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INTERVIEW of
HAROLD HARTMAN

5/22/79

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Recorded as Exhibit 1202 to NRC SIG.

Harriman Exhibit # 1202

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MARSH: The date is May 22, 1979. The time is 6:49 p.m. This is Bob Marsh, MARSH, and I'm and investigator with the U.S. Nuclear Regulatory Commission assigned to Region III, Chicago, Illinois. This evening we are located in Room 119, the Red Roof Inn, in Swatara, Pennsylvania. That's SWATARA, and we are here to conduct an interview of Mr. Hal W. Hartman, who is an ex-CRO for Met-Ed at the Three Mile Island site. At this time I'd like the other individuals in the room to identify themselves, to spell their last name, and to identify their position.

CRESWELL: This is James S. Creswell, CRESWELL. I'm a reactor inspector located at Region III.

FASANO: I am Anthony N. Fasano, FASANO. I am an Inspection Specialist out of Region I.

CRESWELL: I'd like to make a reference to Hal's first name being Harold Hartman.

MARSH: Thank you. Hal you indicated that you go by Hal even though your name is Harold, right.

HARTMAN: Right.

THIS IS A WORKING DOCUMENT AND THE INFORMATION PRESENTED IS AS RECEIVED. FURTHER [illegible] BE ACCURATE NOT TO BE DISSEMINATED [illegible] AND ACCURATE INFORMATION.

MARSH: Hal, before we turn the tape on we had sat here and discussed this two paged memo and I just want to make a few items in there a matter of the taped record. As I indicated the memo does cover the purpose and scope of our investigation and goes to some degree into the rights of the individual being interviewed. On the last page there's several questions which I just would like to get your response to on the tape and that is (1) do you understand the above which addresses the two page memo?

HARTMAN: Yes.

MARSH: The second question reads, do we have your permission to tape this interview?

HARTMAN: Yes.

MARSH: And thirdly, it says do you want a copy of the tape?

HARTMAN: Yes.

MARSH: Fine. On the tape I will get you a copy of this tape probably tomorrow and I will get a copy of the transcript when its available mailed out to you so you have that also. There's a fourth question covered in the body of the text that does not pertain specifically to you, but it accresses the individuals rights. We can advise by it if

you so want, and that indicates that for the Met-Ed employees in that if they so desire, they could have a union representative or a Met-Ed representative present. I think you've indicated that you did not, but can I get your response now?

HARTMAN: I waive my right have any...

MARSH: Fine. Thank you. Hal, to get going with, we'd appreciate it very much if you could give us some words regarding your background, you association with the nuclear field, and your experiences with Met-Ed. I'd also like to include the dates that you went to work for Met-Ed and the date that you separated.

HARTMAN: I started my nuclear career in the United States Navy. I went to basic nuclear power school in Bainbridge, Maryland. I graduated in the top quarter of my class there. I went to West Milton S3G prototype in West Milton, New York. I was then transferred to the Woodrow Wilson. I served aboard her 2 1/2 years. I was transferred to the U.S.S. T_____ who was in overhaul in Pearl Harbor Naval Ship Yard. I was separated from the navy in November '73. I started work with Met-Ed, January of 1974. I believe it was the 28th. I was hired there as an auxiliary operator. I went through six months of technical training on the operations, systems, and technical training, some reactor theory about Babcock and Wilcox reactor plants. I spent 2 1/2 years as an auxiliary operator and was promoted to Unit 2 control room operator in

September of 1976. I attended the 8 week cold licensing program at Lynchburg, Virginia, the simulator training. I graduated there No. 1 out of 6 and in October of 1977 I passed the requirements for a Nuclear Regulatory Commission operators license. From October of '77 until April 13 I served in the capacity as a licensed control room operator in Unit 2 and I resigned my employment as of April 13, 1978, 1979. And that's about it.

CRESWELL: Hal, I wonder if you could go back to the time of March 28, 1979 and tell us briefly when you got on shift and what went on as you got on shift.

HARTMAN: This is gonna be amusing because I was in Lynchburg, Virginia at the one week reactor operation training course down there. So I was in Lynchburg on the morning of the 28th. I guess, well I woke up about 7:00 that morning and my shift foreman came over and said that his girl said Unit 2's down. The safety's were blowing for a couple of hours. I thought that was rather odd since they should never blow that long. And through the course of the day we just gathered bits and pieces of information as it went by, as they became available to us down there. Mostly from B&W people. In fact, we had a shift supervisor, Bernie Smith, he was there with us at the time my supervisor of operations in Unit 2, Jim Floyd was there, at the time and I guess later in the day when they figured things weren't so hectic, they called up and got a little bit more technical information as to what happened. And the way

I understood it at that time was that they had a reactor...a loss of feedwater to both steam generators...and for some reason they didn't have auxiliary feed. Now we didn't know the real reasons why they didn't have auxiliary feed when the pumps failed to start, or we didn't really know. So the rest of the day was then just spent simulating the accident, trying to see exactly what happened. We had several parameters that we knew happened, the pressure excursion in the primary system. They assumed that they had maybe one tube, had ruptured, it separated in the tube sheet on the B steam generator, because that's where the activity came from, that they knew was released at that time. We just, basically then, well, Jim Floyd and Bernie Smith, they left Thursday in the afternoon. They took a plane out and came back to the site and they left myself and the two other operators and the shift foreman down there just to continue with the training. And really the only information we got back then was either from the news papers, the television, or what we could get from Babcock and Wilcox and they didn't want to admit too much. Especially about fuel damage and any design deficiencies that may have been present or have thought may have been a cause of the accident. I got back from Lynchburg on Friday and I didn't really find too much out then. But I did hand in my resignation that day, it was the 31st of March. Or the 30th of March, excuse me, it was a Friday. And I went in to work then the next Wednesday and basically the accident was over. They were still in a state of general emergency according to the radiation, emergency plans. And my duties there were, I was only

there for three days from the time the accident happened until I resigned. The three days that I spent there were basically a data taker, a log keeper, and such as that. I didn't really get into the operation of the plant.

CRESWELL: Okay, Hal. Who was your shift foreman that was with you up there on the...

HARTMAN: It was Dick Hoyt.

CRESWELL: Dick Hoyt?

HARTMAN: Dick Hoyt is my shift foreman, yes.

CRESWELL: Do you recollect who the other CROs were there?

HARTMAN: Yeah. Ray Boyer and he's a licensed CRO, and John Blessing, he is a trainee.

CRESWELL: Now you, if I recollect properly, learned of the event through your shift foreman...

HARTMAN: Yes, who had learned through a phone call from his girlfriend.

CRESWELL: His girlfriend where was she located?

HARTMAN: Well, I didn't really get that personal with Dick, but to the best of my recollection he was dating a guard. It was a Gregg guard. Or...

CRESWELL: Gregg's Security?

HARTMAN: Gregg Security. And I'm not sure if she was on that evening or what. Her information may have been second hand, I don't know.

MARSH: I think that was the point as to whether she just lived in the area or...

HARTMAN: Yeah. She lived in Mount Gretna. As best as I can remember she lived in Mount Gretna which is a small mount community about 10 miles from the site, I believe.

