

SUMMARY
OF
TESTIMONY
BEFORE
THE PRESIDENT'S COMMISSION
ON THE ACCIDENT AT THREE MILE ISLAND

BY
GARY PAUL MILLER
STATION MANAGER
THREE MILE ISLAND

May 18, 1979

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My name is Gary Paul Miller and I am employed by Metropolitan Edison Company as the Station Manager for the Nuclear Generating Units at Three Mile Island, Middletown, Pennsylvania. In this position I am responsible for the operation and maintenance of Units 1 and 2 at TMI. To accomplish these organizational objectives, I have reporting directly to me the respective Unit Superintendents, as well as Maintenance and Administrative Superintendents. I report directly to Mr. John G. Herbein, Vice President Generation.

I will not attempt in my testimony today to present a detailed event sequence or an analysis of the events at TMI 2 on March 28, 1979. I will present my actions and logic as I proceeded through those events. The times I give are approximate and are my best recollection.

Shortly after 0400 I was informed that the reactor and turbine at TMI 2 had tripped. At 0515, I called the Unit 2 Control Room to determine the status of the plant and to discuss the events which had occurred to this point in time. George Kunder, the Unit 2 Superintendent for Technical Support, informed me that all recovery procedures were underway and that the plant was stable at that time. There were two parameters which disturbed me -- a low pressure (approximately 1100 psi) and a pressurizer level of 395 inches (near solid). At this time, I arranged for a discussion via a telephone conference call between Mr. John G. Herbein, Met-Ed Vice President for Generation; Mr. Lee Rogers, B&W Site Manager; George Kunder and myself. During this call which took place about 0610 various plant conditions were discussed, including the fact that the Reactor Coolant Pumps were off due to lack of flow indication, that the electromatic relief valve was thought to be shut, and that there was no radiation reported at this time. We were also aware that the rupture disc on the reactor

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coolant drain tank had ruptured and that there was some water in the Reactor Building sump. It was decided at this time that I would go to the TMI Site in lieu of a previously scheduled meeting which I was to attend at the Oyster Creek Plant that same morning.

During preparation to proceed to the site, I received a call from Dan Shovlin reporting indications of radiation levels inside the plant. This occurred at approximately 0645.

I arrived in the Unit 2 Control Room at 0705 and immediately took steps to identify and evaluate the situation. The Shift Supervisor, Mr. Zewe, had already declared a site emergency. I assumed charge of the Control Room and appointed the Senior personnel available to direct implementation of the Emergency Plan, to set up monitoring of radiation levels, to establish communications, and to assure the Unit was in a stable condition. A team was formed consisting of a number of key supervisory personnel who met continually at my direction throughout the remainder of the day to assess our progress, to make recommendations and to review steps to be taken. Following these discussions, I thereafter directed actions in the Control Room through the Senior personnel. At 0724 based on the status of the plant and the information available to me, I declared a General Emergency and initiated implementation of the steps thereby required by the TMI Emergency Plan.

At 0800 I directed Jim Seelinger to report to the Unit 2 Control Room in order that I might take advantage of his experience with the unit. The high pressure injection system was still on -- the hot leg temperature was pegged high, cold leg was less than 200^o, the B steam generator was isolated and at approximately a 95% level, and the A steam generator downcomer temperature was approximately 510^o. An attempt to start reactor coolant pumps was again made, but with a 100

amp indication and no flow indication we were certain of cavitation. Looking at the temperatures I felt that there was some natural circulation occurring and that we should attempt to charge the plant solid with the HP injection.

During this period I formalized our goals and objectives:

- (1) To protect the public and to assure that Emergency Plans and Procedures were being carried out in an effective manner.
- (2) To maintain the reactor core covered with water and to cool and stabilize it.
- (3) To protect Met-Ed personnel and to minimize plant damage.

These were repeated to the Senior team throughout the day to insure that our priorities were maintained.

The team decided that, although the unit was essentially in a stable condition, the HP injection system did not appear to be taking the plant solid since the reactor coolant pumps still cavitated during attempts to run them and the temperatures indicated voids in the Unit hot leg pipes. Since we were unable to take incore reactor thermo-couple readings on the computer, I directed that readings be taken at the instrument penetration. The readings we received varied from 200° to 2400° with some not indicating any value. We charged the plant for approximately three hours and pressure cycled around 2000 pounds with HP injection flow between 400 and 600 GPM. Plant parameters remained essentially the same but the borated water storage tank was effectively going to the Reactor Building Floor and I became concerned with the ability to keep a water source since the BWST was down almost 20 feet. If I had lost the use of the BWST I would then have had to use water from within the Reactor Building by using the Low Pressure Decay Heat System to feed the HP system.

Another concern was that in using the electromagnetic block valve excessive cycling could cause it to fail.

During this period we lost auxiliary steam and were unable to put the auxiliary boiler back on the line. As a result, we lost the capability to steam to the condenser. The (B) Steam Generator had been isolated due to a suspected leak, and to ensure continued cooling, and having lost the ability to steam to the condenser, I had the (A) Steam Generator steamed to atmosphere. Water samples previously taken had confirmed no contamination of this steam generator. We also placed a man on the roof to monitor to further insure that no radioactive releases were being made.

