UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

GENERAL PUBLIC UTILITIES CORPORATION, JERSEY CENTRAL POWER & LIGHT COMPANY, METROPOLITAN EDISON COMPANY and PENNSYLVANIA ELECTRIC COMPANY,

Plaintiffs,

-against-

THE BABCOCK & WILCOX COMPANY and J. RAY McDERMOTT & CO., INC.,

Defendants.

80 CIV 1683 (R.O.)

Deposition of METROPOLITAN EDISON COMPANY by JAMES R. FLOYD, taken by Defendants, pursuant to notice, at the offices of Davis Polk & Wardwell, Esqs., One Chase Manhattan Plaza, New York, N.Y. on Thursday, February 18, 1982 at 9:45 o'clock in the forenoon, before Joseph R. Danyo, a Shorthand Reporter and Notary Public within and for the State of New York.

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CHARLES SHAPIRO, C.S.R.

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IT IS HEREBY STIPULATED AND AGREED, by and between the attorneys for the respective parties hereto, that the sealing, filing and certification of the within deposition be, and the same hereby are, waived; and that said deposition may be signed and sworn to before any officer authorized to administer an oath, with the same force and effect as if sworn to before an officer of this Court.

IT IS FURTHER STIPULATED AND AGREED that all objections, except as to the form of the question, are reserved to the time of the trial.

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J A M E S R. F L O Y D, stating his residence as 3 Floyd Drive, Middleton, Pennsylvania, having been duly sworn by the Notary Public (Joseph R. Danyo), was examined and testified as follows:

MS. WAGNER: I would like to have marked as B&W Exhibit 460 a one-page resume entitled James R. Floyd.

(One-page resume of James R. Floyd marked B&W Exhibit 460 for identification, as of this date.)

EXAMINATION BY MS. WAGNER:

Q Is B&W Exhibit 460 a copy of your resume?

A Yes.

Q Is it up-to-date?

A Yes.

Q What was your first job in the U.S. Navy?

A Recruit.

Q How long were you a recruit?

A Nine weeks.

Q What was your next job?

A Assigned to the Electronics Technician School.

Q How long did you go to that school?

A I believe it was 36 weeks.

Q After that, what did you do in the Navy?

A I was assigned to the U.S.S. ESSEX as an electronics technician.

Q What is the U.S.S. ESSEX?

A At that time she was an attack carrier.

Q Is that a nuclear ship?

A No.

Q How long were you assigned to the ESSEX, generally?

A I went into the Navy in February 1958, and about November of 1959 I left the ESSEX.

Q You were an electronics technician on the ESSEX?

A Yes.

Q What kind of work did that entail?

A Repairing radars.

Q After you left the ESSEX, what did you do?

A I spent six months in Quincy, Massachusetts, while the U.S.S. LONG BEACH was being built at the Bethlehem Steel shipyard.

Q Were you involved in building that ship?

A We were to watch the civilian yard force build the ship; however, during the six months, it was

during the 1959 steel strike, so nothing was built while I was there.

Q What did you do while you were there?

A Very little.

Q What did you do next?

A I went to the Advanced Nuclear Power School in Vallejo, California.

Q How long did you attend that?

A Six months.

Q Did you take certain courses there?

A There was a standard course of instruction at the school.

Q Do you remember what it included?

A Mathematics, physics, nuclear physics, electrical engineering, systems and components lectures. I don't remember the number of hours in each course.

Q Did you learn anything in that course about heat transfer?

A Yes.

Q Did you learn anything about fluid flow?

A Yes.

Q Did you use any textbooks while you were in that course?

A Yes.

Q Do you remember any of them?

A Glasstone, "Nuclear Engineering." That is the only one I can remember.

Q But you believe there were others also?

A Yes.

Q Was that the first time you had studied physics?

A No.

Q Where had you studied it previously?

A University of Rochester.

Q Did you get a degree from the University of Rochester?

A No.

Q How long did you attend the University?

A Seven semesters.

Q How many courses did you take at the University involving physics?

A Only the first year's course.

Q Did you take any courses involving nuclear physics?

A Not at the University of Rochester.

Q Did you learn anything about nuclear physics prior to your experience in the Advanced Nuclear Power School?

MR. SELTZER: You mean did he take any courses in nuclear physics?

MS. WAGNER: Or had he learned anything from any source.

MR. SELTZER: From the newspapers?

MS. WAGNER: Newspapers, any source.

A I had read an introductory text. I believe it was called "Source Book to Atomic Physics" or some such title. It was a non-mathematical treatment of the subject.

Q Had you read that in conjunction with some kind of a course or had you just read it for your own interest?

A For my own interest.

Q What did you do after you attended the Advanced Nuclear Power School?

A I was assigned to the Nuclear Power Training Unit.

Q Where was that?

A At A-1W at Idaho Falls, Idaho.

Q What was your position there?

A Trainee for the first six months.

Q How long were you there?

A Two years and two months.

Q Did your position change after the first six months?

A Yes.

Q What was your next position?

A Operator, reactor plant operator.

Q During the six months that you were a trainee, did you take courses?

A Yes.

Q What kind of courses?

A Primarily systems lectures.

Q What kind of systems?

A Instrumentation systems and mechanical systems and electrical systems.

Q Were these all systems relating to a nuclear power plant?

A Yes.

Q Did you use any textbooks during this time?

A Yes.

Q Do you remember any of them?

A No.

Q Have you retained any of them?

A Would you repeat that?

Q Do you have any of them today?

A No.

Q Do you have any textbooks from the Advanced Nuclear Power School still in your possession?

A I have my notebook from that school.

Q That is a book of notes that you took?

A Yes.

Q During the six months that you were a trainee at the Nuclear Power Training Unit, did you have on-the-job type experience as well as lectures?

A Yes.

Q Did you have any experience at that time with the nuclear power plant itself, with a reactor?

A Yes.

Q As opposed to a simulator?

A Yes.

Q Did you have to take a test at the end of your six months?

A Yes.

Q Who administered the test?