MARSH: But also employed in and around the site, right.

HARTMAN: Yes.

CRESWELL: Okay. Now basically at that point in time was, is it a fair characterization that the information was restricted to the relief, the safety relief valves blowing for a substantial period of time?

HARTMAN: Yeah. At that time when she said that the safeties had blown for two hours and it raised a question in my mind that the safties, they couldn't have blown for two hours unless something was really wrong. The reactor would have had to stay at power in order for those things to blow.

CRESWELL: Okay.

HARTMAN: So there's no two ways about it.

CRESWELL: So you...

HARTMAN: So I assumed that they were the atmospheric relief valves. Now I, the atmospheric dump valves, yeah. I really didn't know the circumstances which opened. I knew how they could open, but I really didn't know the specifics on why they opened on the morning of the 28th.

CRESWELL: Okay. What happens after, are you at breakfast eating when you found this out or..

HARTMAN: No. We just got, we were in the motel room.

CRESWELL: Oh, you were in the motel room.

HARTMAN: Um um.

CRESWELL: Okay. So then what do you do? You go on into work...

HARTMAN: Yeah. We went in, we went right into the training center there.

CRESWELL: On Old Forest Road. Does Jim Floyd try to get in touch with the plant or anything at that point in time?

HARTMAN: I really can't remember. I know, I think he did. But the information, yeah, as a matter of fact he did. He called up and he got, he was really interested in finding out some of the parameters, some of the things, some of the events, the sequences of the event, some of the readings that they were getting on the radiation monitors, and some primary and secondary chemistry analyses so that we could simulate it, so that we could see if we could simulate it, see some of the transients that took place. They had said that the pressurizer went solid. They said that the primary system pressure went up above the safety limit. At the time we didn't know that the pressurizer relief valve, electromatic, I guess it was, it was stuck. I don't even know at this time, to this date. I just assume that it was the electromatic relief valve. We didn't know that until I think it was Thursday morning we finally simulated that the valve actually failed opened.

FASANO: This is Fasano speaking. Hal, you did mention that, in the conversation and the information that came to you on the first day, that you knew that the aux feed was not feeding. Were you told that over the phone?

HARTMAN: Yeah. They had said that the auxiliary feed, they didn't get it into the generators at the initial point. We didn't at that time, we didn't know how the feed was stopped. We didn't know whether it was a malfunction of the pumps, the piping, or valves. We really know what the cause was.

FASANO: Do you know what valves they were talking about?

HARTMAN: Absolutely. I checked those every time I come on shift.

FASANO: Why?

HARTMAN: They're important. And I is they're always doing surveillance. They do a monthly surveillance on each one of those three pumps when we're at power. In fact, they have to do a once a month in mode 1 or above and I know that those two valves had to be shut in order to do the surveillance so that they didn't feed the water through the air operated regulating valves into the generators.

CRESWELL: This is Jim Creswell again. Have you ever found those valves closed before?

HARTMAN: Yes.

CRESWELL: How many times?

HARTMAN: Once, that I can remember.

CRESWELL: Why was it, why were they closed?

HARTMAN: I can't recall why they were closed. I asked my foreman, when I found them closed, I asked my foreman if this was a general procedure that I follow, I asked him do you know why the EFV 12 valves are shut. He said no, I don't. I said okay, Dick, I'm gonna open them, and then I opened them and everything lets loose.

CRESWELL: The foreman's name is...

HARTMAN: Dick Hoyt.

CRESWELL: Dick Hoyt. Do your recollect when this happened?

HARTMAN: There were so many things that, there were so many things to recollect, I really can't even put a time frame on it. I really don't know.

CRESWELL: Would it be like weeks before the event?

HARTMAN: Yes. It would have been weeks. Maybe, perhaps months.

CRESWELL: Okay.

HARTMAN: Several months.

CRESWELL: Okay. But as far as you know it, there's not a practice of leaving those valves closed for a specific reason? You know of no reason?

HARTMAN: No. None whatsoever except that the surveillance procedure calls for them to be shut when the actual test is being conducted.

CRESWELL: Do you know if that was reported to the NRC that those valves were shut?

HARTMAN: No, I do not.

CRESWELL: Do you know if the unit was operating at power when that happened?

HARTMAN: I can't recall that either.

CRESWELL: Okay.

HARTMAN: But it doesn't make any difference, in Mode 4 they're required.

CRESWELL: Okay. Getting back to the sequence of the event, the time sequence of that day, you went on into the B&W facility on Old Forest Road in Lynchburg and you started simulating the event on the simulator and I guess all of you were in the simulator at that...

HARTMAN: Well, it was, they kind of pushed us aside, really. And every once in a while if we get a break, we had some classroom training when they were running this and the three CRO's, in fact, it was the three CRO's, well myself, and two other guys, and Dick Hoyt, the foreman. We spent most of the morning in class while they ran the tests...

CRESWELL: When you say they...

HARTMAN: Jim Floyd, Bernie Smith, there was one or two other instructors, I know then later there was some of the big wheels down there from B&W that were on the test site, I don't know their names. But I guess they conducted tests from like 10:00 in the morning when they got the information that they needed until probably 2:00 in the afternoon.

CRESWELL: Okay. What basically was the information that they were using when they started at 10:00 in the morning? Did you run down through it?

HARTMAN: Loss of both feed pumps caused by low suction pressure and that caused a high pressure reactor trip and they said that 8 minutes later they got emergency feed. So that's when we simulated turning on the emergency feed pumps. It was 8 minutes into the accident. We also simulated, we also assumed, we didn't get this I don't believe we got this from any information that was sent down that morning, but we knew that the pressurizer was on continuous spray to equalize boron or to keep boron in the pressurizer and the RCS equalized.

CRESWELL: And that was the because of the leaking valves on the pressurizer?

HARTMAN: The leaking pressurizer code safeties.

CRESWELL: The safety valves.

MARSH: Excuse me. Have you nodded in affirmation to that statment, right?

HARTMAN: Yes, yes.

FASANO: Hal, you knew that the code safeties were leaking, I mean...

HARTMAN: Absolutely. They were leaking, I know for at least 3 months before the accident.

FASANO: Now, my understanding the electromotive, the electromatic, was the main cause of leakage prior to the event. Now this is a little different so...

MARSH: Well, this is his understanding.

FASANO: I understand...I just wondered where he gets his information.

HARTMAN: I can look at the computer. They have an analog value of the temperatures at the outlets of these valves.

FASANO: These would be the thermocouples?

HARTMAN: Right. The thermocouples downstream. The electromatic relief valve was the lowest of the three and it had been for 3 months. The other two would kind of weep up and down and they would sometimes maybe every once in a while you'd see them above 200 degrees, but most of the time they stayed between 150 and maybe 120 which before they started leaking they were always down around 100, 105. I know for a fact a leak rate is required every 3 days. That leak rate had to be fudged every time we got, just about everytime that we got it, we had to do something to make it right. We as control room operators on my shift, I know, we kept asking what are you gonna do about these valves. They're leaking. We can't get a leak rate out of the computer. We can hardly even do a hand calculation and have it come out right. We don't have to maybe go look at something. It was just a bad situation. I didn't like it.

