UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of:

IE TMI INVESTIGATION INTERVIEW

of

John Flint
Physics Test Coordinator, Unit 2

Trailer #203
NRC Investigation Site
TMI Nuclear Power Plant
Middletown, Pennsylvania

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NRC PERSONNEL:

Ed O'Connor

O'CONNOR: This is an interview with John Flint of B&W being interviewed by Ed O'Connor. The date is April 20, 1979. The time is approximately 15:50. John, would you briefly state when you came on site, what your role is at TMI, and pretty much what you saw as you entered the control room the morning of the 28th of March.

FLINT: My function onsite was to be physics test coordinator the Unit 2 startup. Previous to this I had been working on writing the Unit 2 startup report. At approximately 08:30 on the 28th of March, I arrived at the north gate to the Island only to be stopped due to security personnel restricting anyone from coming on the Island. During approximately the next 20 minutes to a half hour I attempted to have one of the security personnel contact the control room, and find out if my services were required. This is based on fact that I am familiar with the core physics of the Unit. At approximately 0900 permission was received for me to go on the Island. I immediately drove to Unit 2, entered through the Unit 2 search trailer and went directly to the control room. Upon entering the control room, I noticed the normal alarms were lit. The was printing out is normal after a turbine reactor trip. I also noticed that the emergency team or the radiation type of emergency was in attendance in the control room. In talks with the control room personnel, primarily, Bill Zewe, the shift supervisor, Ed Frederrick, control room operator, and Lee Rogers, B&W site representative, quickly established that conditions were abnormal for this type of

transient. In talking with these personnel and looking at the console indication in the computer print-out noted that the hot leg temperature for the primary system were in excess of 620 degrees, that the cold leg temperatures significantly varied from this, they were quite a little bit cooler. The pressure was low in the reactor coolant system. All the control rod were on the bottom. The indication for the source and intermediate range appeared to be normal for a shutdown condition. I did, however noticed the two blips on the recorders for the source of intermediate range. Ed Frederick informed me that they had thought at the time that they were going critical and that they had added boron. At this time I informed him that in all probabilities that was the not case that there had been a change in the leakage... Flux path from the reactor core to the detectives and it was not in fact a case of the reactor going critical again. Looking at the recorder that prints out the OTSG and reactor coolant temperatures on wide range 0 to 800 degrees, there were several temperatures that were reading from 770 to 800 degrees in the hot leg of the reactor coolant system. Since these thermocouples are not normally calibrated in that range, knew the temperature were high, but did not totally believe the indication. Ivan Porter the Met Ed I&C engineer showed me a set up were he was reading approximately 243 ohms, which converts to approximately 725°F on RTD that he set up specially opposite side of the control room. The talks with various personnel in the control room, Gary Miller, and the rest of the operations personnel informed me of the sequence of events that had led up to this position. At that time in talk with Ed Fredericks,

we were convinced that night that we in fact had a solid steam bubble in both loops of the hot legs. At this time I attempted to initiate the filling of steam generators to induce natural circulation or at least remove enough heat that would collapse the bubble sufficiently to run the reactor coolant pumps.

O'CONNOR: John, let me ask you a question at this point. You said that some time after you got there which was 9:00 you started to sense natural circulation. From that can I infer that the control room staff up to that time was not trying to establish natural circulation?

FLINT: There was some doublt at that time as to whether they were trying to establish natural circulation or not. They were filling the generation to some extent, but it wasn't clear that they were going to try to establish natural circulation.

O'CONNOR: That was not their goal?

FLINT: I didn't infer that at the time. I talked to several different people and I can't remember exactly who said what now. Some of them said they merely filling the generators to obtain a level in them and remove some heat. Others said they were doing -- try to induce, natural circulation, and some said that they were doing it in order to just

cool enough to try to run a full pump. I think most people this time did not believe that there was in fact super heated steam bubble in the hot legs.

O'CONNOR: And this is some time after 9:00.

FLINT: Sometime between 9:00 between approximately 9:00 and 9:30.

O'CONNOR: What was the control room staff trying to do at that time to re-establish some flow in the reactor coolant system.

FLINT: The operators reported to me that they had attempted to run the reactor coolant pumps, had seen a low current indication on the pump, had not observed any flow indication of any significant degree, and therefore had concluded that they were totally steam valve, or that the pumps were just sitting there and cavitating and not operating corectly.

O'CONNOR: Were they trying to increase plant pressure to prevent function cavity.