In yet another meeting, our evaluation and indications did not convince us that we had the core totally covered. I directed that we lower pressure and attempt to use the core flood tanks to assure ourselves that the core was flooded and through this mechanism get the Unit another step towards the decay heat mode or the start of reactor coolant pumps which would place us in a more assured condition of stability and safety.

During the early afternoon, I was requested by Management to stop steaming the A Steam Generator. Since we had regained some vacuum, we were able to direct flow internally to the main condenser. At this time, plant pressure came to about 440 psig and the core flood tanks came down by about a foot and a half giving us some reassurance that the methods we then were employing were keeping the core covered. It was at this time that I was requested to go to the Lieutenant Governor's office, returning at about 1600. When I returned, the Unit parameters were essentially the same and we were still getting some natural circulation plus utilizing the HP injection to cool the core.

From the beginning of the incident, I continuously monitored execution of the Emergency Plan. We had promptly made all of the notifications to offsite agencies and had all offsite and onsite teams out taking readings. Early in the accident open telephone lines were established between the plant and both the Pennsylvania Bureau of Radiological Protection and the NRC. In the early phases, releases were on the order of 1 MR/Hr. offsite with readings onsite in the range of 7-14 MR/Hr. As the day progressed, readings increased offsite to 2-3 MR/Hr. and 10-20 MR/Hr. onsite. The readings were always affected by wind conditions -- increasing as the wind died down and decreasing as the wind speed picked up. Data was passed on continuously to offsite organizations.

In the early evening I was directed to begin to again attempt to make the unit solid at higher pressure and on advice from B&W Lynchburg to maintain HPI at 400 GPM to assure core cooling. I began preparations to start one reactor coolant pump. When these preparations were complete, I directed the Control Room to start the 1A Reactor Coolant Pump, we received flow indications, pressure dropped from 2000 to 1320 pounds, temperatures equalized in all loops at about 380°, and the Unit appeared stable with necessary flow and cooling to maintain the core parameters.

It should be noted that although this emergency lasted for an extended period the atmosphere within the Unit remained calm and professional. The response of all Met-Ed personnel was excellent and the courage of the operators and health physics and maintenance personnel was evident throughout the day. There was not, during the entire time, a period of panic or unsureness within that Control Room.

I believe we minimized the exposure of the public and of our own people, and placed the plant in a stable condition from a situation which none of us had been schooled in and which few of us, including myself, believed we would experience.

TMI STATION
MARCH 28, 1979 INCIDENT
STATEMENT BY
G. P. MILLER
STATION MANAGER

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TMI-MARCH 28, 1979

G. P. MILLER STATEMENT

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INTRODUCTION

My name is Gary Paul Miller and I am employed by Metropolitan Edison Company as the Station Manager for the Nuclear Generation Units at Three Mile Island, Middletown, Pennsylvania, and in this position I am responsible for the operation and maintenance of Units 1 and 2 at TMI. To accomplish these organizational objectives, I have reporting directly to me the respective Unit Superintendents, Maintenance and Administrative Superintendents. I report directly to Mr. J. G. Herbein, Vice President-Generation.

In my statement I have not attempted to produce an event sequence or to go into an analysis or intricacies of the unit trip as this is satisfactorily covered in other documents. I have honestly attempted to the maximum of my recall ability to produce in writing my actions and logic on that day as I moved through those events of March 28, 1979. The events are traced from 4 A. M. until approximately 8 P. M. the night of March 28, since by this hour command type communications were in place with the Observation Center and Senior Company officials were in charge of operations.

I have been at TMI since the beginning of 1973 and I have served in the following positions prior to being named Station Manager.

(1) Test Superintendent for Unit 1

Responsible for initial startup and acceptance testing in Unit 1

(2) Unit Superintendent for TMI Unit 2

Responsible for planning, organization and execution of initial operations and maintenance of Unit 2 during the startup to commercial phases.

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(3) Station Superintendent for TMI

Senior Superintendent for both Units 1 and 2.

As a participant in the organization as illustrated above, I was a party to the acceptance and initial commercial operation of both TMI units.

Both TMI units were put on line using a defined and formal acceptance program with criteria to assure safe and reliable operation and this included the equipment, administrative program, procedures and operator qualification. I consider and have formally stated that TMI Unit 2 was technically and operationally acceptable to go on line for its first fuel cycle. The appropriate Regulatory Agencies were fully cognizant and to some extent participated in the above processes through their inspection and enforcement actions.

It is worthy of mention that many of the "times" given in this statement are from my memory and my personal observation is that all of us involved with the incident have an honest problem in being precise on times. I believe this is due to the extreme pressure I felt and the fact that time seemed to pass very rapidly. As I arrived on site that morning, my mind firmly and quickly grasped the very serious situation which had developed and I knew the public must be protected but I did not entirely realize until later the full extent of damage the Unit had suffered.

My primary goal was to protect the public and our actions were an attempt to minimize releases, project and recommend evacuation, if warranted, with maximum advance notification, to terminate the incident and to stabilize the Unit.

