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NUCLEAR REGULATORY COMMISSIONBEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

TESTIMONY OF HERMAN M. DIECKAMP

My name is Herman M. Dieckamp. I am president and chief operating officer of General Public Utilities and of the GPU Service Corp. GPU is a holding company, whose subsidiaries Jersey Central Power and Light, Metropolitan Edison, and Pennsylvania Electric are the owners of Three Mile Island. I am a director of all of GPU's subsidiaries which also include GPU Nuclear and the GPU Service Corp. At the time of the accident at TMI-2, I held these same positions with the exception of director of GPU Nuclear which did not then exist. In the intervening time since the accident, I was the chairman and chief executive officer of GPU Nuclear from its inception until February 1984. GPU Nuclear became the approved operating Licensee of TMI in January, 1982.

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I graduated from the University of Illinois in 1950 with a Bachelor of Science Degree in Engineering Physics. After school I joined North American Aviation which became Rockwell International. My work experience started with radiation damage to materials and progressed to reactor development in sodium cooled reactors, space reactors, and fast breeder reactors. In 1970, I became president of the Atomics International Division of Rockwell International. I joined General Public Utilities in 1973 and was within a period of about one year appointed to the positions I held at the time of the accident.

The purpose of my testimony is to provide information in response to the Appeal Board's view expressed in the ALAB-772 that:

The record -----[is]--- incomplete with regard to the circumstances surrounding a mailgram sent by GPU president Herman Dieckamp to Congressman Morris Udall.

In its discussion of this subject the Appeal Board noted:

Moreover, the scope of the Board's inquiry is relatively limited. As we pointed out at note 103, supra, the focus should be on:

- (1) Whether anyone interpreted the pressure spike and containment spray, at the time, in terms of core damage, and (emphasis in original)
- (2) Who or what was the source of the information that Dieckamp conveyed in the mailgram?

The Licensing Board in a prehearing conference order on July 9, 1984 added a third facet:

- (3) Whether, when, and how any interpretation of core damage was communicated to Mr. Dieckamp.

This testimony addresses my knowledge about the questions that have been raised concerning my May 9, 1979 mailgram to Congressman Udall.

By way of background, on May 7, 1979, Congressman Udall, Chairman of the Subcommittee on Energy and the Environment of the House Committee on Interior and Insular Affairs, a number of subcommittee members, local congressmen, subcommittee staff, and NRC Commissioner Victor Gilinsky visited Three Mile Island. I had been in communication with committee staff to arrange the visit and participated in the briefing and the tour. I have not been able to reconstruct the specific agenda or recall all of the participants but I do recall the tour of the TMI-2 control room that was conducted by Mr. James Floyd who was at that time TMI-2 supervisor of operations. In the course of that tour which took the form of a general recreation of the accident and operator action, Mr. Floyd made mention of a pressure spike which occurred about 1:50 p.m. on March 28, 1979 and also noted that the pressure spike had initiated the containment building spray. As I recall, he identified the containment building pressure recorder and discussed the conclusion that

the pressure spike was not a spurious electrical signal because spray initiation required coincidence of at least two pressure indicators. He also stated that the pressure spike and the operator action to turn off the containment spray was in full view of an NRC inspector. (It should be noted that Mr. Floyd was not on the TMI site at the time of the pressure spike). This portion of the tour was reported on with some detail in an article in the New York Times on the next day, May 8, 1979. The article was entitled "Lag in Reporting Reactor Damage Laid to Experts" and stated in the lead sentence:

A technician from the Three Mile Island nuclear plant told Congressmen today that control room personnel and Federal inspectors knew that the plant's fuel core was seriously damaged two days before the damage was formally reported and the seriousness of the accident made public.

The pressure spike was cited as the basis for this statement. A copy of the May 8, 1979 New York Times article is attached.

I was disturbed by the article because my own awareness indicated that the reporting of the pressure spike and its significance reflected the actual delayed recognition of the severity of core damage that had occurred during the accident. As a result, I sent a mailgram to Congressman Udall with a copy to Commissioner Gilinsky that stated my belief:

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.

A copy of the mailgram is attached.