FLINT: Shortly after a period of time, there was an attempt to pressurize the system and to collapse the bubble that way. I explained to them at the time that if the temperature we were seeing were anywhere near true we could not in fact collapse the bubble. It would be in excess of

allowable pressures even if we gave the code safetys. The code safetys would lift before we could reach this pressure and the system itself was not designed for this pressure. The

O'CONNOR: That was because the steam bubble was super heated?

FLINT: That is correct.

O'CONNOR: So in summary you are saying that the temperature of the steam bubble was so hot that its saturation pressure was greater than set points for the code safetys and even if they charged the system up the code safetys would have lifted before they could have suppressed the bubble.

FLINT: That is correct, a rough approximation would be say in excess of 3 thousand lbs. And a code safety is set for less than 2400 lbs - 2500 right in that range. So there would be no way that we could have done it. About that time for approximately an hour and a half they were dumping out of the atmospheric dump on the A generator. We then received a call that stated the Governor requested that that valve be closed immediately the request was in the form that made it a demand. Gary Miller complied and was at that time was preparing to go talk with the Governor.

O'CONNOR: Do you recall why you were lifting the atmospheric dumps?

FLINT: We were using atmospheric dumps to try to steam the A generator remove enough heat that we could use it as a heat sink and collapse the bubble that way. Induce natural circu` tion.

O'CONNOR: The vacuum in the condenser was not available at that time?

FLINT: No. We had lost the auxiliary boiler and they were attempting to regain it I believe they gained one boiler porportioned time lost it and was quite some time before we got both boilers back.

O'CONNOR: What did you use as a the heat sink once the plant staff stopped dumping steam through the atmospheric dumps at the request of the Governor?

FLINT: Some of the heat removal was dumping through the electromatic relief valve into the building, some of it was taken away with the filling of the generators. About this time the level in the B generator was also increased. They did dump some down into the condenser on the bypass valves but that was not, you know in that portion of time it is a little difficult to remember exactly which sequence. That was their only method of heat removal at that time. Finally, verified that in fact that we could not collapse the bubble. The pressure was then reduced again. At that point in time it was tried to start the reduce

the pressure to the point where we could get down on the core flood tank. There was some concern that the core was not in fact covered. I felt that it was since the leakage flux as seen by the source range channels appeared to be in a normal range for a shutdown condition considering the length of time we had been shut down. However as a precaution, the pressure was reduced the core flood tanks then slowly came into the system and since we did not see a significant pressure change or rapid dropping of the core flood tank levels where they feed directly into the downcommer annulus or the reactor vessel itself, from that we presumed that in fact the core was covered and that we were essentially feeding in an either bypassing the core or just merely coming out of the core coming back through the legs and dumping out the pressurizer for cooling water. We were not getting anything up through the loops themselves. We did have a high pressure indication in the reactor building somewhere along this length of time. We had the alarm for containment isolation about this time there was a double thud at the time was not thought to be from the building. At least, I personally did not think it was from the containment building. I thought that it was the ventilation damper cycling it. It was very close to that sound. And since we had been in and out of respirators due to levels in the building, I just thought somebody had cycled the ventilation dampers again and related it to that. The reactor building spray pumps came on a normal actuation sequence for high pressure in the building. They were bypassed and later shut down. During this portion of time we finally managed to get the A leg temperature decreased to where we

could see the hot leg temperature on scale we the operator then elected to try to go over to anoter leg and collapse the B side and in doing so he lost the gain we had made on the A side. The A side hot leg again went off scale. Somewhere along in here we finally did see some changes of decrease where the hot leg was coming down. The cold leg temperatures were going up indicating that we were getting some type of heat transfer across there. Later in the afternoon we were requested to once again try to collapse the bubbles by increasing the pressure. Once again we tried to explain that we had tried that that morning gone to approximately 2,000 lbs and it had not work. That the temperatures at this time were still not significantly different from those earlier in the day but we could not persuade them that this could be done. Being unable to convince offsite personnel that the pressure increase would not collapse the bubble, we went ahead and increased pressure of approximately 2300 lbs charging with the makeup pumps. We gradually throttled back on one pump until we achieved this and held it for a considerable period of time. This did not collapse the bubble. However, by this time due to early indications of the whole leg temperature increasing and the hot leg temperature coming down the A loop, we felt that we had enough water around the pump at this time that we could run one of the A loop pumps. The A loop pumps were chosen for two reasons. One we had a better chance of establishing circulation there since that generator was not bogged up and No. 2 the pressurizer spray line comes off there which would give us mixing in the loop and help to bring the temperature down a little more rapidly plus allow us to get better

boron samples if we had to take them out of the pressurizer system. We bumped the reactor coolant pump 1A after trying to start the 2A and it did not start. We went to 1A ran it for approximately 10 seconds this was long enough to indicate to us that the current appeared to be in the normal range and that flow was in fact verified to be in the loop. We then shut the pump off, let it sit for approximately 15 minutes. The 15 minutes was based on the fact that during normal startup due to surge currents you do not want to start and stop the pump anymore frequently than this.