CRESWELL: Let me ask you this. Who did you inform?

HARTMAN: This would be Dick Hoyt knew about it. I know Bernie Smith knew about it, and every other shift supervisor and shift foreman and control room operator that operated the plant in the previous 3 months had to know about it.

CRESWELL: Now you said that you felt that the figures were inaccurate. What other evidence did you have?

HARTMAN: I mentioned that when we simulated the accident we simulated it down at the simulator with the spray valve open and the pressurizer heaters on. And the reason that I know that this, relief valves, were leaking was the fact that if you turned the spray valve off and put the spray system back in its automatic mode that you'd have a continuous rod motion in which indicated that the plant was decorating. When you turn the spray back on and recirculated the pressurizer, force that borated water that was in there back into the primary system the rods would move out.

CRESWELL: Okay,...

HARTMAN: We fought that for 3 months. I hated it. Every minute of it.

CRESWELL: So this was a substantial boron change that you were getting in system.

HARTMAN: Absolutely.

CRESWELL: Due to distillation in the pressurizer.

HARTMAN: Right.

CRESWELL: Okay. So we should be able to look like at the power range charts or the rod positions. Probably rod positions.

HARTMAN: This was during the early days. You know there's a lot of people up there, a lot of, I consider, top notch operators. But when sometimes it comes down to the basics of knowing what happens, you know, they really, they look for the complicated picture a lot of times. They don't go back to the basics. I picked up how to operate this system right off the bat. You just put it in automatic and you leave it there. If something happens, ...or not in auto I mean you put it into manual...and you just let it continuously recirc that way you have no boron change to worry about except normal leakage, maybe you have to add some demin water for fuel burnout just to bring the rods back in a little bit for control. A lot of the operators didn't understand that and they'd get themselves in trouble with all the rods out at 98% power or they get them down in too far so that you get close to the rod index curves and I don't know...

CRESWELL: Let me ask you this, Hal. Regarding the reactor coolant drain tank, the leakage from those valves could go into the reactor coolant drain tank.

HARTMAN: That's correct.

CRESWELL: Now if there was excess leakage it would require frequent startup of the transfer pumps. Correct?

HARTMAN: That's correct.

CRESWELL: Was that an operation that you customarily go through?

HARTMAN: Since the relief valves were leaking I can remember, and there of late we had to pump it at least 4 times a shift.

CRESWELL: Okay.

HARTMAN: And that was, I can't even remember the number. We pump it for about 5 minutes and it was probably 100 gallons per minute. So probably a total of 500 gallons each time.

CRESWELL: Or 2000 gallons per 8 hour shift?

HARTMAN: Right. In fact, I took a backlook at the logs from the time that we started to have to add water into the makeup tank to keep RCS inventory. And at one time I can remember they would pump 3000 gallons of demin water a day. Now that is your information. You can get that right out of the control room operators log to verify that. I even, you know, they, the people that I had to report to didn't even understand the seriousness and I believe that that was a serious problem.

CRESWELL: In what way?

HARTMAN: Control wise, because everybody had a different way of controlling. One time I would come in and the spray would be on automatic building up boron in the pressurizer. Pretty soon I'd end up with my rods at the index limit. Now, where's my boron in the RCS? I don't know. Now, what do I have to do to get the rods out? Well, I can only assume that the boron is in the pressurizer and manually spray. How long it was there, the only thing I can do is go back to the log. If the records were kept accurately, then I could make a pretty good judge of, you know, whether my rods were gonna go out the top or whether I was gonna have to add some demin water to keep them in.

CRESWELL: Well, let me ask you this, Hal. Could ask for a sample on the pressurizer and ask for a sample on letdown, would that help?

HARTMAN: Yeah. I'm not sure how often those samples were taken. I know they were taken at some interval and I believe it was once a week. And I can remember at one time a sample came back and it was 100 and, well to the best of my knowledge, it was around 120. Difference between pressurizer boron...

CRESWELL: 120 ppm difference between the pressurizer and the reactor?

HARTMAN: Right, between pressurizer and reactor. And if I remember correctly, that was with continuous spray. After a while we had gotten to the point where everybody was kind of operating the pressurizer spray system in a, I don't want to say it, a coordinated fashion, where everybody kind of did it the same that you could know where you were at, how to operate it.

CRESWELL: What brought about this consistancy of operation?

HARTMAN: Well, I did a lot of screaming.

CRESWELL: Do you have any indication that management beyond operations was informed or knew about this problem?

HARTMAN: Oh, they had to. My supervisor, Bernie Smith, would, he would make a reminder to all the operators on our shift, the operator that had the panel, the console that day, hey, don't forget to spray

the pressure and don't forget to recirc the pressurizer for at least a couple of hours. And one of the operators, Ray Soyer, he always just liked to put it on recirc for a couple of hours and then take it off. And maybe he'd do that two times a shift and everytime he did it he would end up with rods out. And, you know, it wasn't really funny but then again you kind of had to laugh at the guy because he was ignorant. He didn't you know, I don't like to make any bones about the way a fellow operates but...

CRESWELL: Let me ask you this. Why wouldn't management have shut down and repaired those leaking valves?

HARTMAN: My impression of Met-Ed management was number one, they put the reactor into commercial operation before it was ready. It was so obvious I could run down a list, and maybe I will later, I don't know. I'll run down a list of problems, design deficiencies, that really they should have never gone up with them. They should it even have, never have, attempted to up with them.

CRESWELL: Let's go into that list, let's go down.

HARTMAN: Right now? Okay.

CRESWELL: Just take you time and we'll give you plenty of time to think.

HARTMAN: We started power operations back in, well I won't say power operations, maybe we did too, back about a year, almost a year before, back in March, I believe we made initial criticality. We did the low power physics testing and I believe we escalated to 15 or 20% power. No, I take that back. We got up to 40% when we had the safety valve problems. There was one of the biggest design deficiencies that cost them millions of dollars for that job. And to me it was just misdesign.

CRESWELL: That was when they replaced the Lonergan valves with the Dresser...

HARTMAN: Dresser...

CRESWELL: Dresser valves.