A There were several tests to complete at the end. You had your final qualification in your own speciality, and you had a cross-crew exam which was administered by three, four or five people in an oral setting.

Q What was your specialty?

A Reactor technician.

Q What did the cross-crew exam cover?

A The entire plant.

Q Did it cover theory?

A Yes.

Q Was your final exam in your specialty a written exam or an oral exam?

A Both.

Q Did that cover theory?

A Yes.

Q Did you pass your exam?

A Yes.

Q What was your position immediately upon passing your exam, reactor operator?

A Yes.

Q What were your initial duties and responsibilities as a reactor operator?

A I stood watches throughout the hull.

Q What did you have to do while you were standing watches?

A In some cases, if you were on the reactor control panel, then you controlled the reactor power level, if starting up or shutting down.

If you were on a switch gear watch, you sat there and changed electrical modes as necessary.

If you are in a machinery space watch, you ran mechanical systems, pumps and valves, things of that nature.

If you were in an engineering laboratory technician watch, you carried out the health physics functions of the ship and some of the chemistry functions.

Q Where was it that you were located during this time?

A You mean by that where did I live?

Q No, where did you work? Was this still in Idaho Falls?

A A-1W is the power plant out in the middle of the desert that I was working on.

Q It is not a ship?

A It is a simulated ship.

Q What type of reactor were you working with at that time?

A Pressurized water.

Q Did that reactor have a pressurizer as part of its system?

A Yes.

Q How long were you a reactor operator?

A Until I got out of the United States Navy in 1964.

Q Were you at Idaho Falls then the whole time?

A No.

Q Where did you go after you left Idaho Falls?

A To the U.S.S. ENTERPRISE.

Q How long were you with the ENTERPRISE?

A Until the end of my enlistment.

Q During that time your position did not change?

A I was reactor plant operator on the U.S.S. ENTERPRISE.

Q During that time when you were reactor plant operator, were your duties any different from those you have described as being your duties at Idaho Falls while you were a reactor operator?

A Yes.

Q How were they different?

A On the ENTERPRISE, I did not stand electrical or mechanical watches, but only instrumentation and reactor plant control panel watches.

Q At any time after you finished your six

months as a trainee, did you have any additional training in the Navy concerning nuclear power plant operation?

A For the remainder of my time at Idaho, I was leading reactor control instructor, and as such I was giving the training rather than receiving the training, but I learned while giving the training also.

Q What topics were your topics of instruction?

A Instrumentation systems, reactor physics, nuclear safety.

Q What materials, if any, did you use in instructing with respect to instrumentation systems?

A We had provided at the time I became leading reactor control instructor a system of lesson plans, handout materials including the texts and tests which were administered as part of the program.

Q Were there texts about instrumentation systems?

A Yes.

Q Did you use texts about reactor physics?

A Yes, there must have been a title in this section called Reactor Theory, but I don't remember it that well.

Q You don't remember what text you used?

A It was a Navy text as opposed to a

commercially published text.

Q Do you recall if it had a title?

A I don't recall what that title would have been.

Q Have you kept the textbook until today?

A No.

Q Do you remember what topics you covered in reactor physics?

A Things such as temperature coefficients, pressure coefficients, rod worth, neutron flux shapes, reactor poisons, and reactor control.

Q Can you describe for me what a temperature coefficient is in ten words or less?

A No.

Q How about twenty words?

A It is still tough.

Q Take as many as you like.

MR. SELTZER: Be brief.

A The moderator temperature coefficient is a reactivity effect which is inherently fed back from the temperature of the moderator to the reactivity of the fuel, and is normally negative.

Q Is that one of several temperature coefficients?

A Yes.

Q Can you describe for me a pressure coefficient?

A The same words would apply exactly except substitute pressure.

Q Are there several pressure coefficients?

A No.

Q Just one?

A Just one.

Q What do you mean by reactor control?

A May I go back to the previous question? The pressure coefficient is normally positive.

Q You mentioned that you also covered reactor control. Can you tell me generally what you mean by reactor control?

A Establishing the neutron population to produce the desired power level.

Q How was that done?

A Through control rod positions.

Q During the time you were on the last ship you were on in the Navy, the ENTERPRISE, were you an instructor as well as standing the watch?

A No.

Q You were just an instructor?

A No, I was a watch stander.

Q So the instruction you were talking about was given in Idaho Falls?

A Yes.

Q But not on the ENTERPRISE?

A I received instruction on the ENTERPRISE to become a reactor operator.

Q How long did you receive instruction?

A It seems like six months was the minimum time.

Q Did you receive classroom instruction?

A Yes.

Q Do you recall if any textbooks were used?

A The same texts we had used at Idaho.

Q Did you have to take any tests?

A Yes.

Q Would these be regular tests or one at the end of your training session?

A Both.

Q You left the Navy in 1964, is that right?

A Yes, January.

Q At that time you went to Columbia University?

A Yes.

Q If I read your resume correctly, you received a Bachelor of Science in chemical engineering, is that correct?

A Yes.

Q How long were you at Columbia?

A I received a degree in June '65.

Q So you were there just for a year?

A Three semesters.

Q Did you, while you were at Columbia, study nuclear physics at all?

A I was employed half-time in the nuclear physics department as an assistant. I had no formal courses.

Q This is the nuclear physics department of Columbia?

A Yes.

Q What were you doing while you were there?

A I was assisting a gentleman who was first a doctoral candidate and then a post-doctorate fellow, in the conduct of an experiment which was meant to shed some light on the basic fission process for Professor Malchonian.

Q Were you running experiments or what exactly were you doing to help him out?

A I was manufacturing silicon detectors and evaporating gold onto their surfaces, connecting these mechanically into arrays and electrically to amplifiers and recorders for the collection of data.

Q While you were at Columbia, did you have any access to any kind of nuclear reactor?

MR. SELTZER: What do you mean by "access"?

Q Did you work with one?

A At the time I was there, the reactor at Columbia was being installed, and Professor Malchonian was going to be in charge of it, but it was not yet operational.

Q Were you at all involved in its construction?

A No.

Q I take it as soon as you left Columbia, you went to the Saxton Nuclear Experimental Corporation?

