble.

(Chwastyk, SIG, 10/11/79, p. 18.)

Miller, however, does not recall having told Chwastyk to draw the bubble. He told SIG investigators:

I don't remember that. In my mind, I don't believe I was operating with the bubble in the pressurizer.

(Miller, SIG, 10/30/79, p. 26.)

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large spike on the chart and the [I don't know, . . . it was around the time and Miller was out there] he said, "jeeese you know I thought we are moving down the road there looked at it and we said "Jeesee the valve been an instrument." That was [I've reached over and we said you know now because the pressure came very, very rapid return and we now know that spray pumps were looking back because I did look I personally didn't associate it at all explosion in the building. *I as a problem perhaps and I think so* se we just went on to something else that we thought about any- looking back. (Ross, I&E Tape [Italics added.]

who had observed the pressure spike led to by Gary Miller told the NRC file to Miller on the basis of the spike of the pressurizer relief valve:

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Chwastyk, SIG, 10/11/79, p. 18.)

having told Chwastyk to draw the

my mind, I don't believe I was he pressurizer.

Miller, SIG, 10/30/79, p. 26.)

The question thus exists as to who, if anyone, instructed Chwastyk to cease the depressurization strategy which was terminated prior to or upon the closing of the block valve at about 3:08 p.m. On the one hand is Miller's not recalling such an instruction and on the other hand is Chwastyk's testimony that he sought and received permission from Miller, and:

Remember at this time I could not do anything on that console without prior approval from Gary Miller.

(Chwastyk, SIG, 10/11/79, p. 17.)

For any changes I had to go through Gary Miller who was essentially the man in charge of the control room.

(Chwastyk, I&E, Tape 232/233, 5/21/79, p. 13.)

Ross also recalled that prior to leaving the site for the Lieutenant Governor's office, Miller had issued, "Two very clear instructions. One: Don't steam the generator to the atmosphere. The second instruction I had was, Don't make any major changes in the plant condition." (Ross, SIG, 9/18/79, p. 39.)

On October 30, Chwastyk was asked again whether he thought he had mentioned the possibility of a hydrogen explosion to Gary Miller in so many words, or discussed what that would mean or what had happened to the system. Chwastyk replied:

My best recollection of that is that I did relate to Gary that we had some sort of an explosion. Whether I said it was hydrogen or not, I'm not sure. But I remember distinctly putting together the operation of the valve and the spike, and I think I relayed those thoughts to Gary.

(Chwastyk, SIG, 10/30/79, p. 17.)

When told that Gary Miller did not recall learning of the explosion until two days later on March 30, Chwastyk stated:

Well that could very well be true. Again, I can't absolutely—if Gary said—I may not have told him what I thought at the time, because I really wasn't certain.

(Ibid., pp. 19-20.)

Chwastyk was then asked again for his best recollection and the following dialog ensued:

Q. I understand. Let me ask you this: Was there any—strike that. Let me start it a different way: When you saw this and then [put] it together what you thought had happened, that must have been something that gave you some cause for concern?

A. Yes. It scared the hell of me.

Q. Did you think that this was something that better ought not to be generally broadcast around the control room and outside? Was there any reason to keep this fairly close among the people who were there in light of the fact that it was fairly alarming?

A. I'll say this: I didn't go out in the control room and broadcast it, no. It did scare me, therefore, I'm sure I didn't just make it general knowledge to everybody in that control

room. I'm sure I did pick out specific individuals that, my counterpart types of people, and talked to them about it.

Q. You said you think that you probably discussed it with Brian Mehler, and your best recollection is that you discussed it with Gary Miller. Do you have a pretty specific recollection of who else you may have actually discussed it with on the 28th?

A. I have some recollection of talking to someone from the NRC about it. At the time, I did not have the time to discuss possibilities with him, and I think I related that I think there may have been some kind of explosion in the building, but I didn't know what.

(Ibid., pp. 20-21.)

At the end of the October 30 interview Mr. Chwastyk was again asked by the Metropolitan Edison attorney participating in the deposition, about whether he had told Gary Miller on March 28 that he had correlated the pressure spike with a possible explosion:

Mr. DIAZ. I don't want to put words in your mouth. You recall making the inference, but you don't recall whether you conveyed that inference to Gary Miller; is that correct or incorrect?

The WITNESS. My best recollection is that I did related (sic) that information to Gary. That's the best I can remember. How much of that information though, what information I gave him, I definitely don't remember. I do know that I gave him the information of the bank (sic), the valve opening simultaneously with the pressure spike.

Now, if I related that or if I put that together and told him that I thought it was a hydrogen explosion, if I thought it was an explosion at all, I don't remember.

(Ibid., pp. 28-29.)

In sum, on May 21, 1979, Chwastyk told I&E investigators that he believed on March 28 that an explosion had occurred, and that he had told Station Manager Gary Miller that they should no longer cycle the electromagnetic relief valve because the pressure pulse had corresponded to opening of this valve. On October 11, Chwastyk said, "after the hydrogen explosion", he went to Gary Miller and explained what he, "thought had happened as far as the hydrogen detonation and the simultaneous opening of the valve." (Chwastyk, SIG, 10/11/79, p. 18.) When pressed as to whether he actually did tell Miller that he thought there had been an explosion, Chwastyk (for the first time, on October 30) said that he could not be sure, although he thought he did. It is not clear from the record what was the basis for Chwastyk's changing his mind except that his recollection differed from Miller who had said he (Miller) did not recall learning on March 28 that there had been an explosion.

Chwastyk engaged in the following dialog with NRC investigators on September 4, 1980 wherein he states that he had surmised an explosion, probably involving hydrogen had occurred and that he had related this to Miller:

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(Ibid., pp. 20-21.)

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rogen had occurred and that he had

Q. During your testimony of 5-21-79, and again later on  
10-30-79, you addressed your conversations with Gary Miller  
regarding the conclusion that the spike was related to the  
operation of the EMOV.

What is now your best recollection with regard to the sub-  
stance and time of this conversation?

A. My best recollection, as I have testified before, I think  
I talked to Gary Miller not long after the spike actually  
occurred.

Q. Did anyone else participate in these conversations, or  
was anyone standing by who would overhear them?

A. When I talked to Gary?

Q. Yes.

A. No. I think that Gary was in the shift supervisor's of-  
fice by himself.

By Mr. MOSELEY.

Q. Could you give us the substance of your recollection of  
the substance of the conversation with Miller?

A. Well, essentially, I think—The substance was that—  
Again, as I remember it, I put together the spike, the spray  
pumps coming on, the simultaneous operation of the valve,  
and someone telling me about a loud noise they heard into,  
actually, some kind of explosion in the building.

I talked to Gary about that with the idea—because of that,  
get permission to redraw the bubble, to get the bubble back  
into the pressurizer so we would know where we stand as far  
as the reactor cooling system.

This is substantially why—It was one of the reasons why.  
That was the object that I used in discussing this with Gary  
Miller, to again get permission to redraw the bubble.

Q. So you really believe that there was a real pressure spike.

A. Yes, as I remember it.

Until that time [i.e. approximately 1:50 p.m., the time  
at which the pressure pulse occurred], I did not really know  
what the status of the plant was. I only knew what I was  
told. But when I put together the explosion and the hydro-  
gen, I knew then that we had suffered at least some core  
damage. I did not know how to quantify it simply because,  
you know, it could have been a localized explosion, like I men-  
tioned earlier, or it could have been a minimal amount of  
hydrogen.

That was about the time that I understood that we did have  
core damage.

By Mr. MOSELEY.

Q. Did you conclude this Zirc water reaction on March  
28th?

A. In my mind, you know, when I put the explosion  
together and it was hydrogen, you know, it came from Zirc  
water. It was just an assumption I made.

Q. So you did conclude that the core had heated up suffi-  
ciently to cause the Zirc water reaction.

A. Yes.

Q. You reached that conclusion in the afternoon of March 28?

A. Yes.

By Mr. CRAIG.

Q. Did you discuss your concerns or inferences concerning core damage and hydrogen with anyone?

A. I discussed the explosion, you know, and my thoughts at the time, which were that there had been a hydrogen explosion. I don't think that I went into Zirc water reaction creating hydrogen, or an explanation or discussion of what happened. I think that I pretty much assumed that hydrogen explosion, and the hydrogen came from one place, Zirc water reaction on the core.