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INTRODUCTION

The first concern I had as I arrived in the Control Room at approximately 7:05, was to become fully cognizant of the situation as it existed and once I fully understood the plant conditions and the radiation emergency, I immediately took charge of the Control Room and appointed Senior people to direct the necessary evolutions in the vital areas to assure that the public was protected, that the release was monitored, that communications were occurring and that the plant was brought in steps to a stable condition. The command set up, which I just described, met frequently throughout the day. The group presented Unit conditions, status of Emergency Plan actions, shared opinions, discussed technical data, and made recommendations. Discussions were held with Management, and/or Babcock & Wilcox, Lynchburg, the State, the NRC, and following these evaluations, I made appropriate decisions and so directed the implementation to the Control Room and informed others both inside and outside the plant as necessary.

Basically, I set up this Emergency command team in the early hours as I arrived at the plant and the radiation emergency was in progress, by essentially forming my senior people into a network to supervise, conduct the emergency and report to me while bringing the plant to a safe condition. Mr. Ross was put in charge of Operations to direct the Shift Supervisor, Mr. Dubiel was put in charge of radiation concerns, including radiation surveys, onsite - offsite teams, accountability check, assembly of people, getting in contact with the Emergency Control Station (ECS), etc., Mr. Seelinger was in overall charge of Unit 1, The Emergency Control Station, the Unit 1 Control Room and to assure that all facets of the emergency plan were followed,

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Mr. Logan was charged to assure that all the required procedures and plans were reviewed and to look through each to assure that every item was covered, this included the procedures for both emergency plan and for the Unit itself, and to provide me assurance that all actions were being taken and to be sure the notification calls were made, that management was notified, and all communications were in-place. Mr. Lee Rogers was requested to provide technical assistance plus link-up with his home office as he could. Mr. Kunder was in charge of technical support and communications and Mr. Shovlin was in charge of emergency maintenance.

For information, normal job functions of these persons is provided below:

Gary Miller - TMI Station Manager
Joe Logan - TMI Unit 2 Superintendent
Jim Seelinger - TMI Unit 1 Superintendent
Dan Shovlin - TMI Maintenance Superintendent
George Kunder - TMI Unit 2 Superintendent-
Technical Support
Mike Ross - Unit 1 Operations Supervisor
Dick Dubiel - Station Chemistry/Health Physics
Supervisor
Bill Zewe - A TMI Station Shift Supervisor
Lee Rogers - Onsite Babcock & Wilcox Manager

Because of my training, I felt a strong obligation to the public and to making sure that there was minimal release of radioactivity and that there was evacuation in plenty of time if that was required. The phone, the pressure, the fact that the plant was in

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calm as can be testified to separately. All of the meetings of the command team were held in the Shift Supervisor's office in a calm atmosphere, at a point removed from the Control Room, and the decision making was done precisely, at intervals dictated by the plant, and in no case longer than 30 to 40 minutes a part.

This statement is formatted such that I will attempt to go through the three time periods, place the chronology of times and events as I can best put them, and in addition, describe what I thought, to my knowledge, the plant state was, where I thought we were within the emergency plan and protection of the public, and our goals and purposes to reach the next succeeding safe condition throughout the day. These facts are the best I had knowledge of at that moment and the assessment was made in an optimum fashion to make the next decision and implement action.

EVENTS/OBJECTIVES/ACTIONS

0400

The Unit 1 Shift Foreman informed Senior Station personnel of a turbine and reactor trip in Unit 2. Unit 1 was at hot shutdown condition following a successful refueling and prior to the trip Unit 2 was operating at about 98% power. This was my first notification of a Unit 2 problem. Note that detailed events and actions following the trip are contained in other documents and are not again reviewed here.

0515
(approx.)

G. P. Miller called the Unit 2 Control Room to find out the status of the Unit and to review recovery actions. I was this day, scheduled to travel to Oyster Creek Nuclear Station to participate in a Refuel Outage Critique and prior to departing I wanted to be sure of the actions underway in Unit 2 at TMI. At this time I was informed that the turbine and reactor trip recovery was in progress in accordance with the designated procedures. The plant was reported to be stable at that time, but I was informed that the Unit had undergone a safe-guards initiation (note this had occurred in the past at this Unit and in other B&W units following high power trips, so by itself it does not raise extreme or public concern). The plant had two parameters which disturbed me: 1. A low pressure (approximately 1100 psi), and 2. Pressurizer level of approximately 395 inches (near solid). This call lasted about 20 minutes and the person I talked to was George Kunder. Following the call, I informed Jim

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EVENTS/OBJECTIVES/ACTIONS

Seelinger and Dan Shovlin of the Unit 2 trip and essentially encouraged them to go to the site as soon as practical. Additionally, due to my concern over the plant pressure and pressurizer level, I arranged to have a conference call with Mr. J. G. Herbein of Met-Ed, Mr. Lee Rogers of B&W, George Kunder and myself. G. Kunder had also directed calls to the Lead Engineers to aid in the recovery actions for the Unit.

0605 to 0630
(approx.)

The conference call described with the above parties was conducted. Parties participating in the call were briefed on the Unit trip and subsequent followup actions and conditions of the pressurizer level and pressure were described. Following some discussion of the conditions it was agreed we must believe our instruments. It was also noted by the plant that the reactor coolant pumps were presently off due to a loss of flow indication, the electromatic valve was thought to be shut, and there was no indication of radiation at this time. Additionally, the rupture disc on the reactor coolant drain tank in the Reactor Building was noted to have been ruptured and, therefore, we were aware that there was some water within the Reactor Building sump. At this time, it was decided that I would not go to Oyster Creek and that I would get ready and go into the plant and then report back to Jack Herbein on the Unit conditions.