A Yes.

Q And your first position was supervisor of operations and tests?

A No.

Q What was your first position?

A My first position there was staff engineer.

Q What was the function of the Saxton Corporation?

A Research and development.

Q In what area?

A Reactor materials.

Q Reactor fuels?

A Yes, as well as claddings.

Q What did you do as a staff engineer?

A Studied for my senior license, primarily.

Q This was your senior license on a Saxton reactor?

A Yes.

Q What kind of reactor was there at Saxton?

A Westinghouse pressurized water.

Q Were you engaged in a course of classroom instruction?

A There was very little classroom instruction per se. The materials were available, and based on my own initiative, I learned the material.

Q What materials did you use?

A I don't remember.

Q Do you remember if they were textbooks as opposed to handouts?

A While there were textbooks available as resource materials, the majority of the knowledge existed as system descriptions, system procedures.

Q Was there a training department at Saxton?

A Westinghouse may have had a contingent of training people there for their customers, but not for the plant staff.

Q Westinghouse had customers at Saxton?

A They trained their nuclear customers' employees at Saxton.

Q Did you do any additional study during this time in the area of nuclear physics?

MR. SELTZER: You mean other than studying for his senior license?

MS. WAGNER: As a part of studying for his senior license. He has not described any studying in the area of nuclear physics, so the question is specifically in the area of nuclear physics.

A Yes.

Q Was that also self-study?

A Yes.

Q Do you have any recollection of what materials you used, if any, to study from?

A Glasstone and Sesonski would have been the primary text.

Q Did you then have to take an examination?

A Yes.

Q Who administered the exam?

A Somebody from Paul Collins' group in what was then the AEC operator licensing branch, and in fact it may have been Paul himself who gave the oral.

Q Was there both a written and oral component to this exam?

A Yes.

Q Did you pass it?

A Yes.

Q And then you received a senior reactor operator license on Saxton?

A Yes.

Q How long did you hold that license?

A Until I left Saxton, which was the fall of 1968.

Q You obtained it sometime in 1965, this license?

A April 1966.

Q When you passed the test and became a senior reactor operator, was there a change of title from staff engineer, or did you have some title other than senior reactor operator?

A I think between the time I took the exam and I got back the results from Washington, I was

promoted to supervisor of operations.

Q What were the responsibilities of that job?

A Operate and man the reactor, to carry out the experiments as designed and implemented by Westinghouse.

Q Were there other reactor operators at Saxton at that time?

A Yes, I had a control room staff consisting of four shift supervisors, five reactor operators.

Q Were there any auxiliary operators?

A No. In that configuration, we sent the steam across the street to the coal-fired plant. Their people ran the steam plant across the street and sent us back feedwater.

Q Who owned and operated the steam plant?

A Pennsylvania Electric Company.

Q While you were supervisor of operations, did all of the shift foremen and reactor operators report to you?

A Yes, except we called them shift supervisors.

Q Who did you report to?

A The plant superintendent.

Q Who was that at the time you became supervisor of operations?

A Hugh Williams.

Q Did somebody else become the superintendent during the time you were supervisor of operations?

A Yes.

Q Who was next in that position?

A I believe Bob Swift.

Q Was there anybody after him during the time that you were there?

A No.

Q Were you familiar during that time with Westinghouse's training program with respect to the Saxton reactor?

A Yes.

Q Can you describe generally for me what it entailed?

A Very similar to the training I underwent in the nuclear Navy, possibly not quite as extensive in the classroom phases and more plant-specific to the plant that they were purchasing.

Q Which was a plant other than Saxton?

A Yes.

Q Were the customers you described previously utilities, the ones who were coming for training at Saxton?

A For the most part, yes.

Q Did your position change at all until the time you left Saxton?

A No.

Q Is it correct you left Saxton in 1968 to go to Metropolian Edison Company?

A I was an employee of Metropolitan Edison while I was at Saxton Nuclear.

Q You were not employed at Saxton?

A No, Saxton Nuclear had no payroll.

Q After you left Saxton, what was your first position at Metropolitan Edison Company?

A Nuclear engineer, I believe.

Q Did you change physical locations at the time?

A Yes.

Q Were you assigned to Three Mile Island?

A Yes.

Q What were your initial duties and responsibilities as nuclear engineer?

A To review the design of the nuclear steam supply system and the computer codes that were planned to be used in the operation of the plant.

Q In 1968 when you first went to Three Mile

Island, was there any nuclear unit there?

A TMI Unit 1 was under construction.

Q How were you reviewing the design of the nuclear steam system?

A From materials that were supplied by B&W.

Q What type of materials?

A Prints, flow diagrams and descriptions of the plant.

Q How did you do your review?

A By reading.

Q Did you ever see anything in those materials that you thought should be changed?

A One specific instance comes to mind in the computer program, a minus sign was missing from an equation.

Q This is one of the computer codes you described?

A Yes.

Q Who designed those computer codes?

A I don't know. They were supplied to me by B&W.

Q How did you review the computer codes?

A Basically by writing out the equations and checking reference materials to see that they were

accurate.

Q What kind of reference materials?

A This would be the industry text.

Q Industry texts about what?

A About reactor operation, reactor theory.

Q What role do these computer codes play in the operation of a nuclear plant?

A They determine current levels of fission product poisons and extrapolate into the future what they would be under various situations as the description of one section of codes on reactor poisons.

They were not limited to those. There were more, but that is the one I happened to pick on with the specific example a few minutes ago.

Q These were codes which analyzed theoretically what the plant would do or codes that actually would be used in the operation of the plant?

A They were planned to be used in the operation of the plant.

Q Aside from the example that you have given us, do you recall any other instances where you thought the design of the NSS or the computer codes should be changed?

A I have no specific recollection.

Q In your reviewing of the design of the NSS, were you reviewing, for example, the design of the pressurizer?

A Yes.

Q The design of the reactor itself?

MR. SELTZER: When you say the reactor itself, what do you mean?

MS. WAGNER: The nuclear core.

A The word "review" is probably a bit strong. I was learning primarily.