The mailgram reflected my own understanding of the positive discovery and interpretation of the pressure spike. I first became aware of core damage beyond local failed fuel when I was informed of the pressure spike, the postulated mechanism of a hydrogen "explosion", and the reaction of zirconium and water as the source of hydrogen. This information came to me sometime on Friday, March 30, 1979. Prior to this time, my conversations with state, NRC, and company personnel and my attendance at the Herbein congressional visitors briefing on March 29, 1979 had given me a sense of local and limited fuel damage. At no time on March 28 or 29 did anyone mention to me core temperatures in excess of 2000°F, pressure spike, zirconium-water reaction, hydrogen, or core damage beyond failed fuel.

On March 28, 1979, I was in Harrisburg, Pa. for a meeting with the Pennsylvania Public Utilities Commission. My recollection of specific interactions and information opportunities during March 28 and immediately thereafter can be summarized as follows:

March 28, 1979

- 1) At 9:00 a.m. on March 28, 1979, W. Creitz gave me the first notification of problems at TMI-2. My notes indicate a feed pump trip at 4:00 a.m.; reactor trip; primary (pressure) relief; (drain tank) disk rupture; 30,000 gallons (of water relieved to the containment building basement); and 1# pressure (in the containment building). Creitz also mentioned failed fuel. I indicated that that would not seem possible if the emergency systems worked as intended. I gained the impression that the emergency systems had functioned as intended.
- 2) Shortly after talking with Creitz, I talked with R.C. Arnold who was in Parsippany, N.J. I remember asking him about the emergency systems and failed fuel but I did not get the sense that Arnold possessed added knowledge about the situation.
- 3) At about 9:15 a.m., I made a brief statement concerning TMI-2 to the Pennsylvania Public Utilities Commission (PaPUC).
- 4) I attended a press briefing by Lt. Gov. Scranton and staff at about 11:00 a.m. I left this briefing with a sense of reassurance that the plant's emergency systems had functioned properly.

- 5) I made further comment on TMI-2 to the PaPUC at about noon. I think I spoke with Creitz and/or Arnold just prior to these second comments.
- 6) I spoke with some members of the Lt. Governor's staff at about 2:00 p.m. I learned nothing about the status of the plant but heard some comments about radiation measurements. I am unable to reconstruct the specifics of the comments but I was puzzled that the comments did not make a lot of sense to me. I had hoped to sit in on the briefing of the Lt. Governor by TMI personnel but I was asked to leave.
- 7) At about 2:30 p.m., I encountered Herbein, Miller and Kunder on the steps of the Pennsylvania State Capitol. They were on their way to brief the Lt. Governor. Our conversation was extremely brief. I expressed concern about the absence of senior people from the plant. I recall no detailed discussion of plant parameters or conditions but gained the impression that the plant was stable.
- 8) Sometime in the early evening, after returning to my home in New Jersey, I spoke with R.C. Arnold. He told me about the plant having been taken solid and the starting of a reactor coolant pump. I recall no detailed discussion of plant parameters or a sequence of events throughout the day.

March 29, 1979

- 1) On Thursday morning, March 29, 1979, I met briefly with R.C. Arnold in order to review and sign out a memorandum establishing a task force to investigate and analyze what was then thought to have been a severe plant transient.
- 2) During the afternoon I attended a briefing for a group of Congressmen at the TMI visitor's center. Mr. Herbein's comments (which were transcribed) served as my first overall briefing as well. I do not recall having synthesized the various portions of that briefing into a real understanding or insight into the extent of core damage. I was satisfied that the plant was shut down, being cooled, and stable.
- 3) At the visitor's center, I spoke briefly with R. Vollmer of the NRC. He informed me about core thermocouples that were still reading higher than the coolant temperature. We mused about fuel damage and local flow blockage. I did not get a sense of anything ominous.
- 4) While at the visitor's center, I also spoke with some members of the task force that I had authorized earlier in the morning. I have no recollection of any specific detail from those conversations.

- 5) After returning to New Jersey in the early evening of March 29, 1979, I spoke with R.C. Arnold. I think it was then that he gave me an increased awareness of the open PORV and interruption of high pressure injection. We agreed that Arnold should go to the site to work with Herbein. I still did not sense the full extent of the situation.