HARTMAN: Dresser valves. The concensate polishing system. It was a nightmare. They didn't have an automatic bypass. If you lost instrument air, all 8 discharge valves from the polisher vessels would fail closed. If that happens the booster pumps loses suction pressure, they trip, they cause the feed pumps to lose suction pressure and they trip. Seven vessels is normally all we were designed to operate with. Okay, you could operate with 8 but that's bad engineering practice. Seven vessels could hardly take the load at 98% power let along 100. The condensate reject valve which was located between the condensate booster pump suction and the polishers, if it would cycle because of a high

hotwell level, if we are...or a low hotwell level...if it would cycle open because of a low hotwell level, it would starve the boostar pumps of water that they desperately needed to pump and a boostar pump would trip on low suction pressure, taking a feed pump along with it. This really wasn't too evicent until we got up to, to higher power levels, when two feed pumps were really required to supply all of the feed flow. Whenever the turbine bypass valves, I can't remember the numbers...23 A & B, 24 A & B I believe they are...whenever those valves open on a transient, say we had it in a trip, and the bypass valves would open...dump steam into the condenser ...hotwell level indication would fail low. It would also cause the controller that controls the normal and the emergency makeup valves to see a low level and those valves would fail open, or they would go open thinking that there was a low level. Now the operator at this time saw less than 10 inches in the hotwell and I don't know how many of the other operators realized this, but when I see less than 10 inches in the hotwell and I've got 3 pumps setting there sucking at 1,000 horsepower apiece, I am very concerned about that-equipment damage. So I would watch the hotwell level, it just would stay low. It was horrible. And I would watch the amps on the on the pump, and watch the discharge pressure. That way I could tell if the level was actually low then. That was, yeah. Other than I knew the indicator said less than 10, I can only believe my indication, but I also realized the necessity for condensate flow during a transient like this. So I was a little hesitant to cut the pumps off at that particular point.

CRESWELL: That was the indication you had of hotwell level was the absence... that the condensate pump won't run. Turn the pump off? If you lost the condensate flow, you would trip the main feed pump?

HARTMAN: Trip the booster pumps on low suction pressure trips the feed pumps.

CRESWELL: So, you got a loss of feedwater event?

HARTMAN: Right.

FASANO: How many of these did you have?

HARTMAN: I can remember for sure 2 times. I don't know the exact dates. It was during one of the many trips they had there. Well, I wasn't really on them but I was a bystander. I was on dayshift. I was probably on the lead shift or training shift or something when they had a trip and I ran up to the panel to see what I could do. Then I saw it. But then see, the next problem is with that, I mentioned that the normal and emergency makeup valves saw that low level. They would open and they would dump tons of water in the condensor. Now, the actual level is going high. Now, if it gets too high, vacuum pumps. You also use all that space that normally was vacuum, is now water, and any steam that you've got coming into the thing, it covers tubes, you can't condense the steam as well. So what happens? The vacuum, pow. You lose vacuum, atmospheric dump valves open!

CRESWELL: What about them?

HARTMAN: If you got OSTG tube leaks, you're in bad shape.

CRESWELL: Have they operated properly, the atmospheric dumps?

HARTMAN: The only time I ever remember those things operating, we had just gotten off shift at 3:00. At 3:30, the oncoming shift had a trip and they lost, I don't know how they lost vacuum. Maybe they lost dirt water. I think it was one of the same type transients I just described with the emergency makeup. They just lost vacuum because of a high level in the hotwell and the atmospheric dump valves opened and just if there was anybody down in that room, they would have been PAR boiled, they totally wiped out the pressurizer heater cabinets with steam. Steam was noted to have escaped through the area where they are located. I guess that was called the M20 area. Through the piping holes in the concrete structure down over into the control building area and it went as high as the control room floor, back into the instrument shop. They had steam from the bellows rupturing on the discharge of that valve.

FASANO: Both bellows ruptured or one bellow?

HARTMAN: One that I can recall. I know that one bellows did rupture. I can't recall, I don't think the other one did, but they replaced it with one of the similar design to the other one.

FASANO. Okay. Other equipment problems?

HARTMAN: Main steam line supports. Two years ago I can remember somebody coming up to me and saying I don't want to be around when they trip the turbine from 100% with the restraint system that they have on those pipes. You'll have steam, pipes and lagging everywhere if that turbine trips. I don't really know, I know we went up, we heated up so we did have saturated steam in those pipes before the restraints were put in. I believe those restraints were put in during the relief valve outage when we replaced all the relief valve, they redesigned the pipe hangers and snubber arrangement down there on those. (i) I'm not too hot on Burns and Rowe because they never designed a pressurized water reactor plant, they only ever designed boiling water reactors which is obvious because of the 5 foot concrete wall between the turbine building and the control room. I don't know. Did you ever notice that?

FASANO: There is a, okay, you're talking about where the fire door is between the turbine building and the...

HARTMAN: And the control building, yeah, where they are.

CRESWELL: I've often wondered about that wall that's, not the wall between those two buildings but if you'll notice there's a wall that comes down in that hallway where that door opens up and its separated from the floor by an inch to 2 inches.

HARTMAN: Yeah, I've seen that. I never really wondered why that was there but I just kind of chalked it up to the rest of the crazy things I saw.

CRESWELL: Okay. What about the engineered safety features equipment itself? The high pressure injection pumps, where there ever any problems with them?

HARTMAN: No. I can't really recall any problems with those. Unit 2's kind of lucked out. We hadn't burned any up. Unit 1 went through 4 of them, I guess, before they learned their lesson.

CRESWELL: I understand the suction switches, low suction switches have been taken off those pumps.

HARTMAN: That's correct. They used to have a 3 pound low suction pressure trip on them, I believe. I don't really remember too much that far back, but I knew that I didn't like that particular thing because a lot of times you would start the pump up and it would trip right away because of the low suction pressure. It also had a low discharge pressure. No, no it didn't. It just had a low discharge pressure alarm that I can remember. No, those pumps, everytime I've operated them I never really had any problems with them.

FASANO: Sounds like most of your design deficiencies are concentrated on the balance of plant on the secondary side at least, were there any on the, I mean about, are there any more you that you have in mind? Can you continue on you list? And if indeed on the NSS side?

HARTMAN: Well, the whole nuclear steam supply system, in fact the whole plant was designed for a place down in New Jersey. So in order to accomodate fuel handling buildings they had to take and rotate the reactor building, the guts of the reactor building, the inside part, 90 degrees. So that you could go into the reactor building and look at the wall and you'd have another 150 foot of pipe running around the outer edge of the walls that should have never been there. It should have gone straight out but I can't help but think that because of trying to, having a plant on the drawing board 15 years ago for Forked River, New Jersey, and then just take and modifing those plans, bringing them to Three Mile Island and constructing a power plant of that complexity that things aren't going to be wrong. You know, there are definitely going to be design deficiencies. Somebody that designed the system, somebody else is gonna come along and change it to fit TMI. One thing that I have...that I never really had close contact with, I know that the auxiliary operators, just because they were out in the plant, they had a close contact with it, was the fact that they had extension controls that went through the wall and they had clutches that operated the valve behind a concrete wall for radiation. Those each limit, limiting type thing. And most of the time the valves would never

operate, so you'd have to go through these, back into the valve alley to operate the valve anyway and you had to spend anywhere from 2 to 3 times as much time in the valve alley, crawling over all these extension controls that were in your way that, you know, the poor guy would end up getting three times as much radiation than he should have.

CRESWELL: Is this a wide spread problem or an isolated problem?

HARTMAN: This is wide spread. Especially at filter rooms, the makeup valve suction alley, the discharge alley and the 305 valve alley.

CRESWELL: Those are only high radiation areas during operation?

HARTMAN: Yes. Now I'm not sure, I know the levels were creeping up there in the later days of power operation. I know they were climbing up there and there were still valves in there that had to be operated for surveillance procedures, valve lineups and the like. Filter rooms is the same way only the filter rooms, you can't get into them.