By Mr. MOSELEY.

Q. But given that this is something that none of us ever expected to see, it was not enough to move you to have conversations with others about your conclusions of Zirc water reaction?

A. No. I think that it was enough for me to know that it was just an explosion, and possibly a hydrogen explosion.

By Mr. CRAIG.

Q. When you discussed your recommendation not to cycle the block valve, and your discussion about core damage and the hydrogen, what reaction did people have to that, specifically, Gary Miller, Brian Mehler, and in general anybody else that you have talked to?

A. By reaction, do you mean, did anybody panic?

Q. No. I mean, did Gary Miller say, "Oh, come on." Did they believe what you were saying? Did they take you seriously? Were they going to think about it? Was it one of those, "Okay, Joe," and then he went on with what he was doing?

A. I would have to say, Brian Mehler believed me that we had had an explosion.

Gary Miller, I assume—I have no reason to believe that he did not at least think about it, and take it under advisement.

(Witness conferred with counsel.)

A. The reason that I say I think Gary took it seriously is because it was very soon after I related to him what happened that he gave me the okay to go and draw the bubble to find out where the hell we were at as far as water. This was, of course, a major change in the way we had been doing it before.

Q. Do you remember when Gary left to go to the Lieutenant Governor's office?

A. I remember vaguely that he left. When it was—

Q. Can you relate that conversation when you talked to Gary Miller about hydrogen and then you got permission to draw the bubble and the time to his departure to talk to the Lieutenant Governor?

A. It was before he left to talk to the Governor, I know that.

By Mr. MOSELEY.

Q. I am having a little trouble with time. I thought that you had said earlier that your conclusion on the hydrogen and the

conclusion in the afternoon of March

or concerns or inferences concerning  
with anyone?

osion, you know, and my thoughts  
that there had been a hydrogen  
that I went into Zirc water reaction  
explanation or discussion of what  
pretty much assumed that hydro-  
hydrogen came from one place, Zirc  
e.

is something that none of us ever  
ot enough to move you to have  
about your conclusions of Zirc

was enough for me to know that  
nd possibly a hydrogen explosion.

your recommendation not to cycle  
discussion about core damage and  
n did people have to that, specif-  
Mehler, and in general anybody  
?

mean, did anybody panic?  
Miller say, "Oh, come on." Did  
saying? Did they take you seri-  
think about it? Was it one of  
en he went on with what he was

rian Mehler believed me that we

have no reason to believe that he  
it, and take it under advisement.  
(ounsel.)

I think Gary took it seriously is  
I related to him what happened  
o and draw the bubble to find out  
far as water. This was, of course,  
e had been doing it before.  
Gary left to go to the Lieutenant

t he left. When it was—  
nversation when you talked to  
and then you got permission to  
to his departure to talk to the

lk to the Governor, I know that.

le with time. I thought that you  
clusion on the hydrogen and the

Zirc water reaction was shortly before the restart of the re-  
actor cooling pumps. Did I misunderstand you?

A. Yes, I think you did. I did not mean to intimate that a  
bit.

Q. Straighten me out by saying it again, and relating it in  
time.

A. It was shortly after—again, time really did not have  
much meaning. It was shortly after—when I say shortly, I  
mean within 15 minutes to a half-hour after the—probably  
even less than that because although it seemed like a lot of  
time, I don't think that it really was.

It was shortly after the actual explosion and the pressure  
spike in the building that I surmised that it was, in fact, an  
explosion and probably a hydrogen explosion, and I related  
that to Gary. This was prior to Gary leaving for the Gover-  
nor's office, as far as I can remember.

(Chwastyk, I&E, 9/4/80, pp. 24-27.)

Q. Did you have any conversations on the 28th concerning  
primary system inventory with Gary Miller?

A. I'd have to say yes, but indirectly, okay? And that was  
when I went to Gary and requested permission to redraw the  
bubble in the pressurizer to find out where we stood inventory-  
wise.

Q. Did you explain to him that's why you wanted to draw  
the bubble?

A. Yes. (Chwastyk, I&E, 9/4/80, p. 62.)

The following concerns the time at which Chwastyk was given per-  
mission to draw the bubble:

Q. Concerning your attempt to redraw the bubble on  
3/28/79, can you explain the sequence of events and times re-  
lated to those actions? And you can refer to this chart from  
the Rogovin Report, also.

A. Can I ask you what—what is your question? When did  
I start?

Q. What did you do when you started to draw the bubble?  
What did you see?

A. Okay. Okay, I got the permission to go ahead and redraw  
the bubble somewhere around 2:00 o'clock. The first step we  
did, of course, was to turn on the heaters, and then I think we  
sent some one of our operators out to verify that we didn't  
have any of our heaters tripped; if they were, to reset them.

(Chwastyk, I&E, 9/4/80, p. 67.)

Q. You said you got permission about 2:00 o'clock. You  
seemed relatively confident of that time. Can you tell us why  
that sticks out as—

A. Well, it was not very long after the spike in the reactor  
building. You know, I said 2:00 o'clock, it was somewhere in  
the neighborhood of 2:00 o'clock. It wasn't 2:00 o'clock  
exactly because I'm sure I couldn't even say that, but—

Q. Is it related to Miller being there or not being there?  
Would that have an effect on it?

A. Well, yeah, in the sense that, you know, one of my—when I first took over the control room, one directive was not to do anything to the plant unless I could improve the—

Q. And you did get permission from Miller to draw the bubble around 2:00 o'clock?

A. Yes.

Q. Who else heard this instruction or participated in this conversation?

A. No one that I'm aware of. I think Gary was in the shift supervisor's office by himself at that time, and again this was, you know—as soon as it dawned on me what had happened with the pressure spike, you know, I went into the shift supervisor's office, relayed that information to Gary, and asked permission once again to reestablish the bubble to find out where we stand. And it was soon there afterwards—the reason I remember it was soon was because it kind of surprised me. You know, I expected more of a time lag to get the information passed on to where it was being passed on, and to be thought over and discussed wherever—wherever they were making these decisions, and then go back to me. But it was a fairly short amount of time between the time I asked Gary, you know, again for permission to reestablish the bubble until he gave me the word to go ahead and do it.

By Mr. CRAIG.

Q. You just made one request of Gary Miller to reestablish the bubble?

A. No, no. I had requested it earlier, soon upon taking the control room. I think—I know I asked as soon as I took the control room, and I think I asked him between that time and the spike again and, you know, nothing had happened, and then I definitely know I asked immediately after the spike.

The only thing I'm not sure of, if and how many times I asked him between the time I took the control room and the spike.

(Chwastyk, I&E, 9/4/80, pp. 69-71.)

Mr. McBRIDE. Another question is, after your conversation with Mr. Miller about the pressure spike, the fact that you believed that an explosion had taken place, did you make any assumption with respect to whether Mr. Miller had passed along that information either to his superiors or to the NRC?

The WITNESS. I assumed—he was their emergency director, and he would pass that information along up our chain, and also making the necessary NRC notification.

By Mr. MOSELEY.

Q. Let me ask a couple of questions related to that. In answer to the question, you used the term explosion. Was the term explosion used on March 28?

A. I don't know that. I remember the word "real," that the pressure spike, or the explosion was real, because in the previous discussions I had, there was some doubt like I mentioned earlier.

When it dawned on me what had happened, the first person that I went to was Gary Miller.

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Q. In your discussions with, we will assume it was Mr. Neely, did you have the perception that he understood what you were telling him?

A. I assumed that he understood what I told him, that the pressure spike or the explosion, whatever word I used, was real. I assumed that he knew what that meant. I am not sure that that answered your question.

Q. I am not sure it did either.

What I am looking for is whether you felt he perceived the significance of this, either by the questions he asked, or by comments that he made, or by any other actions that you saw him take.

A. I assumed that he knew what I was talking about, and when he left I just assumed that he went back to notify his chain, whoever it was at that time, which I don't know. That is the only thing that I assumed at that time.

By Mr. GAMBLE.

Q. He did not, in fact, indicate to you what he was going to do when he left?

A. No. He just walked away.

(Chwastyk, I&E, 9/4/80, pp. 105-106.)

The following discussion between Chwastyk and NRC investigators relates to Chwastyk's perception that, not only had there been a real pressure increase in the containment, but that the increase might have been sufficient to breach the containment integrity.