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EVENTS/OBJECTIVES/ACTIONS

INFORMATION

1. Approximately the arrival times at TMI station on 3-28-79 were:
 - George Kunder - 0450 A. M.
 - Joe Logan - 0515 A. M.
 - Mike Ross - 0530 (NOTE: Initially Mike went to Unit 1 in a normal fashion as the Unit was in hot shutdown condition and preparing to go critical following refueling.)
 - Richard Dubiel - 0545 A. M.
 - Jim Seelinger - 0650 A. M.
 - Lee Rogers - approximately 0700 A. M.
 - Gary Miller - approximately 0705 A. M.

2. Indications of radiation: Through a review of sequence of events following the incident, I noted that early in the incident, not sure of the time, the intermediate cooling to the letdown cooler radiation monitor gave a high alarm. Note that this monitor has a low setpoint and in-fact we were seeking a field change and, typically, it has been in the alert state due to being positioned in a high background area. It is located near the Reactor Building sump and due to the indications we had in the past, this was not considered an unusual indication or an indicator of an emergency situation.

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EVENTS/OBJECTIVES/ACTIONS

0630

The chemists had been recirculating the Unit 2 reactor coolant sample in order to obtain a boron analysis following the trip. The first result obtained was 700 ppm, which was not considered accurate by the operators. Backup samples were requested and two backup samples indicated approximately 400 ppm boron.

0640

There was an indication of radiation by an area radiation monitor near the hot machine shop at a location near the sampling lines in Unit 1 (Note: The Unit 2 reactor coolant sample line runs through Unit 2 into Unit 1 and to the primary sampling which is located within Unit 1). We at the plant have calculated that the lead time for a representative sample to get from Unit 2 to Unit 1 due to the line length and flow rate is approximately 40 minutes.

Source range and intermediate range nuclear instrumentation indicated upscale approximately one decade. The Control Room took action immediately re-initiating high pressure injection and initiating emergency boration. They also attempted to start each of the four reactor coolant pumps but indications were of only 100 amps and no flow indication, therefore, the pumps were cavitating and not pumping. The pumps could not be run.

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EVENTS/OBJECTIVES/ACTIONS

0640

Dick Dubiel along with the Chemistry/Health Physics technicians surveyed, with portable monitors, both Auxiliary Buildings in Units 1 and 2. Radiation indications were evident and at this time Dubiel directed that both Units Auxiliary Buildings be evacuated and Dick went to the Unit 2 Control Room.

0645

Dan Shovlin called G. P. Miller, described radiation problems in the Hot Machine Shop and in the Sample Room in Unit 1. At this time I was on my way to the site recognizing that the radiation indications indicated a severe problem. At the time I got to the site I noted traffic tied up at the South Gate and due to the potential traffic at the North Gate, I entered the south end of the Island to have access to Unit 2 as quickly as practical.

0655

A site emergency was declared by George Kunder and Bill Zewe. This was based on radiation monitors increasing in all areas and the Reactor Building dome monitor in alert and increasing.

715

Directed an operator to man the switchboard and to help in the communications effort.

EVENTS/OBJECTIVES/ACTIONS

Information

(1) Unit 2 Auxiliary Building Sump

The Reactor Building has a sump with pumps which normally discharge on a high level indication to the miscellaneous waste holdup tank. There is a path to the Auxiliary Building sump tank, but the operators believe that this path was valved closed. Also it should be noted that the Auxiliary Building sump tank had a blown rupture disc for a few weeks prior to this event and that tank was isolated from the vent header. To summarize, the Unit 2 Reactor Building sump normally fills up and pumps automatically to the miscellaneous waste holdup tank. Water in significant volume as evidenced by the sump backup, was transferred by some path from the Unit 2 Reactor Building to the Auxiliary Building and I do not fully understand this path. Reactor Building isolation occurred on a 4 psig signal at about 8:00 A. M. Nevertheless, reactor coolant was discharged by some path to the Unit 2 Auxiliary Building and did in-fact have Radioactive Isotopes in it which caused some of the high radiation levels in the Auxiliary Building.

(2) Unit 2 Vent Header

This is considered the major path where gas and particulates that occurred in the atmosphere probably came from in Unit 2 and the path was in all probability from the vent of the makeup tank which was degassing fission products at a significant rate.

EVENTS/OBJECTIVES/ACTIONS

Information (continued)

(3) Unit 2 Letdown System

From early in the incident, the amount of letdown flow varied from small amounts to zero as throughout the day we pursued all the practical alternatives of valving and etc., also monitoring the cognizant radiation levels in the various rooms, to restore as much letdown as we could, but we were never able to restore significant letdown during the day of the incident.