CRESWELL: Do you recollect a trip that occurred back in around November 3rd, November 4th of 1978, a loss of feedwater type of trip? This is where an instrument technician threw the wrong switch and in condensate polishing system, all feedwater was lost. Do you remember any of the details of that event?

MARSH: You were nodding in affirmation, were you not?

HARTMAN: Yes, I was. I remembered. I'm trying to think. I have to reprogram myself, here. I have got to get back into that. I've been through two total loss of feedwaters.

CRESWELL: Here?

HARTMAN: Yes. One was at zero power or very low power and the other one was at 20% power. And I really don't remember too many of the details. I do know that the switch that the guy threw was control power for all of the valves in the condensate polishing system that made them shut cutting off all condensate flow path.

CRESWELL: Do you remember any operators on shift discussing that with you, hearing anything about it?

HARTMAN: Well, I remember, they had the LER that was circulating and they had a synopsis of the event that we read in. We had to sign and initial.

CRESWELL: Well, this particular event that I'm speaking of, I don't believe there was an LER generated.

HARTMAN: I see.

CRESWELL: There was one November 7th that was a loss of one feed pump, but that was with the run back. Okay. At this point in time we're getting very close to the end of the tape, so we'll break right here and continue with a new tape.

MARSH: Time is 7:32. I'm gonna break at this point and turn the tape over.

MARSH: Resuming at this time, the time is 7:33.

CRESWELL: Okay. What about you training at Three Mile Island Unit 2, how's that been?

HARTMAN: I hate to say this but I'm gonna have to. They train, my training I thought was very well done. They put us through a pretty comprehensive program, the 8 weeks at Lynchburg, plus we had lots of time to ourselves just constructing the plant when things weren't very busy. We could get out into the plant trace systems and alike. We went through a mock NRC test that was given by a General Physics, the walk around and the test And then we had the actual test. We had a lot of prelicensing training that I thought was a big help. Onshift we had several lectures. They weren't always done as planned but we did get in some training onshift. The guy would take a system and give everybody on the shift a lecture about it. But the licensed operators that have

come on since the cold licensing groups, since the initial group of operators that went up, those operators are trained to take an NRC examination. They are not trained to operate the plant. They have copies of NRC tests, the questions, you know. They're...

CRESWELL: Hal, let me ask you this. You stated that general physics conducted a dry run of the licensees. Do you find that the NRC exams are predictible, the way the test will be conducted?

HARTMAN: Yeah. I think they are fairly well predictible. TMI has got an excellent record. I don't know the records of any of the other operating plants. But I do know that TMI's record is good. I don't think we've had but one failure and that was in Unit 1. We've had several senior operators that went up for a senior's license but did fail the senior part but got a reactor operators license. And, you know, I can just say that I feel that this operating record is indicative of knowing what to expect. They can build up on it. If they know that a certain examiner is going to come, they can dig out all his old tests, they can, we have old interviews that somebody might have snuck a little tape recorder in their pocket and taped the entire walk around and you can get the tape conversations of those. I've seen those flying around.

MARSH: Have you actually seen a tape or heard a tape before this was done, or just transcripts thereof?

HARTMAN: I've just seen transcripts, no tapes. In fact, I don't even know of anybody at Three Mile Island making a tape.

CRESWELL: Do you know what the source of the tape was?

HARTMAN: I do know this, I know that it was a Babcock and Wilcox reactor.

CRESWELL: Okay.

HARTMAN: And it was a specific examiner. I can't even remember his name. No, I wouldn't even begin to attempt to remember his name. I don't remember.

CRESWELL: One interview, it was one interview that you had heard of?

HARTMAN: I think there was one, one for sure, maybe two.

CRESWELL: Okay.

MARSH: Where would I look if I wanted to find a set of those? Who would be my best shot that I could talk to?

HARTMAN: I threw all my old stuff away.

MARSH: You had had a set of them?

HARTMAN: I had a set at one time.

CRESWELL: Did you receive those through your employment at Three Mile Island?

HARTMAN: Yeah. I can't recall who I got them from. I can't remember if it was the training department, which I don't think it was. I think it was one of the other operators and he might have gotten it from training.

MARSH: Okay. If you have any additional recollections on those, I'd appreciate you get in touch with me. I'll give you a card and a phone number and all that where you can reach me.

HARTMAN: Yes.

CRESWELL: You mentioned before you'd come on shift and found those twelve valves shut before. What about, have you done your lineup on your panel before and found other valve mislineups?

HARTMAN: I came in one day, this is just an example of some of the things that I've had to come into. Met-Ed was always famous for performing an evolution 20 minutes before shift relief. Turning the plant over in total chaos. I hated to turn the plant over that way myself and I more than hated receiving a plant like that. I came in one day to relieve the shift that had had a trip and I can't recall the exact, what happened, but I know that there was an operator was trying to control pressurizer level with MUV 16B. Now that's a high pressure injection valve on the A loop. He was throttling this valve, pressurizer level would go up, he would close it, it would come back down again, and he would just keep doing this. And I asked him, "what are you doing?" He said, "I'm maintaining pressurizer level." I said, "what happened to the normal?" "I don't know, it just doesn't work.". And he went over to the pneumatic controller for MUV 17 and he showed me, nothing happened. I said "did you check MUV 18?" That's the manual isolation to 17.

CRESWELL: You're indicating something there...

HARTMAN: I'm indicating that I pointed to MUV 18 and that valve was in fact shut. And he says, "Ah," and other explicitives. And you know, I says you gotta wake up. I said you can't operate a plant this way. I came in another time. Now, I wasn't really taking over the shift but we were walking out the passage way coming in from Unit 1 which is normally the way we came in and every once in a while we'd hear a

safety go. And it would go for maybe 30 seconds then it would reseat. We'd walk a little further and it, pow, went again. What are they doing up there? I was with another CRO, we were just about ready to take the shift. I don't know. They're not testing them. I thought we were at power. You know, what would they be testing them now for? We got up there and what had happened was they lost feedwater, pressure in the steam generators went down to the point where they actuated in the feedwater latching system which cuts off all feed to the generators from the normal feedwater pumps, and it also shuts MSV 4A, B, 7A, and B, which are the main steam isolation valves. The sensing point for turbine header pressure which controls the turbine bypass valves is downstream of the MSV 4's and 7's. They restored normal feed, but they forgot to open the MSV 4's and 7's. So that the turbine bypass valves were seeing 750 pounds pressure and the turbine, the relief valves in the steam generators were seeing 1050, 1060. So everytime they tried to control pressure with the bypass valves, they had those in manual, they would close them down because they'd see pressure was starting to decrease, in closing down the pressure would come back up again and poof. It wasn't two minutes into the shift and Ray Boyer, the guy that was taking the panel sa'd, "what are you trying to do?" He said, "you're blowing safties out there." "But we can't control pressure enough. And look at header pressure. It's down low." Right next to it is OTSG pressure. It was 1050. He says, "Man, what's the difference here." And he looked up and the MSV 4's and 7's were shut. He says,

"crack those valves." They cracked the valves, they closed the turbine bypass valves, put them in automatic and the thing came right on up 832 885. Now these are trained operators. I don't like to say that my shift was the best but, you know, I think we were.