Q. Joe, during the recess you had a chance to finish reviewing the portions of your October 30, 1979, deposition before the Special Inquiry Group that was referenced before the recess, specifically page 20.

Now, going back to the question of what did you mean by not broadcasting, would you explain that to us again?

A. Yes. It was just simply—you know, I would not make a general statement to the control room, or the personnel in the control room, the announcement type.

Q. What was it that caused you to be scared?

A. Well, it was a combination of things. One, it was the explosion itself. You know, the fact that it was possible that the explosion could have been of a higher magnitude that could have, you know, done some damage or more damage than what it did do, primarily violate containment. That was, you know, the first thing that came through my mind.

The second thing that came through my mind was the fact that we did in fact suffer some core damage. That one is not as clear simply because there are so many variables that I didn't know how to interpret. For instance, you know, what kind of ventilation did we have around that pressurizer and, you know, was this stuff really concentrated around the pressurizer, or was it throughout the whole building. You know, I had no means of knowing those things.

Q. On 3/28 or even 3/29 was the possibility of containment integrity ever being breached ever discussed?



A. I am not sure "discussed" would be the proper word. You know, it entered my mind that it may have been breeched. As a matter of fact, the pressure dropping, you know, as fast as it did, one of the things that came through my mind was that possibly it did have some kind of pressure increase in the building, and I think I mentioned this earlier, a steam leak, and simultaneously containment was breeched and we are therefore relieving the pressure. You know, we checked everything we possibly could and found that wasn't the case.

Mr. MOSELEY. What specifically did you check and whom did you ask to check this?

The WITNESS. Well, things like the steam generator pressures, the containment isolation, you know, the valves to ensure that the valves were closed, that were supposed to be closed were closed, I think, and I don't really remember, you know, I can't say and this doesn't stand out in my mind, but I think I had someone get the procedure for loss of coolant which describes containment isolation and verify that, you know, what was supposed to be isolated was in fact isolated. You know, reactor coolant pressure, of course. There were a number of things that we did check just to verify the fact that we did still have containment, and not only to verify that we did still have containment but also to try to determine what caused it, you know, did we have either a loss of coolant or a steam leak or something that caused pressure to go up and simultaneously lost containment. We checked everything we could and didn't find anything.

Mr. MOSELEY. Did you specifically ask for the radiation monitoring people to make a quick survey around the building to see if there was activity leading out?

The WITNESS. I remember directing someone to make an inspection of the containment. I think it was an operator type person. It wasn't a health, physics or radiation control person, and it was probably a shift foreman, a senior CRO, or something of that nature, because you must understand how, you know, the chain of command there is. Essentially the shift foreman directs the operators, the control room operators primarily and the control room operators direct the auxiliary operators who work out in the plant.

I asked and directed someone to make an inspection. Now, I don't remember who, you know. It was just a possibility that came into my mind, you know, that something in containment or some part of the structure itself had possibly broken or fell apart. I didn't really believe it but I thought it was something that I had to check anyway.

Mr. MOSELEY. Did you discuss with Miller, Kunder, Ross or others that you were having these checks made?

Mr. McBRIDE. Maybe the problem with the question is could you explain who you mean the others to be?

The WITNESS. Let me say, normally I would as part of the report, you know, to the chain, in other words, Gary Miller, I would not only explain what had happened but what I am

essed" would be the proper word. ind that it may have been breached. Pressure dropping, you know, as fast that came through my mind was some kind of pressure increase in I mentioned this earlier, a steam containment was breached and we are sure. You know, we checked every- d found that wasn't the case. ically did you check and whom

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ally I would as part of the other words, Gary Miller, I d happened but what I am

doing about it. Whether I did that in this case or not, I don't remember.

Mr. MOSELEY. What about to Ross or Kunder and maybe Zewe? Zewe was the nominal shift supervisor at that time, right?

The WITNESS. It is possible, but I really can't remember. Again, you know, the way I work I would have under normal conditions, and whether or not I did in this case I just can't remember.

Mr. MOSELEY. You just don't recall.

The WITNESS. I just don't recall.

Mr. MOSELEY. Do you recall whether you discussed the results of these checks, some statement of confirmation that everything is okay, we have checked the containment and it is still good?

The WITNESS. Again, no, I don't recall, but, again, knowing the way I operate, I assume I would have. I don't recall that I did.

By Mr. CRAIG.

Q. Do you remember how long it took before you got a report back on that check of the containment?

A. I don't know that I ever got the report back on that outside, you know, check of the containment. I guess I don't remember because I think by the time they could make any kind of inspection I had come up with the idea, and quote if you will, of the hydrogen explosion. And I think after that I just sort of forgot about the containment check.

(Chwastyk, I&E, 9/4/80, pp. 32-36.)

Chwastyk engaged in the following dialog concerning his discussion about the pressure spike with TMI Supervisor Brian Mehler.

Q. Could you try to recall the approximate time or related event in the substance of the conversation with Brian Mehler concerning the pressure spike?

A. As I remember, I was at the console when the pressure spiked, and Mehler was somewhere in the background. Of course, I did not know what caused the pressure spike, and Mehler came over and asked why the spray pumps were on. I really told him. I don't know why they are on. I don't know why they started, but we got a bad pressure spike. This thing was happening, and I did not know what it was.

By the time it came back down to about where it had been before the spike, someone then asked permission to secure the spray pumps and I denied it because I did not why they had started to start with, and until I had a better feel of why they started and what was happening, I did not want to secure them.

After a few seconds or minutes, I don't know what, it looked like the pressure was going to stay down, and then I did allow that the spray pumps be secured. Mehler was either at the spray pump or in that vicinity at the time.

After we secured the spray pumps and secured the other equipment, then I discussed what had happened, some of the

possibilities. I think that it was during this period of discussion that we decided, somehow, I am not sure what the wording was, but that we kind of felt that something had happened in the building because of the spray pumps starting simultaneously with the spike.

(Chwastyk, I&E, 9/4/80, pp. 9-10.)

Mehler himself has said that he believes there was general awareness of the occurrence of the pressure pulse:

Q. Was there a reason why you wouldn't have discussed it with Gary Miller, or it wasn't discussed? Can you recall?

A. Well, I don't know. I—the reason I made the assumption that everyone was aware of it, because everyone came out to the control room. It was obvious to anyone in the control room that it happened, and I did discuss it with a gentleman from the NRC.

By Mr. MOSELEY.

Q. You would consider it to be general knowledge, then, both that the containment spike had occurred, and that the sprays had come on?

A. That's correct.

(Mehler, I&E, 9/3/80, p. 14.)

Q. Mr. Mehler, you indicated right after the pressure spike, you assumed it was common knowledge, and everyone came out in the control room. Who were you speaking about coming out in the control room?

A. When I make that assumption, when the pressure spike occurred, I was in the shift supervisor's office. I do not recall who all was in the office at the time, but upon seeing the people move around there when we got the SAS, I knew it myself, I got up and went out to the control room and so did, I would say, the majority of the people in that room, and they had to be aware of the pressure spike, because we all went over to the console where the pressure indication was, and we looked at it, and we seen spray pumps running, and we discussed it.

Q. Do you recall any of the people who were in that room? I realize you don't know them all, but—

A. I believe Mr. Miller was there, and it's only—I'm not sure, and I believe Mr. Ross. But, you know, I would never say definitely they were there.

(Mehler, I&E, 9/3/80, p. 16.)

Mehler engaged in the following dialog with NRC investigators concerning his training with regard to what was necessary to activate the containment building spray pumps, training from which he learned that two out of three pressure sensors would have to detect high pressure in order for the containment sprays to be triggered.

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hwastyk. I&E, 9/4/80, pp. 9-10.)

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(Mehler, I&E, 9/3/80, p. 16.)

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tainment sprays to be triggered.

Q. What training had you received prior to the TMI-2  
accident with regard to the instrumentation and logic asso-  
ciated with reactor building pressure?

A. I don't quite understand your question.

Q. The instrumentation and logic associated with activat-  
ing containment spray pumps?

A. Okay.

Q. Those kind of things.

A. We've had—I couldn't tell you when I had the specific  
training or anything, but I do know we had training on it,  
and it's based on you have to have an ES signal, plus two out  
of three logic of 30 pounds to start spray pumps. You know,  
that training itself could have been any time over a period of  
a year from probably 1969 up till the day of the accident.