March 30, 1979

Starting on Friday March 30 and continuing for the next several days, I gained an explicit understanding of the first recognition of the meaning of the pressure spike, the confirmation of hydrogen, and a rough quantification of the degree of core damage deduced by analysis of the zirconium-water reaction. My communications with site and GPU personnel and with various individuals around the country in the period of March 30 and beyond were too numerous to recall in detail.

I recall that my awareness of the degree of core damage increased abruptly on Friday, March 30 when I was informed of the pressure spike. In telephone conversations with personnel at the site, most likely Mr. R.C. Arnold, I was told of the pressure spike recording being brought to the attention of the GPU task force during the night of March 29. The task force postulated a zirconium-water reaction as the source of the hydrogen. The presence of hydrogen was recognized as being

consistent with the abnormal pressure-volume behavior of the primary system. The postulate also caused the plant staff to take steps to take a containment building gas sample and to take steps to permit operation of the hydrogen recombiner. The first containment building gas sample was taken at about 4:00 a.m. on March 31. Records indicate that the initial calculation of the non-condensable gas in the primary system were completed at about 0300 on March 30, 1979. The volume of the non-condensable gas in the primary system was measured by observing the system pressure change associated with a change in the water volume in the primary system.

I moved to the site on the afternoon of Saturday, March 31. Thereafter, I was in routine conversation with key members of the plant staff, the task force, the NRC, and the Industry Advisory Group that had been formed. In these interactions I became aware of the confirmation of hydrogen through the analysis of the containment building gas sample(s) which contained hydrogen and showed a depletion in the normal atmospheric oxygen concentration. This depletion along with the residual hydrogen afforded the first indication of the amount of reacted zirconium and thus the first quantitative indicator of the degree of core damage.

During the first few weeks of April, I remained at the site. I was directly involved in the concern about the potential explosivity of the hydrogen bubble, the primary cooling

system vulnerability to high concentrations of non-condensable and/or dissolved gas, and the strategies employed to remove the hydrogen from the reactor primary system. I availed myself of the early GPU operators' interviews, sat in on preliminary reviews of the sequence of events, participated in status reviews with the onsite NRC staff, coordinated the activities of the Industry Advisory Group and generally participated in the management of the accident.

During the third week in April I drew upon this awareness and the developing learnings, including the G. Miller report based on a taped conversation and reconstruction of the day of the accident by a number of key TMI personnel, to assemble testimony for presentation to the Nuclear Regulation Subcommittee of the Senate Committee on Environment and Public Works (Hart Committee).

Prior to May 9, 1979, I did not conduct any exhaustive investigation of the pressure spike and its interpretation. I had given the subject considerable attention in the course of preparing the Hart Committee testimony because the spike, its identification with the zirconium-water reaction, the verification and quantification of the hydrogen, and the subsequent analysis of the degree of fuel cladding reaction was a meaningful way to illustrate the difficulty in recognizing the scale of the accident and the time necessary to derive enough information for some quantification of the degree and nature of the core damage.

From the considerable information available to me prior to May 9, 1979, I had a very clear understanding of the delayed recognition and interpretation of the pressure spike. I also heard or saw no indication that on March 28 the pressure spike had been properly diagnosed as the product of a zirconium-water reaction or that the pressure spike caused the plant staff to change or adopt a strategy for bringing the plant to cold shutdown that recognized the presence of hydrogen or non-condensable gas. Prior to May 9, 1979, I knew that a pressure spike had in some way been observed by numerous individuals on the day of the accident, but my overall awareness caused me to conclude that no one recognized the significance of the spike as a direct indicator of or as a direct measure of core damage on March 28.

In preparing the mailgram I did not conduct or cause to be conducted any additional inquiry into the facts beyond my own knowledge, nor do I remember consulting with anyone on the content of the mailgram. My knowledge on May 9 of the pressure spike and its interpretation along with my general understanding of the accident and the operator response, gave me a sense of confidence and a sense of need to respond to what I considered to be misinformation in the New York Times article.