Q Was the purpose of your doing this activity your own personal learning?

A Yes.

Q Did you review the design of the steam generators?

A Yes. We had a training course provided by B&W in early '69 called the B&W technology course. It was a program they had designed for all of their customers, and I think we were in the first course that was given by B&W, and that lasted some nine weeks, full-time instruction in Lynchburg, Virginia.

Q What was the topic of instruction?

A The nuclear steam supply system. That was our biggest single source of learning.

Q During that course, were you taught classical physics?

MR. SELTZER: What do you mean "classical"?

MS. WAGNER: The physics of Einstein.

A I believe there was very little classical physics in that course.

Q Were you taught nuclear physics?

A To some extent, yes.

Q Did you learn anything about physics in that course that you didn't know already?

A Not that I can recall.

Q During the time that you were a nuclear engineer, did your duties change at all after this initial period of review?

A Not significantly.

Q Is it correct that you held this position until 1971?

A To the best of my recollection, that is true.

Q During that whole time, you had basically no responsibilities except your own self-learning process that you described?

A It broadened out to include learning the construction of the plant as it was being built, so that we would be able to operate it when the time came to

operate it. I was planning to become senior licensed on the unit, and so learning it mechanically and physically in minute detail seemed appropriate.

Q Was there any formal training program in effect at that time by Metropolitan Edison Company?

A Yes.

Q What kind of training did that include?

A It was in that period of time that we brought our first group of control room operators to the Island, and their program was tailored primarily after what we had learned in the B&W technology course.

Q Is that all you taught them, what you learned in the B&W technology course?

MR. SELTZER: I think it was patterned after the B&W technology course.

MS. WAGNER: I am asking if that was all he taught.

A I did not teach the course.

Q Is that all that Metropolitan Edison taught?

A I don't know.

Q Did you attend that course?

A No.

Q Did the Metropolitan Edison Company in 1969 have a training department for Three Mile Island?

A Yes.

MR. SELTZER: Are you talking about the period after they brought the first control room operators to the Island?

MS. WAGNER: I am talking about 1969.

MR. SELTZER: Irrespective whether in '69 they had brought the first control room operators to the Island or not?

MS. WAGNER: Yes.

A Yes, we did have a training department.

Q Who was in the training department at that time?

A We hired Dick Zeckman from Penn State to head up the training department, and we assigned several of our staff to assist him in teaching the programs.

Q Was it your understanding that they were teaching any kind of physics courses?

A They were teaching the physics that was needed to understand reactor theory.

Q When again did you say the first group of reactor operators was brought to Three Mile Island?

A It was in 1969. I have difficulty putting a month on it.

Q Did they immediately begin to undergo

training?

A Yes.

Q But you were not part of that training?

A I may have given some lectures but not many.

Q But you were not a trainee,in any event?

A No.

Q Where did these reactor operators come from?

A God.

Q And after they emerged from God's care, did they come from any place?

A I have no idea what their backgrounds were.

Q Do you know who would know what their backgrounds were?

A The personnel department should have employment records on them.

Q Is it your understanding that Metropol Edison's personnel department employed these people?

A Yes.

Q You had no hand in the selection of these personnel?

A No.

Q Do you know who was in the personnel department in 1969?

Didn't know origin. Was ops? — (Navy)

A To the best of my recollection, Ed Zubey.

Q Was that a department at Three Mile Island or some other place?

A It was in the division office of Lebanon, Pennsylvania.

Q Do you remember which, if any, courses you taught to this first group of people?

A I know I did not teach any course.

Q I'm sorry. Do you remember which lectures you gave?

MR. SELTZER: He said he may have given lectures.

Q Do you remember which you may have given?

A No.

Q During the period 1968 to 1971, were you ever involved as a trainee in any course given by Metropolitan Edison?

A Not that I can remember.

Q When did you become licensed on TMI-1?

A Very late in 1973 or early '74.

Q When did the first group of reactor operators become licensed?

A At that same time.

Q Is it correct that you became supervisor

of operations for TMI-1 in 1971?

A Yes.

Q At that time you were not licensed?

A No.

Q How did your duties change when you became supervisor of operations?

MR. SELTZER: You mean what were his duties when he became supervisor of operations?

MS. WAGNER: Yes.

A At that point in time I was a department head for the operations department, and that consisted of some twenty men, including the control room operators, shift foremen.

Q Just to go back for a second to the time when you were a nuclear engineer, to whom did you report during that time frame?

A The plant engineer.

Q Was that an employee of Metropolitan Edison Company?

A Yes.

Q Do you remember who it was?

A Several people moved through that position, and I don't remember their dates of when they moved, but I believe Joe Colitz was at one time plant engineer.

Q Do you know what the duty of the plant engineer was at that time -- the duties?

A All of the engineering personnel assigned to the unit reported to him.

Q To the best of your recollection, were they all engaged in activities similar to yourself?

A Yes, but specializing in their own areas.

Q When you became supervisor of operations for Unit 1, to whom did you report?

A The superintendent.

Q Superintendent of Unit 1?

A At that time I think there was only one superintendent.

Q Do you remember who that was?

A Jack Herbein had been plant engineer for a while. Jack Weiss was our initial superintendent. I don't remember when Jack Weiss left us, but when he left, Dick Klingaman became superintendent, and he was followed then by Jack Herbein.

Q During the time when you initially became supervisor of operations, what were the CRO's in your operations department doing on a daily basis?

A I have difficulty remembering what date we manned the control room. At that time they were

assigned to shift work in the Unit 1 control room.

For about a year before that time, we manned one watch station out in the water treatment building around the clock, and the remainder of thei time was spent in learning the plant in detail.

Q How were they learning the plant in deta

A By watching it being built, by studying systems descriptions and procedures, and in some cases the shift foremen were tasked with writing balance of plant procedures, and they utilized their control room operators to help them gather together the information that was necessary to write either the system description or the procedure.

Q And you were supervising that work?

A Yes, as well as the finalization of procedures that were submitted by Babcock & Wilcox.

Q At some point during the time you were supervisor of operations, you obtained a license on TMI-1, is that correct?