(Mehler, I&E, 9/3/80, p. 12-13.)

In a similar vein, Mehler told investigators that he believed the  
instruments to have indicated occurrence of a real pressure pulse and  
not to have been a manifestation of spurious electrical signals. Mehler  
referred to the pressure pulse as having originated with a chemical  
reaction; he stated that he did not recall thinking that a hydrogen  
detonation might have occurred.

Q. Okay, I think in your I&E interview you said that you  
thought initially that the pressure spike in the containment,  
when you saw it, was probably due to somebody fooling  
around with the transmitter.

A. Yes, I said that. But then I also said it couldn't have  
been possible because building spray pumps started.

Q. Which meant that there had been a pressure signal that  
went through and started the building spray pumps?

A. Right.

Q. Now, after looking at it in that initial dismissal, did you  
later realize that there had been pressure in the containment  
that caused that spike on the instrument?

A. Yes.

Q. Do you have any idea what could cause that kind of a  
rapid pressure spike?

A. I know Joe and I talked about it later on that day, about  
what could have caused it and I don't think hydrogen entered  
into it. We thought maybe some kind of chemical reaction or  
something happened because it was up and down so quick.

Q. That is Joe Chwastyk?

A. Yes.

Q. So you really didn't have a good diagnosis?

A. I personally didn't think hydrogen could form that  
quick in the building to that concentration to cause it in that  
period of time. (Mehler, SIG, 10/11/79, p. 13-15.)

Mehler also recalled in his conversations with investigators that on  
March 28 he had been told not to turn on oil pumps in the containment,  
apparently out of concern that electrical sparks might be produced

which could cause detonation of hydrogen in the containment structure. On October 11, Mehler told SIG investigators that:

. . . I do know sometime after the pressure spike happened we were told not to start equipment because they assumed that it [the pressure spike] could happen again and they probably put it that there was hydrogen in there, but that was sometime after 1:50. Now how far past that, I don't know. And I do not, I said—well, to Gary Miller I said—he said don't start any more oil pumps and I said we don't have to, I already tested them all, because they were concerned—but how far into the afternoon at that time, I don't know whether it was 4:00, 2:00 or what, but it was sometime after.

(Ibid., p. 16.)

Mr. Mehler was interviewed again on October 30 and at this time he was less certain that the above noted instruction not to start the pumps had been given on March 28. The following exchange took place during the October 30 interview where the questions are being asked by Mr. Frampton of the SIG and the answers are Mr. Mehler's:

Q. Since the interview that our group did with you on October 11, as indicated by Mehler Exhibit No. 2, you have become less certain that this instruction and the conversation you had with Mr. Miller was on Wednesday, the 28th.

A. That is correct.

Q. What is it that has caused you to doubt the recollection that you had before?

A. I've talked to some other people that were there on the 28th, and also thinking back upon it, you know, I cannot be certain that it did happen on the 28th.

Q. In talking with other people—well, let me ask you who you have talked to about it?

A. I've talked to Gary Miller, Mike Ross, Joe Chwastyk,<sup>104</sup> Bill Zewe, and none of them recollect that instruction being given on the 28th.

Q. Do any of them recollect such an instruction being given on the 29th?

A. I don't think they would say specifically that it happened on the 29th either, but I do believe some of them recollect it being given.

Q. Do you remember which ones?

A. I think Joe does.

Q. Any of the other people?

A. I don't know.

Q. In your conversations with them, what is it that they have said that's made you think that your recollection is probably wrong that it was the 28th?

A. Well, they would have been in the room the same time I was to hear the instructions, and it seems funny, if I would be the only one that remembered it happening on the 28th when there were other people in the room that don't remember it.

<sup>104</sup> Chwastyk told NRC investigators on September 4, 1980 that to the best of his recollection the instruction not to operate equipment was given on March 28. (See pp. 81, 82, 86-87, 88.)

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September 4, 1980 that to the best of his rec-  
equipment was given on March 28. (See pp. 81.

Q. So this is in part conversations with other people that  
you have had and in part sort of a general reconstruction of  
events that's made you think that you're wrong in thinking  
it was the 28th; is that fair to say?

A. That's fair to say, and also, you know, quite a bit hap-  
pened the 28th. And I did come back the 29th. It could have  
very well been the 29th, and I wouldn't even say for certain  
it was the 29th right now.

Q. It's conceivable it could have been the 30th?

A. I wouldn't want to get definite and say it was—you  
know, I'm just not certain right now which day it was.

Q. Would it be fair to say that your own recollection, faulty  
or not, standing alone, has been that it was the 28th, but that  
in talking to other people, you think that your recollection is  
most likely to be somewhat faulty and it was more likely that  
it was the 29th?

A. That's correct.

(Mehler, SIG, 10/30/79, p. 15-17)

Chwastyk also recalls being told, "... not to restart any equipment  
in the reactor building. And someone at the time had just finished  
starting a piece of equipment." Chwastyk said he thought the equip-  
ment referred to was the DC oil pumps on the reactor coolant pumps,  
presumably the same pumps referred to by Mehler. Chwastyk said that  
he thought the instruction had not been issued on Wednesday, March  
28,<sup>15b</sup> because he remembered receiving it in the supervisor's office, and  
"... I don't think on Wednesday I was in the shift supervisor's office  
at all." (SIG, Chwastyk, p. 16, 10/30/79.) This recollection of  
Chwastyk is referred to in the SIG report (Volume II, Part 3, p. 907)  
and is part of the basis for the SIG conclusion that Mehler was prob-  
ably incorrect when he remembered the discussion, about not turning  
on the oil pumps, as having occurred in the shift supervisor's office on  
Wednesday, March 28. On the other hand, TMI supervisor Mike Ross  
did recall Chwastyk being in the shift supervisor's office of March 28:

At times Joe (Chwastyk) would come into the think tank,  
(i.e. the shift supervisor's office where supervisory personnel  
convened during the day for the purpose of assessing events  
and deciding upon actions to be taken) where we were at,  
and he would enter discussions.<sup>15b</sup>

(Ross, SIG, 10/30/79, p. 15.)

The SIG report, prepared prior to the NRC I&E inquiry begun  
in March, 1980, does not mention that Ross' recollection as to  
Chwastyk's appearance in the shift supervisor's office conflicted with  
Chwastyk's recalling that he did not think he had been in this office  
on Wednesday, March 28. The SIG report notes but does not com-  
ment upon a further discrepancy in the testimony of Mehler and  
Miller: Mehler testified that it was Miller who gave the instruction  
not to start the pumps even though the date was uncertain; i.e.,  
Mehler's own recollection was that the instruction had been issued on  
the 28th, but after talking to other people, he said that his recollection  
was most likely faulty and it was more likely that it was the 29th.  
(Ibid.) Miller, on the other hand, did not recall at any time having

<sup>15a</sup> Chwastyk himself told NRC investigators on September 4, 1980 that to the best of  
his recollection he had been in the supervisor's office on March 28. (See p. 85.)

<sup>15b</sup> Chwastyk subsequently changed his testimony, stating that to the best of his recol-  
lection, the instruction not to operate equipment was given on March 28. (See footnote 15a.)

given an instruction not to start pumps or even having been in the control room on the 29th at 9:15 p.m. which was the Special Inquiry Group's conclusion regarding the time at which the instruction had been given.

(SIG, Vol. II, Part 3, p. 908.)

On September 3, 1980 Mehler was again asked about his recollection and changes therein regarding a March 28 directive not to start equipment in the containment building. Mehler said the changes from his recollection as of October 11, 1979 to that stated on October 30, 1979 were based on his having talked only to Chwastyk and Zewe (not Ross and Miller, in addition to Zewe and Chwastyk, as he had said in his SIG interview on October 30, 1979) and it was on the basis of these discussions that he decided that he had been wrong about receiving on March 28 the instruction not to turn on equipment in the containment building. However, Chwastyk, as indicated below, says that he did not tell Mehler that the instruction had not been issued on the 28th, and that it was in fact Chwastyk's recollection that this was the day on which it had been issued. Furthermore, the most likely time for issuance of the instruction was after 6 p.m., the approximate hour at which Zewe had left the control room. Therefore, Zewe would not have been present had the instruction been issued after 6 p.m., and thus it is unclear what would be Zewe's basis for leading Mehler to believe that his (Mehler's) recollection was faulty. (See Mehler, I&E, 9/3/80, p. 27-28.)