INITIAL MARCH 28, 1979 NOTIFICATIONS

- 0655 - Site emergency declared.
- 0702 - Pennsylvania Civil Defense Duty Officer notified.
- 0702 - Notified Dauphin County Civil Defense (Kevin Malloy).
- 0704 - NRC Region I notified. No one there but secretary to beep duty officer.
- 0704 - Civil Defense called Bureau of Radiological Health (BRH). Noted by Lt. at 0704.
- 0707 - Attempted to notify J. G. Herbein, Vice President Generation, Met-Ed. (approx.) Unable to contact him.
- 0709 - ERDA (RAP Team) notified.
- 0709 - Attempted to notify L. L. Lawyer, Manager, Generation Operations, Met-Ed. (approx.) Unable to contact him.
- 0710 - Notified R. M. Klingaman, Manager Engineering, Met-Ed.
- 0710 - Notified Pennsylvania Bureau of Radiological Health.
- 0711 - Notified Dauphin County Civil Defense.
- 0713 - Called Radiation Management Corporation at Philadelphia Electric number. (approx.) Answering service will forward number.
- 0714 - Contacted State Police and notified of General Emergency.
- 0717 - York Haven portable radiation monitor turned on, (0) reading - State Police helicopter requested and confirmed it would be sent to TMI. (Per GPM recall and from status board in Control Room). Notified Pennsylvania State Police of Site Emergency.
- 0720 - Attempted to contact ANI. No answer. (approx.)
- 0724 - General Emergency declared by G. P. Miller. Initiated notification for a General Emergency (Note: These are the same parties as previously notified of site emergency).
- 0725 - Pa. State Bureau of Radiological Health notified of General Emergency via direct phone line from Unit 2 Control Room. This line was then held open between BRH and Unit 2 Control Room.

INITIAL MARCH 28, 1979 NOTIFICATIONS (continued)

- 0725 - On-Site radiation monitoring team dispatched in downwind direction.
- 0735 - Pennsylvania State Civil Defense notified of General Emergency.
- 0735 - Notified ANI. No one there except for operator. Left message for them to call us and that it was important.
- 0736 - Radiation Management Corporation (Mr. Fred Rocco) notified of General Emergency.
- 0738 - Recalled Radiation Management Corporation at Philadelphia Electric to tell of General Emergency. He will forward message.
- 0740 - York Haven radiation monitor reading (0) - helicopter at TMI - dispatched (approx.) offsite teams in helicopter and one separately in car to West Shore (from G. P. Miller and R. w. Duziel recall of the incident).
- 0750 - On-Site monitoring team reports less than 1 MR/hr. readings in downwind (approx.) direction at West Side of TMI (at boundary).
- 0755 - Open line established between U2 Control Room and NRC Region I. Notified them of General Emergency. They will send a team to the site.
- 0755 - Off-Site radiation monitoring teams report readings of less than 1 MR/hr. at North Gate and Observation Center.
- 0800 - Porter-Gertz (Radiation Consultants) notified of General Emergency and asked to provide assistance in our monitoring effort.
- 0800 - Offsite team in Helicopter at West Shore (Goldsboro) (approx.) '0' reading - we actually were ahead of the plume - plus onsite team at our west site boundary - '0' reading.
- 0930 - ANI returned phone call and were notified of General Emergency. (approx.)

0730 to 0830

At approximately 0800 I directed Jim Seelinger to report to the Unit 2 Control Room. This was based on the fact that the Emergency Plan and Emergency Control Station in Unit 1 were in full operation, Unit 1 was in a stable condition and I needed Jim Seelinger's technical help due to his past experience in the Unit 2 Startup program. The Unit Status - High pressure injection was on as I had directed it to be kept on, hot leg temperature was pegged high, cold leg temperature was less than 200^o, the (B) steam generator was isolated and at approximately a 95% level, the (A) steam generator downcomer temperature was approximately 510^o, we attempted to start a reactor coolant pump in each loop, but again, we got 100 amp indication and cavitation without flow indication, we were dumping steam condenser at this time from the 'A' steam generator and we put a Shift Foreman and operator in charge of each panel within the Control Room as we now had some extra crews in place. At this time, I believed based on the temperatures indicated above, there was some natural circulation occurring and I had hoped with the HP injection to charge the plant solid.

Status of the Emergency Plan Implementation

The plan was fully initiated at this time. All steps within our procedures and plans were carried out, all communications both on and offsite were fully established, accountability was in progress, teams were dispatched both on and offsite, all readings were less than 1 MR per hour and Iodines were less than background. Additionally, we are making frequent announcements over the page to inform people of the situation and that we were in a general emergency and that it was real. At this time I placed one person in charge of the Observation Center, and sent persons from the gate to the Observation

0730 to 0830 (continued)

Center and others to the designated assembly areas onsite. At approximately 0730 or a little before, I had received predictions of an offsite dose of 10 R at Goldsboro, this was based on the Reactor Building dome monitor, which was still increasing and from our past experience with this source calculation, we did feel these were really this high, but as a precaution, I dispatched a State Police helicopter with an offsite team along with an offsite team in a car and separately, to the West Shore (Goldsboro). During this time period, the command team met in the Unit 2 Shift Supervisor's office in the Unit 2 Control Room and we assessed essentially what our goals and objectives were during this day and during the time of this incident.

0830 to 1200

I decided that our objectives and goals for this day were as follows, and in order of priority listed:

1. To protect the public and to assure that the Emergency Plans and procedures along with the Units procedures were fully carried out in an effective manner.
2. To maintain the reactor core covered with water and to cool and stabilize it.
3. To protect Met-Ed personnel and minimize plant damage.