A I believe I have attested to a range of dates as to when that license was issued.

Q Late '73, early '74?

A Yes.

Q Is it correct that you obtained that license

even though you had not gone through any formal training program at Metropolitan Edison Company?

A I do not believe I said I did not go through any training programs, formal training programs at Met Ed.

Q What training programs did you go through?

A I believe between the time I assumed the position of supervisor of operations in '71 and the time I sat for a license in '73 or '4, we had a training program which I would have attended.

Q Do you remember who was in charge of that training program?

A No, I do not. That program included some time in the simulator, I am sure.

Q Do you remember if it involved any classroom instruction at Three Mile Island?

A I have no specific recall of that fact, but I would think that it did.

Q Did you use any textbooks?

A Not that I remember.

Q Did you have to take a test in order to obtain your license?

A Yes.

Q Did your duties and responsibilities change

at all after you obtained your license?

MR. SELTZER: You mean immediately upon obtaining the license, did he then assume different responsibilities?

MS. WAGNER: That's right.

A Only the ones that are inherent with the issuing of the license.

Q Did your responsibilities change at all in the time period after you obtained a license on Unit 1 and the time at which you became supervisor of operations for Unit 2?

A I don't believe the responsibilities changed. The day-to-day work activity, the receipt of fuel and the loading of the fuel into the core and the start-up of the plant was very different from what had been going on before.

Q You are talking of the start-up of Unit 1 now?

A Yes.

Q Until 1975, did you have any involvement in any activities relating to Unit 2?

A I may have reviewed some documents.

Q Do you remember what kind of documents?

A It would be operating and emergency

procedures with which my experience might have been helpful.

Q Prior to the time you became supervisor of operations for Unit 2, did you take any training program with respect to Unit 2?

A We had established what we called a difference program, that is, building on our knowledge of Unit 1 and what was different in Unit 2, and so we learned Unit 2 by difference.

Q Who taught that program?

A Metropolitan Edison Company training department.

Q Did you at any time obtain a license on Unit 2?

A Yes.

Q When was that?

A Probably late '77.

Q When you became supervisor of operations of Unit 2 between '75 and '77, were your duties and responsibilities similar to those you have describe for the period during which Unit 1 was under construction before fuel load?

A Yes.

Q During that time, was there any program

the licensing of operators on Unit 2?

A Yes.

Q Was there something other than this difference program you described?

A Yes.

Q What was that program?

A It was for control room operators, and the people that we selected for those positions were not NRC licensed in Unit 1, and therefore we had to start at ground zero for those people and reinvent t wheel.

Q Am I understanding correctly that the persons who were selected to be Unit 2 control room operators were not licensed on TMI-1?

A That is true.

MR. SELTZER: Are you asking about the initial group of people who were going to be trained as licensed operators for Unit 2?

MS. WAGNER: Yes.

Q Does that change your answer at all?

A No. The training program is still patterned after the B&W technology course.

Q And that was all it was patterned after?

A That was the principal pattern.

Q Was there any other pattern?

A There was balance of plant that had to be taught, steam cycle and steam system. The turbine generator that we were going to use was Westinghouse in Unit 2 and it was General Electric on Unit 1, so some changes in the program had to be instituted for those physical changes in the plant that were different.

Q Did you hold the job of supervisor of operations for Unit 2 until 1979?

A Yes.

Q When did you change positions?

A The summer of 1979.

Q Did your responsibilities during the time before you changed positions change at all?

MR. SELTZER: Are you talking about the period before the accident?

MS. WAGNER: Yes.

MR. SELTZER: I think there were a few changes after the accident.

A They were parallel with the changes in job responsibility that happened with Unit 1, and we went through fuel load and initial start-up and initial testing on Unit 2 the same as we did on Unit 1.

(Recess taken.)

BY MS. WAGNER:

Q During the time you were employed at Three Mile Island and prior to the accident, did you ever sit on any committees of the Metropolitan Edison Company?

MR. SELTZER: You mean was he a member of any committee?

MS. WAGNER: Yes.

A Yes.

Q What committee or committees?

A Primarily the Plant Operations Review Committee.

Q For what period of time were you a member of that committee?

A All the time I was supervisor of operations.

Q For either unit?

A For both units, for each unit, and possibly as nuclear engineer, if we had a Plant Operations Review Committee back that early. I don't remember.

Q What was your understanding of the function of the Plant Operations Review Committee?

A It existed to advise the superintendent.

Q Superintendent of the site?

A The unit.

Q What was it to advise him about?

A Nuclear safety issues and anything else he so elected to use them for.

Q What types of things do you mean when you say nuclear safety issues?

A As covered by 10 CFR Part 50.

Q What is 10 CFR 50?

A Part 50 is the section under which the operating license is issued by the Nuclear Regulatory Commission.

Q Can you tell me generally what it is that 10 CFR Part 50 covers?

A Design,construction, operation and testing of nuclear power plants.

Q So is it your testimony that the PORC was created to advise the superintendent on any of those things?

A I believe that to be a fair representation.

Q Have you ever heard of the General Office Review Board?

A Yes.

Q Were you ever a member of that?

A No.

Q How about the Test Working Group?

A Yes, I was a member of that.

Q What was your understanding of the function of that group?

A It provided a consensus of opinion among the involved parties that this is the way and the degree to which the unit should be tested.

Q For what period of time were you a member of the Test Working Group?

A On Unit 1, from its formation until commercial operation.

Q Do you recall generally when it was formed?

A It grew out of the first meeting we had in Reading in the 1967 era. When it was formalized as a Test Working Group, I don't recall.

Q When you say you sat on it until the -- until when did you say you sat on it?

A Until commercial operation.

Q That was for Unit 1?

A Yes, and the committee was disbanded at commercial operation because there was no more testing to be done.

Q Was there such a committee for Unit 2?

A Yes.

Q Were you a member of that committee?

A My title may have made me a member of the

this litigation prior to 1982?

A I think your company has had access to my files.

Q Hopefully, not direct access.

Have documents been taken out of your files?

A I believe that to be true.