On September 3, 1980 Mehler recalled, as he had previously (Mehler, SIG, 10/11/79, p. 16), that it was Miller who gave the instruction although the day on which it was given remained unclear in his mind. Mehler engaged in the following dialog with NRC investigators:

Q. Your best recollection now is that an instruction was given.

A. That's correct.

Q. By whom was it given?

A. Mr. Miller. (Mehler, I&E, 9/3/80, p. 30-31.)

\* \* \* \* \*

Q. Your recollection is quite certain that it was Mr. Miller who gave this instruction. Could it have been anyone else? You're quite certain it was Mr. Miller?

A. The best I recall, it came from Mr. Miller.

(Ibid., p. 32.)

\* \* \* \* \*

In a meeting with I&E investigators on September 4, 1980 Chwastyk presented additional recollections (and clarification of previous recollections) with regard to his awareness of the hydrogen detonation, its significance, and the instruction not to start equipment in the containment building, an instruction Chwastyk now appears certain was issued on March 28:

Q. At what time and what logic caused you to conclude that the spike was caused by hydrogen?

A. The time, I have to say, the time really did not have much meaning on the 28th. I don't think it was very long simply because it did not take us long to—It did not take the spike long. The spike was not there very long. Mehler and I

start pumps or even having been in the  
:15 p.m. which was the Special Inquiry  
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(SIG, Vol. II, Part 3, p. 908.)

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(Mehler, I&E, 9/3/80, p. 30-31.)

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did not go into a two-hour or three-hour discussion. It was just  
a matter of exchanging ideas.

It was shortly thereafter that someone related to me that  
they heard a noise of some type. Again, I don't remember who  
related that to me. Somehow, the noise, the pressure spike, the  
operation of the valve which was being operated all came to-  
gether, and it scared the hell out of me. That is when I as-  
sumed that we had had some kind of explosion, a hydrogen  
explosion.

Q. Your best recollection is that it was on 3-28?

A. Yes.

Q. On testified on 5-21-79 that you recommended to Gary  
Miller that the EMOV should not be cycled. What was the  
basis for your recommendation not to cycle the EMOV?

A. The basis for the recommendation was what I have just  
related. The operation of that valve with the pressure spike,  
I therefore assumed that there was something wrong with the  
operator motor, or some kind of connection there that was  
causing a spark.

Q. Was your concern based on the failure of the motor for  
the block valve?

A. No, I will be quite frank with you, my first concern was,  
Holy Christ, we had an explosion in there, and if we operate  
that valve we may have a bigger one. Of course, you know,  
I did not think it through and the fact that the first burn  
should have burned anything that was there.

Q. Were you concerned about localized concentrations of  
hydrogen?

A. Well, yes. I will state also that I assumed that the explo-  
sion was localized in the pressurizer area. One of my concerns  
was that there may be other pockets around there, and that  
would be dangerous.

Q. Why didn't your concern or recommendation include  
other equipment inside containment?

A. At that time, we were not operating any other equip-  
ment in the containment. Our mode of cooling was cycling the  
valves.

Q. If other equipment was to have been energized, would  
you have recommended to Gary Miller that that not be ener-  
gized also?

A. I will be quite frank with you, I did not think in those  
terms. As a matter of fact, there was word put out not to oper-  
ate in the equipment, and I sort of kicked myself for not  
thinking about that myself?

By Mr. HOEFLING:

Q. When was that word put out, do you recall?

A. To the best of my recollection, it was on the 28th.

Q. Who put it out?

A. I assume that it came from Gary Miller, but I cannot say  
that Gary Miller told me specifically.

Q. You mean that it might have been passed along from  
someone else?

A. Yes, and I am not sure of that.



By Mr. MOSELEY.

Q. You don't recall who gave you that order or instruction?

A. I am just trying to think about it.

I will be quite frank. Again, I don't remember, but I think Gary Miller was there, but whether he actually said it or not, I don't remember.

By Mr. HOEFLING.

Q. But your best recollection is that it came out on the 28th?

A. Yes.

By Mr. MOSELEY.

Q. Following up on the same thing, do you recall any reason for the order or instruction not to operate equipment? Was any reason for this order or instruction?

A. I don't remember now if it was stated, or I just assumed that it was so that we did not cause any more sparking.

Q. You don't recall which?

A. Can I talk to my lawyer?

Mr. MOSELEY. We will go off the record.

[Discussion was held off the record.]

Mr. MOSELEY. We are back on the record.

The WITNESS. May we have the question asked again?

By Mr. MOSELEY.

Q. The question was, do you recall at the time that the order was given whether or not there was a statement as to why the equipment was not to be operated?

A. Again, I don't remember specifically that the reason was given or that I just assumed it that this was to prevent sparking in the building.

I do remember the circumstances and who was present. Essentially Gary Miller had mentioned, and Brian Mehler was there. Mehler said something to the effect that it was too late, and that he had just started some piece of equipment in the building.

I remember some comment of mine to the effect, and this was sometime later, "Don't worry about it because we have burned up that was in there anyway."

Q. That was your comment?

A. That was my comment.

By Mr. GAMBLE.

Q. To Mr. Mehler?

A. Yes.

Q. And Mr. Miller?

A. To whoever was there.

By Mr. MOSELEY.

Q. Mr. Miller, to your recollection was there?

A. Yes, to my recollection he was.

(Chwastyk, I&E, 9/4/80, p. 14-18.)

On September 4, 1980, Chwastyk engaged in discussion with NRC investigators indicating that no general announcement was made in the control room regarding the instruction not to start equipment in the containment. In addition, Chwastyk recalls that he was not sure as to the extent the instruction had been followed since they had re-

cently started a piece of equipment and "nothing happened," i.e. there had been no indication of a hydrogen detonation. The discussion follows:

Q. How was that order transmitted?

A. Again, I don't remember specifically Gary Miller giving that order specifically to me. I do remember that soon after it was given, Gary Miller and myself were discussing something when Mehler walked in. How the order was actually transmitted, I don't know.

Q. It was not somebody saying to you in a calm voice, "Don't restart any electrical equipment," as opposed to somebody standing back and saying in a loud voice, so that other people could hear, "Don't restart any electrical equipment in the containment."

A. It was not a general announcement made in the control room. I remember that definitely.

By Mr. HOEFLING.

Q. Would that kind of order or direction be recorded in a log?

I am not familiar with plant operation, but normally would something like that be recorded or logged?

A. It is difficult to answer because I cannot think of an analogy to use during normal operations for an order like that.

Q. So it is unclear.

A. Yes.

Q. So you don't have a feel for one way or the other.

A. Let me say this. During normal operations, or right now, for that matter, there are a number of ways that we would prevent operation of equipment if we did not want it operated, and that would be tagging it out, which involves a lot of time to get instituted.

Prior to that time, it would have been a verbal type of communication to whoever was in charge of the shift. Right now, presently, the shift foreman. If I had a piece of equipment that I did not want run, I would institute the proper tagging, whether it be safety tagging, or a caution tag, or something of that nature, but until the time that the tags were placed, I would give a verbal order by way of the shift foreman not to operate that equipment. But I don't think that they would log it.

By Mr. MOSELEY.

Q. In this circumstance, wouldn't that be sort of well publicized to all the operators in the control room because each of them may have had some reason to operate some equipment?

A. Normally it would, except for the fact that at the time the word was put out, it started a piece of equipment and nothing happened. So I am not too sure how far we carried it out. I don't think that we did at all because that was about the time we were starting the reactor cooling pump.

Q. This would have been about six o'clock in the afternoon?

A. Between 4:00 and 10:00, I guess.

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Q. The pump was bumped at about 7:30.

A. I remember, to the best of my recollection, that it was about that time that we were getting ready to run the reactor cooling pump that all of this happened.

Q. Could you tell me from your knowledge what precipitated at this point in time, some six hours or five hours after the time of the explosion? Had there been discussion of this? What caused the long time period?

A. I don't know, to tell you the truth. All I can relate is what I remember, and my first impression was, "Oh hell, why didn't I think of that."

After I thought about it a little more, I thought, oh hell, we have already burned it up in there. We have not been recycling the valves, so we have not been putting any more hydrogen in the building.