It might be noted that these goals were stated by me to this group throughout the day in order that we maintain our priorities in proper perspective. The group also decided that at this time, the Emergency Plan was fully in effect and working and that the Unit was in an essentially stable condition but that high pressure injection did not appear to be taking the plant solid and this was most evident by the fact that the reactor coolant pumps still cavitated during attempts to run them. Incore thermocouples readings were taken on the computer. The computer put out a "question mark" which means that we were not in its program, therefore, we sent instrumentation personnel to take readings at the penetration, and additionally, to me this indicated that the potential for high readings on the thermocouples were evident. The readings we got back from the penetration varied from 200° to 2400° to nothing. The technical explanation that I was given indicated that they were probably hot, that if they were hot, that there could be melting of the thermocouples and different junctions would have been formed and therefore, the temperature indication was not considered reliable on a technical basis, but to me personally, it

0830 to 1200 (Continued)

indicated we certainly had high temperature readings within the core. Additionally, we had had a recorder hooked up to a reactor protection channel temperature indicator which indicated that the hot leg was greater than 700°, in other words, essentially the hot leg indicated greater than 700° on a zero to 800° full range scale. We had lost over 1/3 to 1/2 of the pressurizer heaters and throughout the day we kept trying to maintain and increase heaters and control with the pressurizer.

Plant conditions were essentially the same as I described earlier and I had notified Mr. Ross that HPI must be kept on unless I personally directed otherwise. High pressure injection was kept on at my direction. I conducted a meeting in the Shift Supervisor's office and we decided to keep trying to take the plant solid using high pressure injection and throttling with RCV-2 (the electromatic block valve) and to maintain approximately 2000 lbs. while attempting to go solid. We charged the plant for approximately three hours and pressure cycled at around 2000 lbs. and HP injection flow was somewhere around 400 to 600 gpm. Plant parameters remained the same as I described in the 0730 to 0830 time period. The borated water storage tank was essentially going to the Reactor Building floor and my concern began to become the ability to keep a water source as the BWST was down almost 20 feet or more through this period and at the existing makeup rate it would have left us without water in a matter of hours. This was not an immediate concern but one which I was attempting to keep an eye on so that we did not end up with a surprise of no water available.

0830 to 1200 (Continued)

The alternative would have then required me to use the water from within the Reactor Building by utilizing the Low Pressure Decay Heat System to feed the High Pressure Injection System. Additionally, I became concerned over the possibility of the excessive cycling on RCV-2 causing it to fail. This has been a problem valve both in Units 1 and 2 and at other sites (it is in a very hot environment and has failed in the past). During the same period we lost auxiliary steam and we were attempting to put the auxiliary boiler back on line but we had problems with the boiler and therefore, we had to break vacuum and steam the A steam generator to atmosphere. NOTE: At my direction, the B steam generator was maintained isolated at all times as we had suspected from the early hours it had a leak. We had samples taken in both steam generators and these confirmed that the A steam generator was not contaminated. This was done prior to steaming to the atmosphere. Additionally, we put a man out on the roof as close as practical to the steam pipe and during steaming, consistently got readings indicating no activity.

The command group met periodically throughout the morning and restated our objectives, re-reviewed the emergency plan and communications. Our concerns became one of a fear that HPI might be short circuiting the core to the Reactor Building floor, that possibly the core might not be covered, and the potential of having RCV-2 fail (open or shut). Instruments available did not convince us that water was in fact on the core but my firm decision was to always maintain high pressure injection. The group discussed and I directed that we go down in pressure and attempt to use the core flood tanks to convince ourselves that the core was covered and possibly through this mechanism we might get the plant towards the decay.

0830 to 1200 (Continued)

heat mode which we considered at that time to be the ultimate condition and place of stability and safety. Additionally, we had level indication on the core flood tanks and the core flood comes in directly over the vessel through separate nozzles and we felt this would give us additional assurance that the core was covered. During the pressure decrease I specifically directed and it was implemented that High Pressure Injection be maintained at all times.

Status of the Emergency Plan

The on and offsite teams were fully out, the wind had changed several times; but early in the morning it was blowing very slowly, 1 to 2 mph, and at times essentially it died. During the times that the winds shifted or died, we did obtain onsite readings which were above 1 MR/hr. Readings through this period offsite were less than 1 MR/hr. and Iodines less than background. We had had one Iodine taken in Goldsboro that indicated essentially background. We had directed a backup sample be taken using a helicopter. It was taken and analyzed by the Bureau of Radiological Health (BRH) where the analysis of the backup sample confirmed the results of the earlier sample taken in Goldsboro. Therefore, we simply felt that there was not an offsite concern at this particular time and additionally we were not in any level of action in accordance with the Environmental Protection Agency (EPA) guidelines. The State concurred with this evaluation and it should be noted that we had an open line with the State