Q Have you ever testified previously?

A Yes.

Q When was the first time?

A The first time I was under oath was with the Kemeny Commission, May 30, 1979.

Q Was that concerning the accident at Three Mile Island?

A Yes.

Q What was the next time?

A From there on, the record is too hazy for me to recall.

Q Do you recall giving testimony to the Rogovin investigation or special inquiry group?

A Recall, no. Reconstruction, yes. Records of those discussions exist.

Q Do you recall giving testimony to the United States Senate?

A The same answer would apply.

Q You don't recall it but you believe from reconstruction that it happened?

A There is paper that exists that says it happened.

Q Do you have any reason for believing it didn't happen?

A No.

Q Did you at any time give any kind of interview which was not under oath concerning the Three Mile Island accident?

A Yes.

Q To whom did you give such interviews?

MR. SELTZER: You are referring to transcribed interviews?

MS. WAGNER: Transcribed or untranscribed.

MR. SELTZER: Untranscribed interview sounds very much like a conversation, and if you want to start relating every conversation he had with anybody relating to Three Mile Island --

MS. WAGNER: If he can recite every conversation he ever had about the Three Mile Island accident, then I would be happy to sit here and listen to it.

MR. SELTZER: I would object and not answer such a harrassing question.

BY MS. WAGNER:

Q Did you have any interviews with anybody concerning the accident, which were either transcribed or recorded in any fashion whatsoever?

A Several.

Q Can you name any of them, either as to who interviewed you or when such an interview occurred?

A The technical staff for either Kemeny, Rogovin or Hart, and maybe more than one of those. The lawyers for the Kemeny Commission would be another, and I don't believe the deposition I gave for the Hart Committee was under oath, although I believe it to be either transcribed or minutely paraphrased.

Q Did you ever see a transcription or minute paraphrasing of that testimony?

A In the cases where I was deposed or under oath, if you will, I was frequently asked to review the record for corrections prior to signing the transcribed testimony.

Q Did you in fact do so?

A In some cases -- I think in all cases where I was asked to do so, I did so, but if that one wasn't

transcribed and it doesn't need to be signed, I don't know that I ever reviewed it.

Q Have you given any testimony, either under oath or not under oath, to an organization since the end of 1979 other than to me?

A Would you rephrase the question for me, or repeat it?

Q I will change it. Since 1979, since the end of 1979, have you given any kind of testimony,and we will start with under oath, concerning either the accident or any other aspect of operation of TMI?

MR. SELTZER: I object to the compound question.

Q Concerning the accident?

A No.

Q Concerning any aspect of operation of TMI?

A Yes.

Q What was that testimony?

A It was given before the Special Master for the ASLB, for the Unit 1 re-start.

Q When did you give that testimony?

A I believe early December '81.

Q Do you know if that testimony was transcribed?

A Yes, it was.

Q Have you reviewed it?

A No, I have not.

Q Have you given any unsworn testimony at any kind of formal setting concerning the accident at Three Mile Island since the end of 1979?

A Not that I recall.

Q Is this ASLB testimony the only sworn testmony that you gave?

A That would be all I recall.

Q Have you given any unsworn interviews concerning any aspect of operations at TMI since the end of 1979?

A Not that I can recall.

Q During the time that you were supervisor of operations for TMI-1 or TMI-2, was it ever part of your responsibility to review what the control room operators in your operations department were being taught with respect to running TMI?

A Yes.

Q Did you undertake such reviews?

A Yes.

Q How did you do that?

A Normally, I discussed the course content

with the supervisor of training prior to the course being taught, and I frequently had the responsibility of oral exams at the end of the course to see that the finished product was acceptable.

Q Was the supervisor of training Mr. Zeckman?

A During some of that time, yes.

Q Who else was it during that time?

A I don't recall who all might have worn that hat.

Q Do you recall a Mr. Tsaggaris?

A Yes.

Q Was he at some point in that position?

A Yes.

Q Did you ever review any kind of documents which were being used in the training program, in any training program?

A Can you be a little more precise on the training program?

Q Did you ever review any kind of documentation used in any training program administered by the training department of Metropolitan Edison Company?

A Yes.

Q What kind of documents did you review?

A Primarily the ones where I was a trainee.

Q Did you ever review such documents in your role as supervisor of operations, reviewing what was being taught,as opposed to in your role as a trainee?

A My memory is not clear enough to say yes because I can't think of any specific documents.

Q Do you recall whether you had any opinion at the time as to whether that was part of your job as supervisor of operations?

MR. SELTZER: When you say does he have any opinion, are you asking does he recall whether one of his responsibilities was reviewing the written materials used in the Met Ed training program?

MS. WAGNER: Does he recall whether he understood that to be part of his responsibility.

A I don't recall.

Q Do you know if lesson plans were used during training administered by Metropolitan Edison Company?

A Yes.

Q Do you recall ever reviewing such a lesson plan?

A In the context of your question saying

"ever," I must have reviewed one once upon a time, but I don't recall a specific detail.

Q Do you recall generally whether that was something you did on a periodic basis?

A I don't recall.

Q Do you know if the training department kept a file someplace of all of their lesson plans?

A I don't know.

Q During the time you were supervisor of operations for either Unit 1 or Unit 2, was there a library at Three Mile Island?

A Yes.

Q Where was it? Was it in a trailer or in a building,or just generally?

A It was not a mobile library, but it moved around frequently.

Q What was in the library?

A Books, periodicals.

Q Do you know what generally they covered, what topics they concerned?

A I would hope that the nuclear power industry was their main concern, but I don't have firsthand knowledge that that was in the library.

Q Did you ever go to the library?

A Ever? Yes.

Q Why did you ever go to it?

A I don't remember what motivated me to go to the library.

Q When you indicate that the library moved around a lot, why was it moving around a lot?

A The training department was moving around, and it normally traveled with the training department, although there is now a central library in the Unit 2 Administration Building which has much more permanence.

Q When was that established, before or after the accident?

A I believe it was after the accident.