CRESWELL: Let me ask you this. What are the difficulties that you encounter in operating a plant of this design?

HARTMAN: Feedwater is very sensitive. It, I don't know. I don't want to say that feedwater is sensitive. When you move 11 million pounds of water an hour, that, needless to say, is going to be touchy, you know, whatever its just that a slight change in flow is gonna cause a big change in the steam generator, but not only that the primary system is very sensitive. The pressurizer was totally too small. Any decrease in primary system temperature, which would result from an increase in feedflow, would cause the pressurizer level to go down and the pressurizer pressure to go down. It was really very hard to control in this respect. You know, I, in fact, when we, when I control the feedwater, the amount of feedwater to know how much to put into the steam generators to keep the reactor basically as stable, as stable as I can keep it in a transient situation. I look at reactor pressure. If pressure goes up I feed a little more. When I start to see it come down again, I back it off a little bit. And that's how I know where to keep feedwater flow.

CRESWELL: How do you, after a reactor trip, what are the immediate actions that you take? Could you walk us through what actually goes on?

HARTMAN: Well, the first thing that you do is you insure that, you mainly trip the reactor. Okay, that just insures that, well, I don't know why it would, but the second thing says that you look up on the RI panel and verify that all the rod in-limit lights are on. You check to make sure that the turbine is tripped. That it's auxiliary oil pumps are operating. Make sure that the turbine bypass system is controlling steam header pressure at 1010. You close MUV 376, which is a letdown isolation valve. If pressurizer level gets down below 100 inches, you're supposed to start a second makeup pump and just keep it ready to go if you need it. If pressurizer level gets down below, I think its 20 inches, then you're supposed to open MUV 168 to admit more water. If the makeup tank is low and the pressurizer level is low, then you shut, or you open the DHV 220, which is allows the BWST to come down to the suction of the makeup pumps and then you shut MUV 12.

CRESWELL: Is that a valve you have to go out and manipulate manually or do you...?

HARTMAN: Its one you have walk around 20 feet of panel and back 20 feet to open.

CRESWELL: What about the feedwater control...?

HARTMAN: Well, if you have any feedwater stations in hand, you should verify it, you should run those back consistant to the parameter that they should be, in other words just take it and take it all the way down.

CRESWELL: What if they're in auto?

HARTMAN: Well, if they're in auto you just verify that feedwater flow is coming back at a rate consistant with the header pressure.

CRESWELL: Now, they're set, the feedwater is set for 30 inches, right?

HARTMAN: On the low level limits, right, yeah.

CRESWELL: Has that always been the case? It's always been set at 30 inches?

HARTMAN: Well, 30 inches is the nominal, is a nominal number. It could be plus or minus. What they do is they set the levels in the steam generators at 532 degrees so that they could get 532 degrees 885 psig. If they need a little bit more heat transfer to get that 885, then they would raise the level slightly, you know, varied maybe plus or minus 3 inches from 30 on either generator. I knew one that was about 32 and the other's 29.

CRESWELL: I guess you've had a chance to talk to the operators since the event. Have they noted anything to you that was peculiar about the event? Where they had to take special actions and...?

HARTMAN: I really didn't get that specific with them. The only time I ever talked was in a bar room. And I, you know, I don't like to repeat what I hear in bar rooms.

FASANO: You mentioned that you at one time found MUV 18 shut. What reason would anyone have to have that valve in a closed position?

HARTMAN: To the best of my knowledge that particular event came when somebody tried to change a light bulb in the ICV 5 valve controller. They removed the lens covers and everything. They pulled the old light bulb out and they went to stick the new one in and, you know, these were those PSB 120's that they're telephone lights. They're about that long and they have a contact making surface on either side of them about maybe a half inch. And as they slid this thing into the socket, it made contact with the hot side and the ground, it blew the fuse for that indicating circuit. It also took away the indication for all the other valves and happened to fail when MUV 18 shut, when they re-energized that.

CRESWELL: Was it, did maintenance repair it promptly?

HARTMAN: I really don't know the time frame. What I saw, I understand it, how it happened. I can't remember when the trip happened. I knew they had a trip on that particular instance. I can't remember what the time frame was between the time that the fuse actually blew and the time they got it fixed. I wasn't on shift at that time. Then I do recall a sign back on that particular operating panel that said operators are not to change light bulbs in this panel, call the electricians. So we have to call the electricians and have a light bulb changed. Another one of Burns and Roe's designs.

CRESWELL: Okay. One thing we haven't talked to you about is why you quit.

HARTMAN: Why I quit? About a year ago, well, it was even, no, it wasn't a year ago. It was a year ago. Back in June I had wanted to leave this racket for a while. I think it can be a good career. In fact I enjoyed my work up there. What I did, or what I had to go through to do what I did, it was hectic. When I left Met-Ed my blood pressure was 180 over 110, which for a man of 30 years old is outrageous. My blood pressure had been high for over a year. In fact, I had gone job hunting back about this time last year and I had gotten a job but it was a little less money than I really wanted to take and it was in St. Louis, and I didn't want to move. So it wasn't really a spur of the moment type decision, which a lot of people thought it was because of the accident. I did know that once the accident happened, when I

realized the severity of the accident, I knew that it was gonna be a long time. I had just gone through 2 1/2 grueling years of bullshit, which is what it was, with GPU startup, UE&C startup, and then Met-Ed. And I didn't like being hassled by 3 or 4 different foremen and 2 or 3 different supervisors plus 3 or 4 shift test engineerings and various other mechanical and electrical engineers, you know, it was just too much. I couldn't take it anymore. I thought I was a good... There was shift supervisors that would actually stand over your shoulder and tell you exactly what to do. Raise steam water, you gotta get feedwater up, now check this and check that. It was, you know, ridiculous. I knew how to operate the plant. He should have been back there taking care of his paper work, but instead, he was right up there in the front lines, and trying to keep myself oriented in my own head I always had to listen to this guy. And if I wouldn't do something he told to do, well, he was right on me. He says why didn't you do that, why didn't do that. Well I didn't see any importance to do that right at that particular time. And most times I was right.

CRESWELL: Well, did they know what they were doing? The shift supervisors?

HARTMAN: Yeah, for the most part, but they worried about the wrong things. You know, they put their priorities a little different than I did.

CRESWELL: What should they've been worrying about?

HARTMAN: The overall picture. They should have been back staying taking a big, a big look at everything that was going on around them and not getting themselves involved in what the control room operator or the shift foreman is doing. The shift foreman could direct. Its a team effort and I tried to promote that my 2 1/2 years that I spent on that shift, I tried to promote team work. And it just didn't work. There were personnality conflicts, conflicts of interest, period, you know, the guy just doesn't do it the way I tell him, or the way I ask him or the way I show him that maybe that's the best way of doing... He wouldn't do it just plum because I told him, and he would do it just to defy me. Now, this, you can't have team work that way.