Since I sent the mailgram on May 9, 1979, there have been several investigations which have led to disclosure of additional information on the pressure spike and the awareness of

it and its significance. I have reviewed this information including specific interviews of individuals. The testimony of Chwastyk, Mehler and Illjes has been focused on as evidence of: (1) the identification on the day of the accident of hydrogen as a cause of the pressure spike; (2) the prohibition of equipment operation in containment as a further indicator that hydrogen had been identified; and (3) awareness of core damage.

My reading of Mehler's testimony indicates to me that he is uncertain about the timing of equipment limitations. In this regard, I am influenced by the fact that there is objective data in the form of a control room log book entry at about 9:00 p.m. on March 29 concerning "sparking potential". Further, my reading of Mehler's statements is that he has consistently testified that hydrogen was never mentioned on March 28. On October 30, 1979, he testified:

No, the word (hydrogen) to my knowledge never entered into any conversation until it came out in the press. And that was the first time I heard the word hydrogen mentioned. Now, if you read through my transcripts, that word is mentioned a lot because the transcripts were made after March 30 and everyone knew it was hydrogen.

The time uncertainty of the relevant testimony is illustrated dramatically by the May 23, 1979 testimony of Illjes who recalled the discussion of a hydrogen explosion and the simultaneous operation of electrical equipment as occurring when the containment pressure recorder chart was removed in order to

make a copy at about 8:00 p.m. on March 28, 1979. The physical evidence demonstrates that the chart was not removed until March 29, 1979.

Of the three, the testimony of Chwastyk is the most suggestive that the pressure spike was related to core damage on the day of the accident. It is significant to note when appraising the accuracy of the mailgram that the first interview of Chwastyk took place on May 21, 1979, 12 days after the mailgram. In that NRC interview Chwastyk refers to the pressure spike as being the result of "some kind of explosion" and states that he did not understand the cause. He makes no mention in his May 21, 1979 interview of hydrogen. In Chwastyk's October 11, 1979 and October 30, 1979 NRC depositions he refers to a hydrogen explosion and correlates its occurrence with the operation of a valve but does not identify any assessment of core damage or non-condensable gas. In this regard, the October 30, 1979 SIG deposition of Chwastyk includes the following exchange:

Q - Do you remember forming any opinion or thought in your own mind on Wednesday about how substantial the damage must have been to the core to generate that great deal of hydrogen? Is that something that you thought about at all? What was your reaction to that?

A - I thought about it, and I think from the time that it dawned on me what had happened in the reactor building, I knew we had sustained some core damage. How severe it was, I tried to stay away from thinking about how severe or unsevere the accident was, simply

because I don't know. I don't want to make any conjecture. At the time, remember, I had other things that I just did not have the time to waste thinking about what ifs essentially.

It isn't until a September 4, 1980 NRC interview that Chwastyk mentioned "zirc-water reaction" in relationship to "some core damage". In my judgment interview does not reflect an understanding of the zirconium-water reaction and its core damage implications. It contains the following exchange:

Q - Is that another way of saying, what is the basis of your conclusion that there was zirc water reaction?

A - Let me answer this way. I don't know of anything specifically during from the time that I got there until the spike that would lead me to believe that we had zirc-water reaction. But what happened previous to that was so unclear that it was a possibility.

My determination that it was a hydrogen explosion due to zirc water reaction, I could not come up with any other explanation that would explain what I had seen take place, and that was the simultaneous pressure spike with the operation of the valve and the loud noise heard.

I just had nothing in my background that could tell me or that could suggest that it was anything other than an explosion, simply the way it acted plus the fact that it led to the zirc water because I did not where else we could get anything to explode.

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

the accuracy of the judgment expressed in the mailgram. While Chwastyk's later testimony mentions the link between the pressure spike and core damage, I don't find any meaningful discussion of the conditions necessary for a zirconium-water reaction nor do I find any attempts to infer the type or degree of core damage. I cannot conclude that Chwastyk "interpreted the pressure spike and spray initiation in terms of reactor core damage at the time of the spike." My readings of these individuals' statements, too, is impacted by the various investigators' reactions to all the statements before them.