How the order came about, I just don't know.

Q. I just wondered if you overheard or knew of any conversations in the interim in which this was being discussed?

A. No, I didn't, or at least I don't remember any.

By Mr. GAMBLE.

Q. Do you recall hearing any comments from any of the personnel who received this order, operators or anyone, indicating that they understood the order was to prevent any sparks?

A. I don't really remember that the order got out to the control room operators. As I think about it now, there would be no reason to because we had just started some equipment in the building.

Whether the word got out to them prior to my knowing what happened, I don't know.

Q. Was there any discussion amongst the personnel, aside from Mr. Mehler, Mr. Miller and yourself, which you have talked about earlier?

A. Was there any discussion along the lines, "Well, we don't have to worry about this problem because we just started these pumps and nothing happened," any discussions along that line?

A. The one between Mehler, myself and Miller, I definitely know about.

(Ibid, p. 19-22.)

The following is Chwastyk's explanation presented on September 4, 1980 regarding his previous recollection that he had not been in the shift supervisor's office on March 28, a recollection that was part of SIG's basis for concluding that the directive not to start equipment was given after March 28.

Q. Ross has testified on the 30th to the SIG that you were in the shift supervisor's office on March 28th, and today you have also likewise testified that you were in the shift supervisor's office. Is that correct?

A. Yes.

Q. You, however, testified on the 30th to the same group, the SIG group, that you don't recall being there on March

28th, and this is in relation to again the sparking potential. It is your recollection, however, today that you were indeed in the shift supervisor's office on March 28th?

A. Well, yes, it is, but when I answered that question previously I answered it in terms of that was not my station, you know, I was not doing anything specifically in the shift supervisor's office other than going in and making reports or getting directives, you know, depending on what it was.

Q. Well—go ahead.

A. That is essentially what I meant about not being in the shift supervisor's office. You know, I didn't go in there and hold lengthy discussions on the plan of attack, which was going on at the time. I wasn't involved in that type of thing. I was in the office, you know, just to receive my orders and to make reports only.

Q. Well, the reason I asked the question of course was the fact that two people, yourself and another person, testified that you weren't there on that day, weren't in that office on that day. Those two testimonies were taken to discount that the order was given on the 28th. I just want to clarify that it is now today your recollection you were in the shift supervisor's office on that day, and I have done that.

A. Yes.

(Chwastyk, I&E, 9/4/80, p. 45-46.)

On September 4, 1980 Chwastyk engaged in the following dialog with NRC investigators wherein he seeks to explain how Mehler might have gotten from him the impression that the instruction concerning equipment in the containment had *not* been given on March 28. Chwastyk tells the investigators that it was in fact his recollection that the instruction to not start equipment *was* given on March 28.

By Mr. HOEFLING.

Q. Joe, let me go back to something we have already talked about. This is the instruction not to start electrical equipment that we talked about earlier. What you basically said was that the instruction was given on March 28th by Miller not to start any electrical equipment in the containment.

Now, we have talked to Brian Mehler on this same subject, about the instruction and when it was given. This is how that spun out. On October 11th, 1979 Brian testified on this subject and he said basically what you have said that he recalled the instruction having been given by Miller on the 28th. After that he had some doubts, reconsideration, what-have-you, and he later testified that he wasn't sure when the instruction was given. He wasn't sure if it was given on the 28th or the 29th. He still recalls such an instruction being given, but he didn't know when it had been given.

We talked to Brian about this yesterday and asked him what prompted him to think about this and begin to doubt the time. He indicated that he had some conversations. Specifically he said he had a conversation with you. He asked you did you recall the instruction being given on the 28th and that you told him that it had not been given on the 28th, to your recollection.

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Do you recall talking to Brian about this subject?

Mr. McBRIDE. Before you answer that. He may have said that on October 30th, but so far as I recall he didn't say specifically yesterday that Mr. Chwastyk said what you just related that he said.

(Short pause.)

Mr. HOEFLING. Can I read from the Mehler interview.

Mr. McBRIDE. Please.

Mr. HOEFLING. This is Brian talking yesterday.

Mr. CRAIG. Excuse me. For the record, that is the Mehler interview of 9/3/80.

Mr. HOEFLING. This is the question to Brian.

"Question: Who did you talk to?"

"Answer: I believe I talked to Joe and Bill.

"Question: Chwastyk?"

"Answer: Chwastyk and Zewe, and I really don't know who else.

"Question: What did they say? What did you ask them?"

"Answer: I asked them if they recalled the conversation where they said not to start any electrical equipment in the reactor building.

"Question: What did they say to that?"

"Answer: They don't recall that conversation happening on March 28th."

The WITNESS. I remember a conversation with Mehler about that. I am not sure I remember exactly, you know, what was said. My first impression when you asked that was that Mehler related to something about someone saying that it didn't happen until the 29th. He wanted to know what I thought, or maybe even to try to help him, you know, in his own mind, you know, get it straight on when it happened. It seems to me I remember, at least I think I remember saying something to the effect that—I think essentially I told him, you know, that he has just got to go with what he remembered, and I may have made a comment of something to the effect that, you know, I didn't think it happened on the 29th, but I don't remember saying that.

The only thing I remember of that conversation was my not wanting to impress anything on Mehler, or him not impressing anything on me. I don't think I really wanted to talk about it. You know, I sort of glossed over it and tried to change the subject type thing.

By Mr. HOEFLING.

Q. But you don't recall telling Mehler that it didn't happen on the 28th or anything like that?

A. Well, I don't really remember. I may have.

Q. You may have said that to him, that it didn't happen on the 28th?

A. I may have. I don't know why. Again, I really didn't want to discuss it with him at the time, and I may have just said it to close out the conversation.

Q. But you are clear that the instruction was given on the 28th?

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A. Yes, to the best of my recollection, it was given on the 28th, you know, and I think it was after Miller came back from seeing McGovern.

Q. And you are clear that Brian did come up to you, I suppose it would have been after the—

A. Yes.

Q. What do you recall of that conversation? Can you recall when that happened?

A. No, I don't recall when it happened. I remember it was right about the time we were getting, you know, all the interviews. You know, I didn't know where we stood, and I was told not to discuss it by a number of people. I really didn't want to discuss anything that happened.

Q. You were told not to discuss what?

A. Well, on similar previous interviews, you know, it was mentioned not to, you know, discuss—maybe not even at the interviews. Maybe it just came from someone else. I don't know. We had been given instructions not to talk amongst ourselves about some of these items and I never did. I never really sat down and went through the whole scenario of what happened with, you know, for instance, of what some of the control room operators saw.

Q. So the general instruction that you were operating under was not to discuss the events on the 28th with others?

A. Yes, essentially.

Q. And it was your personal objective not to impress others with what happened on that date or to receive impressions?

A. Exactly. Exactly. And I think that is the thinking.

Q. Why would you then have told Brian that it happened on the 28th during such a conversation?

A. Well, the only reason I can think of, and I don't remember specifically, is that it may have been a way to close out the conversation.

Q. Wouldn't that have broken the "standing policy"?

A. No. I think, and I probably said it under the assumption that if you think it happened on the 28th, you know, that is what you have got to go with, you know, and I will go with what I thought. I don't know if I mentioned, you know, what I thought at the time to Mehler. As a matter of fact, I remember trying not to, you know, give him an impression of what I thought simply because I didn't think it was right for us to be talking about it because we were told not to.

Q. But still you recollect you told him it did not happen could not have happened on the 28th?

Ms. BOAST. Excuse me, I can't hear you.

By Mr. HOEFLING.

Q. I said but still during that conversation you recollect that you told him it did not happen on the 28th? I am trying to get a feel for what the words were that you gave to Brian on the subject.

A. You know, as I think about it a little bit, I think it came out in the context of someone, you know, it was Zewe or Miller or something said that it happened on the 29th. And I said,

well, if they said it happened on the 29th maybe it did. I think that was the kind of context that we held our conversation in.

Q. Do you recall telling him that you thought it happened on the 28th during that conversation?

A. No, I tried to stay away from telling him what I thought, quite frankly.

Mr. HOEFLING. Okay, Joe, let me show you page 16 of your deposition given on October 30th, 1979, to the Special Inquiry Group. I want you to look at that page.

(Document handed to the witness.)