O'CONNOR: Excuse me John, why was the pump stopped after just a few seconds of running?

FLINT: We were not certain that what would happen was we would pull the steam bubble down into the pump and cause severe cavitation or possibly with a rapid pressure change and of mass density change fail the seals in the pump. We therefore just wanted to verify the moving water get some mixing once again turn that water over collapse the bubble a little further and then run the pump once we were verified that we felt we could do without any significant problems.

O'CONNOR: If you didn't have the, I withdraw that question.

FLINT: Since the pump had appeared to be normal. The pump was restarted and we saw the expected pressure decrease and flow rate that we expected. The pump current was normal at approximately 600 amps. The pressure decreased was due to the collapsing of the steam bubble and we saw the A loop temperatures on the hot leg come down and the cold leg temperatures going up indicating we did have flow and mixing across there. The smooth trace on the flow plus the pump current indicated we did not have any serious steam bubble problems in fact we were pumping primarily water if not entirely all water. That period of time the pump was left running to mix the system up. In this period of time we started drawing a vacuum on the condenser and were preparing to get the aux boilers back on line so we could start feeding back into the condenser normal method for cooldown. After a period of time we, fairly late in the evening by now, established the bubble in the pressurizer, we had brought the temperatures in the B loop down on scale and we were getting some small amount of circulation through the B side as well. One point that I did forget to mention earlier was that shortly after I came in we also started calling up on the computer the incore thermocouples attempting to establish what had happened in the core. Many of them were indicated question marks which indicated they were greater than their 700 degree range only one or two seemed to indicate there were in fact bad. These temperatures were monitored for the rest of the day during this portion of time to follow what was happening with the core.

O'CONNOR: John, does B&W, were you functioning as a B&W employee during this event, or were you just there providing advice.

FLINT: I was providing primarily there providing advice not as a B&W because I was still on master service's to GPU and felt that I was filling the role of advice and consultation to the customer from that standpoint. I was however interacting with Lee Rogers providing him with a physics parameters and...

O'CONNOR: Where was Lee?

FLINT: Lee was in the control room during all this portion of the time frequently he would be in the meetings with George Kunder, Gary Miller, Mike Ross, Bill Zewe and the rest of them establishing what they were going to do next what the conditions were. Well I was primarily working with the operators themselves monitoring parameters and helping them try to assess what the actual situation in the core in the primary system was.

O'CONNOR: I see. Was B&W in Lynchburg communicating with Lee Rogers?

FLINT: There was an open line to B&W Lynchburg on a continuous basis as well as an open line for the Nuclear Regulatory Commission to communicate with their personnel and open lines direct over to the observation center and to other personnel on the outside for advice from the GPU and Met Ed facilities.

O'CONNOR: Were you in a position to observe how the emergency plan was being carried out?

FLINT: During the portion of time that I was there it seemed to be extremely well organized, personnel knew what they were required to do, there was excellent communication between Unit 1 control room personnel which was set up as an emergency control center, the Unit 2 Control Room, the offsite personnel and I would say that all aux operators, NRC personnel, HP that were associated with this, were almost as if this was a drill rather than the real thing since they were functioning extremely smoothly during this course of time.

O'CONNOR: How would you describe the atmosphere in the control room during the period of time that you were there?

FLINT: I would say that the personnel were extremely calm and well organized. Late in the afternoon it had a tendency to get a little noisy in there when the immediate problems were over we have a large

number of personnel in the control room by this time we had a large number of NRC personnel, we had at least a shift and a half of personnel plus additional personnel from Unit 1 and so forth. It got a little noisy from that standpoint but it was still very well controlled and well organized.

O'CONNOR: People were not running around not knowing what to do. Or panicing?

FLINT: No, no panic, especially since frequently announcements were made over the page system to let all personnel know what was going on. Unnecessary personnel were released either to their homes or were mobilized over at the observation center for assistance if necessary. The only personnel that remained onsite were those that were absolutely required and since they were well informed of what was occurring and since most people were in either one of the two control rooms, there was no problem of people appearing not to know what they were doing.

O'CONNOR: Are there any other observations that you would like to get into the record?

FLINT: No. I do not believe I have any other observations or remarks concerning the incident.

O'CONNOR: Well, thank you very much John. Appreciate it.