CRESWELL: Let me ask you this. When the supervisor was standing over you shoulder, was this during a trip condition or during normal operation?

HARTMAN: No, this was during, in fact, I remember this startup really well. My problem has been diagnosed as labile hypertension which means it goes up and then I'm gradual to bring it back down. I don't have a constant high blood pressure problem. I keep things bottled up inside of me. This particular night I came in, I had the panel, we were scheduled to do a startup from 1% shutdown to 15% power. With all the paper work and everything that's involved in mode to mode checklists and the surveillance tests that had to be done prior to going critical,

getting the operators stationed where they needed, just getting the plant in a general stable condition to perform this thing, it takes a lot of concantration. It takes a lot of effort on the part of the control room operator to do that. At that particular time there was, in our alarm system is totally ridiculous, there were too many of them and the system that they have is it fails all the time. An alarm card could go bad and it would just send an alarm. It would just keep flashing in and out. You would silence it and it would just keep coming in. And that God-awful horn, it would just, you know, you're trying to concantrate on doing a startup and you got this buzzer going off and I'm particularly conscious of alarms because if you just ignore this stupid thing, what if you get one that's important. If you get one that's important and it goes unrecognized because you're ignoring this one over here you might as well not be in the control room. My job is to keep the plant safe. If I, you know, if I can't see what's going on around me then I felt apprehensive about the whole thing. I didn't feel like I can keep as close a surveillance on the whole thing as I really wanted to. I asked this supervisor, I'll even mention his name, Brian Menler. I asked, I said, "Brian, could you have an instrument tech take a look at that alarm?" I said, "its driving me nuts." I said, "am I gonna have to listen to that all night through this startup?" "Well, I guess you're gonna have to." Those were his words pretty close. And with that I told him, I said, "I won't do the startup under those conditions." I said, "either get that thing fixed or find me a relief." And he said, "you know if you become, if you are relieved

you might as well get your lunchbox and take off." Well, at that particular point I wasn't ready to leave my employment there. Maybe it was a prayer, I don't know what it was. The alarm settled down and I didn't have to listen to it at that point. It did come back later but not until after the whole thing was done. They had an ECP there ready for me. I looked it over and I can generally tell whether the thing is gonna be close by just looking at the numbers. I've done enough of them, you know. And by just looking at the numbers I can tell whether they're gonna be...

FASANO: ECP and concentrator pointer...

CRESWELL: No, estimated critical position.

HARTMAN: Estimated critical position, yeah. And this one looked good. It was, I think, somewhere around 60% on groups 6 and 7. It was where they wanted it no, no, I'm sorry. It was about 62%, its the closest I can remember, on group 5. No wait, no wait, I'm getting screwed up here. I've been away for a month and a half and it's a little...

CRESWELL: Well, I don't think that this is critical information.

HARTMAN: Anyway. Well, just the way they operate. Its, the estimated critical position was something. We have a guideline if you go critical before half a percent less than when you're anticipated to go, you

should shut back down. You should put all the rods in until you get the safeties in and then investigate why. So, I wasn't even, I was just getting to the minus .5% position and all of a sudden I looked up and I had an alarm, it was the startup rate rod withdrawal inhibit circuit. The only thing that throws that into count is 3 cpm in the source range. And I looked down and I did have 3 cpm in the source range. It stopped the rod motion. I put the rod stick in and he says, "no, no, no. Just take it down one." I said, "what do you mean. We just went critical here at 2% on group 5." I said, "the ECP called for a half a percent above that or better." Now that's alright. That's alright. We'll calculate a new ECP for where we went critical. Now that's what they did. Now that doesn't show on any log books or anything like that. But that is a fact...

CRESWELL: Was Mr. Mehler still a shift supervisor at this point?

HARTMAN: Mr. Mehler is still a shift supervisor at that plant.

CRESWELL: At that point.

HARTMAN: Yes, yes.

MARSH: Mehler was the one that was on duty at that time...

HARTMAN: Yes. He was the one that I kept telling you that he would look over my shoulder. So I told him, I said, "I don't believe that that's right. I think that that is unsafe. I think that there's something wrong here." Well, we'll recalculate it and make it right. Which is what they did. They redid the numbers and somehow they fudged them, I don't know. They...

CRESWELL: Did they have a nuclear engineer come in?

HARTMAN: To the best of my knowledge, no. This was on a midshift. This was pretty late at night, which normally that doesn't hamper them from calling anybody out but I don't recall any nuclear engineer coming in.

MARSH: Hal, you say they. Who else besides Mehler would be involved in that calculation?

HARTMAN: The shift foreman.

MARSH: Which would be who? ...

HARTMAN: That was. I can't recall.

CRESWELL: Okay.

HARTMAN: I don't want to name any names if I can't be sure. Because we were well, Menler is not my normal shift supervisor so I'm not sure that I was with my normal foreman at the time.

CRESWELL: Could you estimate when in time, it would help us to pursue this matter if you could give us the approximate date. Was it early in the startup test program?

HARTMAN: Yeah, I believe it was right back before the relief valves.

CRESWELL: And that would have been like in April or May in 1978.

HARTMAN: Right. . Yeah, it was about that time.

CRESWELL: Okay. You mentioned team work before. Are the panel assignments clearly indicated to people when they're onshift?

HARTMAN: Generally on our shift what we did was we had a panel operator. He was in charge of taking the, filling out the log book and just generally overseeing the operation of the plant in a wide scope. Normally we were at steady state. We also had a person that was assigned to what we call the switching and tagging desk, and he would take care of any safety tags that needed to be hung. He would also perform the daily logs and the shift and daily surveillances and any computer information that had to obtained that day. Then we usually had a third

operator that was assigned to surveillance desk and he would oversee the, take care of coordinating the control room and the auxiliary operators in performing monthly or weekly surveillance tests. If anything went wrong generally what would happen the closest guy to a section of panel, you know, like we used to divide it up into 3 sections. We had the secondary, we had the reactor plant and we had the nuclear steam supply system which was basically makeup pumps, low pressure injection and that sort of thing. And then the foreman, he would kind of rove around and maybe if he was in the back panel and if there was some valves back there that he could operate. This is generally the way we worked. If something happened, you know, you'd yell out and say...analyze the problems as best you could...and say, "we lost feed water." And at that time the three operators would come up and they would key in on a position that wasn't occupied and then take over.

CRESWELL: What about shift turnovers? What sort of turnovers did people ordinarily make to your knowledge?

HARTMAN: Well, they varied between shifts. It depended who you turned over to and I always turned over to major stuff, any, I always let them know where they were in rods, what they were doing, whether they were coming in or going out. I let them know of any abnormal conditions that existed in the secondary plant, you know, like they are doing a polisher vessel, regenerating that. Or we throttled this down and put this in automatic and something, maybe a major change throughout the day. Any

jobs that were in progress, I'd go over to the computar and show him the primary system parameters, pressure, boron concentration, reactor power, and such things like that. We generally have a written sheet. Sometimes guys would draw it our for 3 or 4 pages and they would put the most miniscule items on there that, you know, generally I looked over those. But the major stuff, the turnovers, I guess, were generally pretty good and I say that on a steady state basis. Like, I don't know how may times I've taken the plant over in a transient and it was total chaos. You know, they'd leave, you know...