By Mr. HOEFLING.

Q. Joe, is the substance of the testimony on that page that you weren't sure whether the instruction had been given on the 28th? Is that what you were saying there?

A. Yes, I think that is what it says. At this time, you know, when I did this interview I wasn't sure that it was the 28th simply because, you know, I didn't really have time to think about it and relate it to you.

Q. What is your recollection now?

A. Well, my recollection is now that it did happen on the 18th and it was about the time we started those reactor coolant pumps, you know, the first reactor coolant pumps. But again, you know, this is some time period even after that interview. I think it was about that time, and again I can't be absolutely sure.

(Chwastyk, I&E, 9/4/80, pp. 36-42.)

A reactor operator, Theodore Illjes, who arrived in the control room after the detonation, told NRC investigators that he had been briefed on the reactor building pressure pulse:

I was told they had a spike on both indications of the reactor building pressure recorder. There was some discussion as to what it was. A hydrogen explosion was discussed. This was later in the evening.

(Illjes, I&E Tape 261, May 23, 1979, p. 6.)

When asked again as to whether the discussion of a possible hydrogen burn had taken place on the first evening (March 28) Illjes said:

As far as I know that possibility was discussed that evening.

(Ibid., p. 10.)

Mr. Herman Dieckamp, President of General Public Utilities, stated in a May 9, 1979, mailgram to Chairman Udall:

There is no evidence that anyone interpreted the "pressure spike" and the spray initiation in terms of reactor core damage at the time of the spike nor that anyone withheld any information. (See Appendix G.)

#### *Log Entries*

Two logs containing a listing of significant events that occurred on March 28 indicate that a pressure pulse occurred at approximately

## I. SUMMARY: MANAGEMENT AWARENESS OF REACTOR CONDITIONS

Upon arriving in the TMI-2 control room at approximately 7:05 a.m., Station Manager Gary Miller established a "command" group, consisting of senior plant personnel, which convened frequently during the day for the purpose of discussing plant conditions and developing a response to them. Miller stated that the group meetings ". . . were held in the shift supervisor's office in a calm atmosphere, at a point removed from the control room, and the decisionmaking was done precisely, at intervals dictated by the plant, and in no case longer than 30 to 40 minutes apart." (Supra, pp. 4-5.) The record of the TMI investigations shows that on March 28, the TMI plant managers were aware of information indicative of a situation much more perilous than was reported to State and Federal officials.

*Stuck Open PORV*

Zewe, Ross, Mehler, and Bryan have made statements to NRC investigators indicating that prior to 7 a.m. they were aware that the leaking PORV had been the cause of symptoms observed in the early hours of the accident. Zewe stated that closure of the block valve had caused primary system pressure to increase and reactor building pressure to decrease. (Supra at 7.) Ross said reactor building pressure decreased following closure of the block valve, and recalled Zewe commenting on this to him. (Supra at 6.) Mehler, who arrived at about 5:45 a.m. said that ". . . upon closing the block, I assumed we found the problem." (Supra at 8.) Chwastyk, who arrived between 11 a.m. and noon recalled that "when he got to the control room" he had found out about the stuck open PORV and that Mehler had stopped the flow from the system by closing the block valve. (Supra at 9.) Miller said he did not recall having been aware on March 28 of the PORV having been open for an extended period of time. (Supra at 10.) Zewe, however, said he had briefed Miller upon his arrival as to what happened up to that time, and that among the matters covered in the briefing "should have been" the shutting of the block valve, decreasing containment pressure, and increasing primary system pressure. (Supra at 11.) Ross recalled that information about the PORV having been opened had been passed on to Miller. (Supra at 11.) Kunder's statements indicate that he became aware of the PORV having been open sometime after the General Emergency had been declared, probably no later than 8:30 a.m. (Supra at 8.)

*Throttling of High Pressure Injection (HPI)*

Zewe knew about the HPI status because he had been the shift supervisor under whose direction the HPI controls were manipulated. Zewe said (Supra at 13) that he had discussed with Miller the status of the HPI and letdown systems as they had existed prior to 8:30 a.m. Kunder said (Supra at 12) that when he arrived at about 4:50 a.m. he became aware that HPI had been secured.

In answer to a question as to whether prior to 11 a.m. there had been discussion of the fact that an open PORV and HPI being turned off could have resulted in a substantial loss of inventory, Ross said (supra at 12) that he thought the fact of the HPI having been off or throttled back had been discussed. While Zewe recalls having told Miller about the HPI and others recall Miller having been present when it was



discussed, Miller himself has never made a clear statement as to whether or not on the morning of March 28, he knew that the HPI had been throttled during the period the PORV was open. Miller was concerned, however, when he found that the HPI had been throttled after his arrival at about 7 a.m.; Miller recalls his having issued strong instructions that the HPI not be throttled again without his explicit instructions. (Supra at 13.) The preponderance of evidence (including the likelihood that he would have insisted in the periodic meetings of the command group on having been informed as to what had transpired prior to his arrival) suggests that Miller, following his arrival, was informed as to the state of the HPI prior to his having arrived at the site.

*Superheated Conditions in Hot-Legs*

Miller was aware that the hot-leg temperatures were in excess of 620 degrees, the upper limit of the computer readout, and consequently he instructed that an instrument capable of indicating temperatures in excess of 620 degrees be attached to the hot-leg temperature sensor. Miller recalled that the latter device indicated 720 degrees (Supra at 19), a temperature that Miller, on the basis of his training would have known to imply the existence of superheated conditions in the hot-leg. Ivan Porter, a TMI engineer, was responsible for connecting the device to the hot-leg and was aware of hot-leg temperatures in excess of 700 degrees. (Id.) John Flint, a B&W engineer at the site, said that Porter had shown him the setup that was indicating hot-leg temperatures in excess of 700 degrees. (Supra at 19.) A strip chart at the back of the control room showed the hot-leg temperature record; this record was monitored by Flint; but his statements are ambiguous with regard to whom he discussed this data which clearly indicated heating and uncovering of the core that began shortly after the last of the reactor coolant pumps was turned off at about 5:40 a.m. Zewe said that he had recognized temperatures in excess of 700 degrees to have indicated the presence of superheated steam; Zewe further recalled conversations with plant managers about this, although he did not recall the names of managers with whom such conversations occurred. (Supra at 20.) Kunder was aware of hot-leg temperatures on the order of 700 or 800 degrees (Supra at 20.) Ross said he was aware of temperatures around 700 degrees which at this time meant to him, "I didn't have a cooling method for the core." (Supra at 22.)

*Superheated conditions above the core. (See Supra at 22-23.)*

John Flint, a B&W engineer at the site, monitored the computer printout which indicated question marks for temperatures in excess of 700 degrees. Flint said, "Only one or two seemed to indicate they were in fact bad. These temperatures were monitored for the rest of the day to follow what was happening in the core." (Supra at p. 23.) Miller said that he "... was never trained that those thermocouples were too much of a device which you were to use but I used them because they were the only indicator (of) what was going on in the core. (Id.) Porter recalled that shortly after 7 a.m. Miller had asked him about the in-core readings and that he had called for the computer to print them. In all, the computer was called upon to print in-core thermocouple data at least 9 times between 8 a.m. and 10 p.m. on March 28. (Supra at 22.) Because the thermocouple data was valid for higher

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temperatures than could be processed by the computer, Miller asked for direct measurements of the thermocouple voltages. These were made between 8 and 9 a.m. The data showed 9 out of 51 thermocouples indicating temperatures in excess of 2,000 degrees. One technician told NRC investigators that the data was such that "... it was the general consensus amongst the instrument people there that the core was definitely uncovered." (Supra at 25.)

The foreman in charge of making the measurements said, "We had possibly uncovered the core was the only way we could see that you could have obtained temperatures of that magnitude." (Id.) Another technician said, "I feel then that there was a definite sign then that the core had definitely been uncovered to the point where it suffered damage." (Supra at 25.) Ivan Porter, the engineer who, at Miller's request, had instructed the technicians to obtain the data, has given conflicting testimony as to whether he believed the data was credible. At various times he implied he did not believe the data because of the wide scatter in the readings. But when pressed as to whether he considered a reading of 2,300 degrees to be anomalous, Porter said, "I don't know. I was afraid it was real." (Supra at 20.) Three of the technicians involved in making the measurements recollect that Porter did accept the data as a valid indicator of core conditions. (Supra 28-30.) Miller has implied at times that he did not believe the in-core data, but as indicated above he also said that he had used them because they were the only indicator of what was going on in the core and that, "So, I did utilize them to tell me that what I had was that severe, more than something to prescribe a procedure or action or something." (Supra at 23.)