In November of 1979, the NRC staff's investigation of the accident, NUREG-0600 stated at 4.42:

No statements that have been obtained indicate that anyone present postulated that the pressure spike was due to the rapid burning of hydrogen.

The NRC's Special Inquiry Group reported in NUREG/CR-1250 in January 1980 at page 42:

The true nature of the pressure spike will not be generally recognized until Thursday (March 29) evening.....

The Special Inquiry Group's Vol. II, Part 3, at page 908 states:

Except for Chwastyk's testimony, no other evidence indicates that anyone in the control room realized on March 28 that there might have been a hydrogen explosion in the reactor building.....

The NRC's Investigation into Information Flow During the Accident at Three Mile Island, Jan. 1981, NUREG-0760 reviewed added information and states at page 28:

They (the investigators) conclude that Chwastyk's recollection of the cause of the spike is in error. The investigators conclude that hydrogen was not discussed as a cause for the pressure spike on March 28, 1979; there was no acknowledged cause for the spike on that date. It is concluded that the order not to restart electrical equipment was given on some date subsequent to March 28, 1979.

These independent investigations and their conclusions arrived at after the date of the mailgram and based on additional information provide direct support for the thrust of the mailgram statement. While the SIG takes Chwastyk's testimony at face value, I cannot conclude from his sequence of interviews and depositions that he understood the source of the pressure spike or that he recognized its implications on the day of the accident. I am forced to conclude that his post-accident learnings have been incorporated into his recollection of the day of the accident.

It is interesting to note that the only other report on this subject, the Majority Staff Report of the Committee on Interior and Insular Affairs of the U.S. House of Representatives, dated March 1981, with the benefit of the cumulative testimony and analysis, makes no explicit finding on the mailgram.

The latter portion of the Mailgram statement "and no one withheld any information" refers to the pressure spike and its interpretation. It was my conclusion that the pressure spike and its meaning was not understood on the day of the accident and consistent with that conclusion it was my further belief that no one made a conscious decision to withhold information about the spike.

The Special Inquiry Group examined the "assessment and dissemination of information" and reported its findings in the January, 1980 Report. Subsequently the SIG principals reported to the NRC on the result of a review of specific questions posed by Congressman Udall on January 21 and February 4, 1980. A number of these questions relate directly to the matter of the mailgram and relevant "evidence". In a Memorandum to Chairman Ahearne on March 4, 1980, the SIG principals reported that their review "tends to corroborate the Report's overall findings". The SIG Report had concluded:

The evidence failed to establish that Met Ed management or other personnel willfully withheld information from the NRC. There is no question that plant information conveyed from the control room to offsite organizations throughout the day was incomplete, in some instances delayed, and often colored by individual interpretations of plant status. Indeed, information conveyed by Met Ed, NRC and B&W employees in the control room to their own managements and offsite organizations was in many cases incomplete and even inaccurate.

However, based on the evidence, we could not conclude that the causes of this breakdown in

information flow went beyond confusion, poor communications, and a failure by those in the control room, including NRC and B&W employees, to comprehend or interpret the available information, a failing shared to some extent by offsite organizations as well.

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I was interviewed on the matter of the mailgram on September 12, 1980, by NRC investigators who prepared NUREG 0760. In that interview, I stated, "I still consider the statement that I made on May 9th to be accurate". In a public meeting before the NRC Commissioners on October 14, 1981, I was questioned by Commissioners Gilinsky and Bradford about the mailgram. I said then, "I believed that the mailgram was correct on May 9th. I believe that it is correct as of today".

Today in 1984 my belief is the same. In my own assessment of the accuracy of the mailgram, I focus on the thrust of the mailgram statement -- namely, no one interpreted -- rather than the "no evidence" introductory phrase. I continue to believe that the evidence and independent analysis thereof support the thrust of the mailgram statement. In making this statement I recognize that the mailgram phrase "no evidence" can if taken literally indicate a measure of absolute knowledge that goes beyond the reasonable basis that I possessed for my judgment and my belief. By the same token, the "evidence" that is sometimes cited was not only adduced after the mailgram but does not rise to the level of substance necessary to justify a

responsible questioning of my integrity. I respectfully ask this Board to make a definitive finding in this matter.