Q Do you ever recall during the time when you were a trainee, either while you were supervisor of operations or some other time, did the training department ever give you assignments that required you to go to the library to look something up?

A I don't remember any specific assignments that required that action.

Q Did you have in your possession something called a horse book?

A There was such a book, and it was a recognized source of training material, and I imagine

I was presented one by the training department, but I don't know if I ever carried it to my desk or not.

Q What was in the horse book, do you know?

A The information that is needed to be known by licensed operators.

Q Do you know who put together the horse book?

A No.

Q You don't recall if you have one in your possession today?

A No.

Q Do you know why it is called a horse book?

A It was an attempt to condense the entire literature of licensing to several hundred pages for ease of study.

Q During the time you were employed by Metropolitan Edison Company at Three Mile Island and prior to the accident, did you ever keep notes of training that was administered to you by anybody?

A I have great difficulty with that word "ever" you keep throwing in there. I don't remember any specifics, but I know if you go through my desk, you will find some training materials and I probably put them there, so I kept them. I guess the answer to your question is yes.

Q Has anyone gone through your desk to see what is in there recently?

A People have called and asked permission to do so. I have granted that permission by telephone. I was not present at the time it was done.

Q Do you believe it was done?

A Yes.

Q Do you recall whether during the time you were at Three Mile Island and before the accident, the training department used video tapes in its training?

A Yes, I viewed several video tapes as part of my training.

Q Do you recall ever using books, textbooks, which were associated with video tapes?

MR. SELTZER: What do you mean by the verb "associated"?

MS. WAGNER: I mean books written to go along with the tapes.

A I believe that there were a series of video tapes that had self-study material associated with them.

Q At any time while you were employed at Three Mile Island and before the accident, did you become familiar with the final safety analysis review?

A If you are referring to Chapter 13 of the

FSAR in Unit 1 and Chapter 14 of the FSAR in Unit 2, yes, I was familiar with both.

Ch 15 U-2

Ch 14 U-1

Q What did those chapters concern?

A The transient analysis for which the ; was designed.

Q How did you become familiar with those chapters?

A My first exposure and hence probably the lasting impression was gained in the B&W technology course in 1969 as it was taught in Lynchburg, Virginia by Jim Millett.

Q At that time there was an FSAR for Unit 1 in effect?

A No, there was some literature that was put together to train us in the transient analysis. In fact, it was called an accident analysis, and by the time it was formalized through the PSAR stage and the FSAR stage, it became transient analysis.

Q What is the PSAR?

A Preliminary safety analysis report, a document that is required to be submitted by Part 5 to the NRC.

Accident Analysis

Q How did you become familiar with what i in those chapters, Chapters 13 and 14 of the TMI-1

FSAR's?

A Our initial exposure was at the B&W technology course.

Q That is before there was an FSAR, isn't it?

A Yes.

Q When did you become familiar with what is in the FSAR?

A Starting in the B&W technology course in '69 and reviewing all the drafts that finally led to a final product.

Q You reviewed all the drafts?

A I think I did.

Q Why did you review the drafts?

A For information.

Q Do you know what the purpose of the FSAR is?

A Yes.

Q What is it?

A To describe to the Nuclear Regulatory Commission and the public the design, construction, operation and testing of a nuclear power plant.

Q Is a utility required to submit an FSAR in order to obtain a license?

A Yes.

Q Is the utility bound to operate as described in the FSAR?

A The FSAR is never memorialized, and hence is always subject to amendment, so that it would be possible to gain an amendment to operate out of any existing draft or FSAR that is in effect at any given day, but the one that is in effect at a given day must be operated within.

Q During the time you were supervisor of operations for Unit 2, was part of the training that was administered to the TMI-2 trainees administered by Babcock & Wilcox?

A I believe that to be true.

Q In your position as supervisor of operations, did you feel it was part of your responsibility to review the training given by Babcock & Wilcox?

A No.

Q Did you yourself attend any training given by Babcock & Wilcox?

A I attended the yearly qualification training at the simulator.

Q Did you ever become aware that B&W was critical of some of the trainees at Unit 2?

A Yes.

Q When did you become aware of that?

A The evaluation reports on the trainees were forwarded to the site.

Q Do you recall what year that was?

A No.

Q Did this concern the initial group of trainees for Unit 2?

A It could have included those.

Q Do you recall what the basis of the criticism was?

A No.

Q Do you recall whether you did anything about it?

A I have no such recall.

Q Did you ask anyone else to do anything about it?

A Whatever was done about it would have been done in concert with the supervisor of training and myself.

Q Do you recall what was done?

A No.

MS. WAGNER: I would like to have marked as B&W Exhibit 461 a document, three pages, addressed to Herbein from G. P. Miller, dated

6/24/76.

(Three-page document dated 6/24/76, to Mr. Herbein from G. P. Miller, marked Bl Exhibit 461 for identification, as of this

BY MS. WAGNER:

Q Have you ever seen B&W 461 before?

A Not that I remember.

Q I note for the record that you are listed on the third page as a recipient.

During June 1976, were you supervisor of operations for Unit 2?

A Yes.

Q Do you remember Mr. Herbein's position at that time?

A No.

Q The memorandum appears to concern training of Unit 2 CRO's, and on page 2 it indicates that "Floyd should document any additional info."

Do you recall being asked to document any additional info on Unit 2 CRO training during that time?

MR. SELTZER: It doesn't say Floyd, it says Floyd/Tsaggaris.

MS. WAGNER: It says "Floyd/Tsaggaris -

should document for themselves and to GPM/JGH any additional info they have."

Q Do you recall being asked to document any additional information for training of TMI-2 CRO's?

A No.

Q The next sentence indicates, "We have given them a better than fair program to pass - Note: if I sent Walt Perks, the odds might be better but we have given them what they need and more now."

Do you know what was meant by the comment "if I sent Walt Perks, the odds might be better"?

MR. SELTZER: You mean does he know what Gary Miller meant when Gary Miller wrote that?

MS. WAGNER: Not what Gary Miller meant, but do you have a meaning independently of why the odds would have been better?

MR. SELTZER: Are you asking him thinking what this meant when he got this memo?