Miller also said, with regard to the direct measurements of the in-core thermocouple voltages: "So you know the bottom line here was that they (the in-cores) are hot, they were hot enough that they scared you, as far as what you're looking for. It told me that the reason the computer was off scale at 700 degrees F . . . The in-cores were reading anywhere from 2,500 or so, and I picked 2,500. It could have been higher than that." (Supra at 30.) Ross said the thermocouples were discussed in the think tank: "Thermocouple temperatures were brought up to Gary Miller, and I guess the bottom line they got out of that, was that they were not conclusive. It showed the core was hot, basically." (Supra at 32.)

*Core uncovering and uncertainty as to adequacy of core cooling*

Prior to 10:30 a.m. on March 28, B&W Engineer John Flint concluded that the core had been uncovered earlier and he said he informed Lee Rogers (his B&W supervisor at the site), Bill Zewe and Ed Frederick of his conclusion. Flint said he believed that Rogers had gone off to discuss his (Flint's) conclusion with Kunder and Miller. (Supra at 36.) Kunder said the high temperatures indicated to him that the core had been uncovered. (Supra at 39.) Apparently in reference to the situation between 9 a.m. and 10:30 a.m., Kunder also expressed concern that cooling water from the high pressure injection might be bypassing the core and therefore not adequately cooling it. (Supra at 46.) Ross said in reference to the strategy employed prior to 11:30 a.m. that there was uncertainty as to whether the core had been uncovered. (Supra at 50.)

Seelinger said that he had concluded on the basis of radiation alarms on the morning of March 28 that the core had been partially uncovered. (Supra at 40-42.) Miller said in a statement quoted on page 114 of the Senate report: "Based on the instruments we had, we didn't know whether the core was covered." While the record contains no clear statement by Miller indicating whether on March 28 he believed the core was or had been at least partially uncovered for some part of the day, Miller did say that, "We were not in our minds convinced the core was actually covered." (Supra at 44.) The foregoing statement concerns conditions after Miller had instructed that the high pressure injection not be turned off without his approval. On the basis of his understanding of reactor theory, including the significance of superheat, it is likely that Miller did understand by 9 a.m. on March 28 that portions of the core had been uncovered for some interval during the period between 6 a.m. and 9 a.m. It is also likely that Miller was uncertain with regard to the adequacy of first, the "feed and bleed" strategy pursued between 9 a.m. and 11:30 a.m., as he himself admitted in the course of postaccident discussions, and second, the depressurization strategy initiated at about 11:30 p.m. and pursued until an uncertain hour, but in any case no later than approximately 3:08 p.m. when the pressurizer block valve was closed.

*Awareness that there were no Written Emergency Procedures Applicable to Conditions Existing in Plant*

Miller's recorded comments to Troffer at Met-Ed at approximately 9:30 a.m. on March 28 indicate an awareness that the plant was in a condition that had not been analyzed. ". . . to be honest with you we've been assessing the plant . . . We don't know where the hell the plant was going. The situation we're in is a delicate one because we actually have plant integrity . . . If we had a leak we'd be all right." Miller also stated ". . . the cooling method we were in wasn't recognized anywhere that had ever been studied . . ." <sup>16</sup> The discussion in the think tank ". . . involved how to cool the core from a condition that we didn't (sic) have recognized in any formalized training or implemented (sic) document." (Supra, p. 52.) Miller also said, after referring to the high in-core temperature: ". . . but we just know (sic) we didn't have control, we were out of control. We knew the situation was one we hadn't anticipated too many times here." (Supra, p. 31.) Kunder, in referring to the abnormal situation in the plant said, "I think that those conditions were beyond the bounds of plant conditions that I was used to dealing with." (Supra, p. 47.) Ross said with regard to conditions as they existed on March 28 that: "Our evaluations were not very thorough that day, admittedly, but the evaluation we made is we didn't have a known method to cool the core, and we were trying to cool the core with high pressure injection. (Supra, p. 51.) Chwastyk stated that he did not like the "feed and bleed" cooling procedure, ". . . primarily because it's so alien to operating the plant." (Supra, p. 51.)

*Awareness of Hydrogen Burn and Symptoms Thereof*

Persons in the control room at the time the pressure pulse occurred were generally aware of it. Zewe said he found it hard to believe that anyone could have missed it or the ensuing discussions of it.

<sup>16</sup> Full transcript of conversation at appendix A.

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(Supra, p. 65.) TMI-2 operator, Ed Frederick said that Gary Miller was particularly interested in the pressure spike on the chart recorder. (Id., p. 63.) Ross said that he was aware of the pressure pulse and that he was standing near Miller when the pressure pulse occurred. (Supra, p. 65.) Chwastyk said that soon after the pressure pulse occurred, he realized that it had been real, that it was indicative of core damage, that he explained his conclusions to Gary Miller, and that on the basis of these he recommended that they no longer cycle the PORV because the explosion had appeared coincident with opening of this valve. (Id., pp. 69-73.) Chwastyk recalls that he was concerned that the containment integrity might have been breached by the pressure pulse; he recalls directing that a radiation survey be made outside the containment to determine whether cracks had developed in the concrete containment building. (Supra, pp. 73-75.)

Chwastyk also told I&E investigators that to the best of his recollection that someone (he assumed Miller) had given a directive on March 28 that equipment in the containment building not be turned on and the record indicates that the basis for this directive was concern that turning on equipment would cause a spark that would ignite hydrogen feared to be in the building. (Supra, pp. 81-88.) Mehler recalls having believed that the chart recorder had indicated that there had been a real pressure pulse in the containment building rather than an electrical noise signal. Prior to October 30, 1979 Mehler recalled the instruction not to start equipment in the containment building. (Id., p. 78.) While Mehler said on October 30, 1979 and subsequently that he was unsure as to whether this instruction had been issued on March 28, the testimony on balance indicates that Miller gave the instruction (or it was given in his presence) to Mehler and Chwastyk in the shift supervisor's office late in the day on March 28. (Id., pp. 78, 82, 83.) Theodore Illjes, a TMI operator stated that on March 28 the pressure pulse and a possible hydrogen explosion were discussed. (Id., p. 88.) Miller admits having heard a noise at the time the pressure pulse occurred, but he has denied having been aware on March 28 of a pressure pulse having been recorded, of the containment sprays having initiated or of an engineered safeguards systems actuation.

In sum, of those senior personnel present in the control room on March 28, most recollect the pressure pulse and actuation of containment sprays; Illjes said that on March 28 there was speculation about hydrogen; Mehler and Chwastyk believed on March 28 that the reactor building pressure chart had shown a real increase in pressure; Chwastyk recalled that he told Miller that the pressure pulse was "an explosion and probably caused by a hydrogen explosion"; Mehler and Chwastyk recall that someone (the evidence indicates Miller) instructed that equipment in the containment building not be started, the record indicating this being out of concern that a spark would cause an explosion of hydrogen; and Miller states that he heard a noise but was unaware of the pressure pulse and the possibility of hydrogen ignition being the source of the pressure pulse until two days later, on March 30.

On balance, consideration of statements describing the situation at the time the ignition occurred and in the following hours leads to the conclusion that it is likely that Miller's recollection of not having been aware of the pressure pulse and its significance is erroneous.

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of )  
)  
METROPOLITAN EDISON COMPANY ) Docket No. 84 50-289 SP  
)  
(Three Mile Island Nuclear ) (Restart - Management Phase)  
Station, Unit No. 1 )

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OFFICE OF SECRETARY  
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BRANCH

I hereby certify that I have served this 20th day of August, 1984 a copy of the foregoing Three Mile Island Alert's Opposition to Licensee's Motion for Protective Order and Motion for Extension of Time on the following by mail, first-class, postage prepaid:

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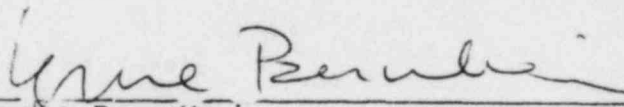
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