0830 to 1200 (Continued)

throughout the whole day from both Control Rooms and an open line to Region I of the NRC and that NRC inspectors were in both Units who had knowledge of the data and essentially did not object to our course of action and there was not a public concern. We did have at this time onsite readings in the area of 7 to 14 MR/hr. Additionally, accountability was completed during this period so we knew where all the site personnel were located. Our concern became to assure that the people in the designated assembly areas were not exposed to high readings and therefore, we decided to send people both on and offsite, except for the ones we needed, home. This would allow us to minimize the exposure of our own people and by this time we realized that the normal work day was not going to occur. Several times we sent personnel through the entire site including all buildings to assure that the site was evacuated. Additionally, throughout this period both Units were in and out of respirators and due to the high readings in Unit 1 we moved the ECS (Emergency Control Station) officially to the Unit 2 Control Room to minimize exposure of personnel. A review of the communications in effect at this time were:

1. All the required lines and communications in the Emergency Plan were fully in effect. Teams were constantly monitoring and sampling to assure public and Met-Ed personnel safety.
2. We had a direct line to the BRH starting at 7:30 to Mr. Gerusky and Margaret Reilly of that office.
3. Mr. Lee Rogers of B&W, starting at about 7:45 and intermittently thereafter was talking to the Lynchburg home office through himself and Mr. Greg Schaedel.

0830 to 1200 (Continued)

4. The NRC had a direct line in our Control Room to Mr. Don Haverkamp of the Region I office.
5. The Unit 2 Control Room also had a direct line to the BRH in Harrisburg.
6. The NRC had representatives in both Units Control Rooms.

NRC representatives onsite, from memory, personal logs or security logs as available today were: Mr. Neely, Mr. Galina, Mr. Nimitz, and I believe Mr. Higgins who arrived at approximately 10:10 in the morning. Approximately 10:34 in the morning, Mr. Smith and Mr. Baunack arrived. Approximately 10:30 RAP (NRC team) arrived with a plane or a helicopter, I am not sure. At approximately noon Mr. Stohr and Mr. Raymond were here and at 11:00 P.M. that night, Mr. Keimig was here. I might note that there seemed to be an abundance of the NRC from about noon on, and we were very careful to assure that we communicated with the NRC; they were very satisfied with the interface and provided us communication and advice as they could, but it was made very clear that the decision process and decision maker was the Licensee, that is me. One other entry of interest to the site that I could remember would be Mr. Syd Porter on the phone early in the day and as the magnitude of the situation became evident, he came to the site about 8:00 P.M. along with some HP techs., approximately 4, from the Salem plant.

1200 to 1430

Plant parameters remained about the same, again I insured HP Injection was maintained and additionally, the communications between myself and Senior persons in Management, plus the State and the NRC were increasing to a very high level during this period and the pressure was of an intense level and that the grasp of the situation and the seriousness was beginning to take hold on all of our people. I was directed to stop steaming because it was believed that I was releasing radioactive steam. I considered that steaming only the 'A' steam generator was satisfactory since I did not feel we were in fact releasing radioactivity through this path. I had been pressured to do this throughout the morning but I could not do this without a vacuum as I did not feel it was responsible to give up my heat sink which was needed to help assure the core was cooled, but I was making attempts to redraw vacuum and to secure that steaming. Eventually, I was directed to stop steaming, and I did. We did at that time, have some vacuum and were able to steam internally. It should be noted that we are designed to steam to atmosphere in this mode without a vacuum for this plant condition. Plant pressure came to about 440 psig at about 1430. Core flood tanks went down about a foot or foot and a half which to us indicated that we did have a high level in the core and this gave us some reassurance that the methods we had been employing were keeping the core covered. Additionally, I was directed to go to the Lieutenant Governor's office, and therefore I departed the site at approximately 1430 with as much information as I could about the incident. It should be noted that I returned to the site about 1600. Prior to leaving the site, I had seen the first response on the T_H and T_C

1200 to 1430 (Continued)

instrumentation. This seemed to occur when we pumped HP. heavier to the C injection leg and after the pressure was lowered to core flood ability. Since the response of the temperatures had occurred, this made us feel we had some natural circulation as both T_H and T_C indicated, coming close together. It should be noted that at approximately 1400 I heard a loud deep noise and at that time the Reactor Building spray pumps started. Subsequently to the events of this day I learned that was a 28 lb. pressure spike which occurred in the Reactor Building due to Hydrogen. Note that prior to my leaving for the Lieutenant Governor's office in Harrisburg, I had directed the steaming through the atmospheric valve be ceased and only be recommenced at my direction. Please note again that we had not seen any activity with a man and a meter onsite and I did not feel that we were releasing radioactive steam, and the steam generator samples indicated there was no contamination of the A steam generator. The emergency plan was fully in effect including offsite communications and we had full agreement with the State that there were, at the time, no offsite actions required based on our EPA guidelines, our past experience, and our Emergency Plan requirements. Please note that they consistently reviewed both the onsite and offsite readings throughout the entire period. Dick Dubiel did an excellent job of keeping us current, watching for wind shifts, discussing actions with the State in attempting to hold down the tremendous amount of communications and pressures to evacuate or to increase the severity of the incident beyond what we had seen at this time offsite.

1600 to 2000

The unit parameters remained essentially the same as described earlier. We did maintain our charging lineup through HPI and heavier to the (C) leg to maintain the A instrument response on temperature indicating better heat removal as we had earlier. This convinced us we had as much natural circulation as we could get to remove the heat from the core. We were additionally steaming the A steam generator to the condenser and with the temperature response, we did feel we were getting natural circulation and discharging a minimum amount of BWST water to the Reactor Building floor. Our concern still was that the unit was not in its final condition and that we would eventually run out of water in the BWST. At this time we were still hoping to get down to the decay heat point, or to get a solid water condition in the loop and start a reactor coolant pump.