CRESWELL: You would have a turnover in the middle of a transient?

HARTMAN: Well, maybe nor necessarily in the middle of a transient. I, let me rephrase that. Let me say after the transient was over, perhaps during the recovery which sometimes took days. But generally, you could get things straightened out in a shift to the point where, you know, the major work is done. The big things that have to be done and the small things. Most of the small things are done. The big things and they can come later, you know. But its really hard when you have a trip. There's so many things that you might have seen that you took some corrective action for, that maybe somebody else might not have done that or maybe the procedure didn't call for but it was okay to do it. It was safe, it was conservative. And you forget to mention that to your relief, and you go this valve open and then you go and try and do something else and, you know, it just doesn't restore right and you

looking around for a problem-why that dummy left that valve open. Why did he do that? You get mad at the guy because he didn't tell you about it but, you know, it was an honest mistake. I very seldom got mad at guys for poor turnovers because I generally made a pretty good tour of the, right after he left I would go around the plant, the panels, and look for abnormalities that I saw. If I had any questions I would ask the foreman.

FASANO: Did you have a check sheet or did you do this just by knowing the system, its all in your head.

HARTMAN: Just by knowing the system, knowing how the board was to look. The positions of valves, you know, its like it almost becomes instinctive after a while.

FASANO: After a while.

HARTMAN: Yes.

FASANO: You mentioned that you did have design concerns on both the nuclear and the steam side of the plant. Are there any ways other than complaining verbally that you could have reported these to your management? I mean, are you people...

HARTMAN: Yeah.

FASANO: Allowed to report things on paper?

HARTMAN: Yeah. We can generally write a little letter to, you know, the cognizant engineers of the problem. And generally some of the operating conveniences, they used to take care of but things like, and we'd write these or even a verbal comment, they would normally jot it down themselves. They were pretty good. Sometimes they never got done, but at least they'd listen. But the major things, you know, like the relief valves, condensate hot well thing. I don't even know if he has yet today, whether that system has been modified. But, yeah, you could write him a letter and even a little diagram showing what you'd like to see, explaining maybe even perhaps how to go accomplishing the change.

FASANO: How about reporting to say other agencies? I mean can you, I mean talk to other people like ourselves or...?

HARTMAN: Well, that is, I forget the part number. 10 CFR 20? I can't remember the regulation..,?

FASANO: 21?

HARTMAN: Yeah. Its the one where if you see the company doing something in violation of any rules that you can go to the NRC with the complaint.

CRESWELL: Have you done that?

HARTMAN: No.

CRESWELL: Why not?

HARTMAN: Because I felt that if I had of gone there, to the NRC, then they would come down on me. I was a little afraid of that.

MARSH: What makes you think that way? Do you know of other instances where this has happened? Have you been told anything formally or informally?

HARTMAN: No. They never really came right out and told us that, you know, that you would be "prosecuted." But I just felt that knowing the way they operated that it would be kind of like being the black sheep now all of a sudden and it was tough enough to get along. I found it was tough enough trying to get along with the other people up there. Just, you know, team work type thing. And trying to develop the rapport of the other shift supervisors as well as with my own. That would just make it totally miserable for myself.

FASANO: You're mainly on Unit 2?

HARTMAN: Unit 2.

FASANO: Do you have any knowledge that this is similar type of operation on Unit 1 or are they different? To your best knowledge. You know, I mean if you don't know, you don't know. If you do....

HARTMAN: The only thing I can make is an assumption. The only thing I can assume is that the shift supervisors that are at the plant today were either former control room operators in Unit 1 or they were former shift supervisors in Unit 1. Now I can't help but think that they gained some experience in Unit 1. That's all I'm gonna say. There's nothing really else I can say about it.

CRESWELL: How about the performance of surveillance tests at TMI. Can you comment on that?

HARTMAN: Surveillance procedures, I guess, sometimes I, well, I did a lot of them. In fact, I did the one that caused the first safety features actuation where I tripped the alternate feed supply to the invertar and lost a DC supply. I corrected that too, by the way, while everybody else stood around, looking around like they didn't know what was going on. Now generally, the surveillance procedures, we did them and sometimes they required a change, you know, like well there was a small procedural deficiency or maybe a valve number was wrong or maybe there was a better way of doing it to get the end result. We would change those, the TLNs would take two licensed operators or two senior licensed operators unless nuclear safety was involved, then it would

take PORC approval. We would change those, make them right. Sometimes in the performance of a test you couldn't get the required results and we'd go back out with the shift foreman and he would get the proper results. Sometimes we'd...

CRESWELL: Excuse me. Could you elaborate on that?

HARTMAN: Well, an example, the emergency feed pumps, running at surveillance it was a bear. Every time that we did the surveillance that they called for a thrust bearing vibration measurement and it also called for a temperature reading on the bearing and called for a certain differential pressure, suction pressure had to be between a certain amount. We've never done that test where it came out the same way twice. So we tossed up our hands and we say, you know, what do we do? We can't get the reference values, we can't get the proper data. Okay, well never mind. I'll take this procedure and I'll throw it down at the surveillance... I assign people, the inservice inspection type and they would evaluate the data and then they would come up with a new set of reference data everytime. And of course the surveillance that we did would fall right into that. I never did understand that.

CRESWELL: Any other systems besides the emergency feedwater system involved?

HARTMAN: I can't recall. I know that a lot of the balance of plant surveillance. It wasn't tech specs or balance or anything like that, that would go by the wayside. You know a lot of time it would call for maybe the secondary service coolers to be backwashed and we don't have time for that. Then you just sign it, you know, throw it in the basket not completed, and it would come back next week to do it, you know, never get done. There was a lot of things like that on the secondary side. We normally did all the surveillance that was required for tech specs, but there was a lot of times, you know, I can't really name any specific instances but...for specific procedures...but I know that there was exceptions and in the exceptions they could paper those away somehow. I never did really understand. I don't go in for that kind of thing. I figured if it can't be done by the surveillance procedure, you change it so that it can be done correctly and within the scope of the surveillance requirement or you don't do them, you know, you get the thing right and then do them.

CRESWELL: Hal, are there any other operators like you that are concerned about some of these occurrences?

HARTMAN: Yeah. I would imagine that there's quite a few that are concerned. I'm not sure that their attitude is the same as mine. I know that they like money. I mean obviously I didn't quite up there for a higher paying job and that I know that a lot them stay around there just because of the money, that they're afraid to leave because,

you know, they like money so much. But not only that, I guess they're a little bit more, well, they are just cut out of a different mold. They're not as, they don't say things the way I say them. They have to be concerned. I can't really see where they couldn't be concerned. I have respect for everyone of the operators up there. I have respect for the supervisors too because well they went through hard times but somethings that they do I really lose respect for. There's a couple I just, you know, I wouldn't work with them for anything and that's one of the reasons I left.

MARSH: We are getting towards the end of the tape. The time being 8:14, so at this time I'm gonna break for a moment while I put a new tape on.