Status of the Emergency Plan

We continued our on and offsite monitoring and at this time, we did see readings offsite of 2 to 3 MR/hr. while some onsite readings were 10 to 20 MR/hr. due to the wind dying with most readings 2 to 3 MR/hr. During the day we had a helicopter overhead giving us readings which was extremely helpful, and we had at one point during this period 10 MR/hr. above the Unit 1 Cooling Tower and 20 MR/hr. at 300 feet above the Reactor Building Unit 2. As the wind would stop during this period the readings would at points get as high as 70 MR/hr. and we were in respirators most of the time. I had Mr. Hitz, Shift Supervisor, conduct a tour of the Auxiliary Building with the operators and we did note that there was water backed up in the

1600 to 2000 (Continued)

Auxiliary Building sump. We reviewed the Environmental Protection Agency guidelines and we had not reached any of those which required evacuation or any public action and communication was still occurring and the State was reported to me to be in full agreement on this point. It is important to note that for the most part, I was given offsite readings of less than 1 MR/hr. except for a few indications above that level. At this time I felt that the public was being protected and that our major concern was to get the Unit to a safe condition and to stop the release.

17C0

Management (Jack Herbein and Bob Arnold) ordered me to commence taking the unit solid at a high perssure, and additionally, I had gotten work from Lynchburg to attempt to maintain 400 gpm HPI to assure core cooling and this was implemented at this time. I was at this time also attempting to get preparations underway to again start the reactor coolant pumps. During the day I had lost some vital switchgear which disabled the lift and backstop oil pumps for the reactor coolant pumps. During the afternoon we made various attempts to trouble shoot and reclose the necessary breakers to obtain power to these pumps. We had high exposure risk problems due to radiation levels in the building (Auxiliary Building) and I had to proceed very carefully to insure minimum or no injury to personnel and yet be timely to ready the RC pump for starting.

1930

We had available the DC (Direct Current) oil lift pumps and we attempted to start the 2A reactor coolant pump. I had selected 'A' loop due to the fact that its instruments had shown the most response on temperature and natural circulation and we thought that there might be water in the A loop and enough for the pump to be effective. The 2A pump did not start and we went over to the 1A reactor coolant pump using the DC oil pump and energized/bumped it and it did in fact run for 10 seconds. Pressures and temperatures responded immediately and it indicated coolant flow. We secured the pump, waited approximately 15 minutes in order to assure that we didn't harm the motor from an electrical standpoint. It is normally required to wait 15 minutes between starts due to the excessive starting currents these pumps experience and I did not want to damage it at this time since we needed it to assure flow and put the unit in a stable condition.

680 048

1945

I directed the Control Room to start the 1A Reactor Coolant pump, the pump started, ran and had flow indications, pressure dropped from 2000 to 1320 lbs., temperature equalized in all loops to 380^o, and the plant, for the first time appeared stable and we were convinced that we now had necessary flow and cooling to maintain the core. It should be noted that during this same period, that we were concerned about the release and some way to stop it, we inspected and troubleshot the Vent Header, which is very complicated, and we were laying poly on the floors over the water in an attempt to stop the evaporation or release that could be occurring from there. The highest readings, which I was given, offsite for the day for the information occurred at 2230, that is, 10:30 P. M. and that was at the Airport and these readings were 12 MR/hr. and at Kunkle School near the turnpike at 13 MR/hr.

This completes the sequence of events for this day of March 28th through 8 P. M. at night. By 8 P. M. I was still in charge of the Control Room but I was essentially under the direction of Senior Management and we had at this time an abundance of NRC people and observers and I spent many periods clearing the Control Room in order to maintain the calm atmosphere that was evident throughout the day.

680 049

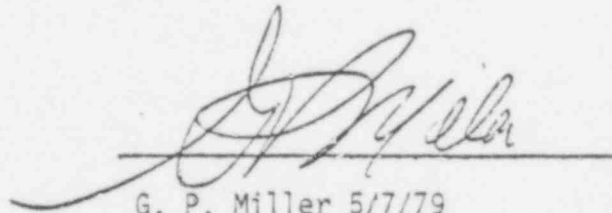
TMI 3-28-79
G. P. MILLER
STATEMENT

CONCLUSION

It should be noted that this emergency lasted for an extended period but the atmosphere within the Unit remained calm and professional. The response of all Met-Ed personnel was excellent and the courage of the operators, health physics and maintenance personnel was evident throughout the day and that there was not, during the entire time, a period of panic or unsureness within that Control Room.

I personally feel that we must suffer the public pressure and media distortion as we have, and that we should be criticized that we surely could have done better, but it is my hope that the full story and the calm decision making that did occur are eventually put before public attention, as I believe we minimized the exposure of the public, of our own people, and placed the plant in a stable condition and from a situation which none of us had been schooled in and which few of us, including myself, had probably never believed we would ever be in.

I left the Unit 2 Control Room at approximately 0300 3-29-79,



G. P. Miller 5/7/79
Manager, Generating Station-Nuclear

680 050