MS. WAGNER: Yes.

MR. SELTZER: I object. He said he doesn't recall getting this memo.

Q Do you have any recollection at all of thinking that the odds might be better with respect to training if Walt Perks were sent someplace?

A I have no such recollection.

Q Who was Walt Perks?

A He was a shift foreman in Unit 2.

Q The third page indicates, "Street could not identify specifics - he states that they are shallow and when he digs in, he finds this generally."

Do you recall anybody ever telling you that Unit 2 CRO's were generally shallow?

A No.

Q Did you ever believe Unit 2 CRO's were generally shallow?

A No.

Q On that same page there is a comment, "Push B/W to keep reasonable."

Do you recall at any time being instructed to keep B&W reasonable?

A No.

Q Do you have any idea at this time what that meant?

A No.

Q Do you recall any difficulties with the Unit 2 training program of CRO's during 1976 or 1977?

MR. SELTZER: I object. That question is vague and ambiguous and overly broad.

Q Do you recall yourself being displeased with the progress of Unit 2 CRO's in training?

A I have no such recall.

MS. WAGNER: I would like to mark as B&W Exhibit 462, a document on the letterhead of Metropolitan Edison Company dated 3/1/77, concerning Unit 2 OJT weekly progress report.

(Document on letterhead of Metropolitan Edison Company dated 3/1/77 marked B&W Exhibit 462 for identification, as of this date.)

Q You are welcome to review the whole document, but I just want to question you on the front page of it. Have you ever seen B&W 462 before?

A Not that I can recall.

Q Again, I note for the record that you are listed as one of the recipients of the memo. The first sentence of handwriting on the memo is, "We are in trouble in this program," and the memo concerns Unit 2 OJT.

Do you recall ever being aware that there was some "trouble" with respect to Unit 2 OJT?

A No, I have no such recollection.

Q What is OJT?

A On-the-job training.

Q Do you remember any discussion with Gary Miller on or about March 3, 1977 concerning "trouble" in the OJT program?

A No.

Q Do you recall ever thinking that the OJT program for Unit 2 had to be speeded up?

A I have no such recall.

Q During March of 1977, were you supervisor of operations for Unit 2?

A Yes.

Q Do you recall during the time you were supervisor of operations for Unit 2 whether or not the General Physics Corporation ever gave any training to the reactor operator candidates for Unit 2?

A Not specifically.

Q Do you recall generally whether General Physics ever gave any kind of instruction to TMI personnel?

A It is my belief that we have had them on the Island several times. Whether it was specific to Unit 2 or not, I don't recall.

Q Do you recall for what purpose they were at the Island?

A I don't recall.

Q Do you recall yourself ever being trained by them, by personnel from General Physics?

A No, ma'am.

Q Do you recall ever being administered a test by General Physics?

A No.

MS. WAGNER: I would like to have marked as B&W 463 a document on the letterhead of Metropolitan Edison Company dated July 18, 1977, subject: General Physics Audit Exam Results.

(Document dated July 18, 1977, on letterhead of Metropolitan Edison Company, subject: General Physics Audit Exam Results, marked B&W Exhibit 463 for identification, as of this dat

Q Have you ever seen B&W 463 before?

A Not that I recall.

Q Again, I note for the record that on the fourth page you are listed as a recipient of a copy the memorandum.

In July 1977, is it correct you were supervisor of operations for Unit 2?

A Yes.

Q On the first page there is a discussion about an oral exam conducted by General Physics, and there is

a section entitled "Areas of weakness/strength." Subcategory C indicates, "Candidates were generally weak in operating and emergency procedures. This area needs a good deal of review."

Do you recall ever hearing while you were supervisor of operations for Unit 2 that CRO candidates were weak in operating and emergency procedures?

MR. SELTZER: You mean other than the normal training programs?

MS. WAGNER: Or other than the normal training programs if they were changed.

A I do not so recall.

Q The second page indicates under the same subheading, at section N, "Generally weak on reactor theory."

Do you recall ever hearing or believing that the CRO candidates for Unit 2 were weak on reactor theory?

(Discussion off the record between the witness and his counsel.)

MR. SELTZER: Do you want to say anything additional?

THE WITNESS: Would you repeat the last question?

Q Do you recall ever hearing or believing that CRO candidates for Unit 2 were "generally weak on reactor theory"?

A I have no specific memory that they were weak in either procedures or reactor theory. I would suspect from the date on this memo that the plant was not in operation at that time. The operators had not had the opportunity to use those procedures, and in the ensuing year while the plant was being tested, they would actually use the procedures and, therefore, become much more proficient with them. So although they may have been diagnosed as weak in this point of time, it is not to be unexpected in light of the plant construction status.

Q Isn't it correct that some of the CRO candidates for Unit 2 had been reactor operators at Unit 1?

A To the best of my ability to recall,the people listed on this last page, whatever number it is, as reactor operators were not reactor operators in Unit 1.

Q You are saying none of them were?

A None of them were. They may have been auxiliary operators in Unit 1, but not reactor operators.

Q Page 2 of the memo under the section about reactor theory refers to something called the six factor formula. Do you happen to know what that is?

A Yes.

Q What is that?

A The six factor formula is used to describe the state known as criticality in a nuclear reactor.

Q What were the six factors?

A Fast fission factor, resonance escape probability, thermal utilization, reproduction factor, fast non-leakage factor, and thermal non-leakage factor.

Q Page 3 of the document indicates at the bottom, "Copies of the oral exam results have been given to each candidate for review. By copy of this memo, Don Goodman is instructed to meet with Jim Floyd and set up mutual problem sessions with each candidate who received a fail or a marginal fail.

"At each session, the examiner's results should be reviewed in detail with the individual and a bargaining unit representative."

Do you recall ever meeting with Don Goodman and setting up mutual problem sessions with candidates who received a fail or a marginal fail?

A I have no such recall.

Q Do you recall ever meeting with a bargaining unit representative with respect to training of a reactor operator?

A I met with and probably all of them at many times, but I have no specific recall of any particular instance.

Q When you say you met with many of them many times, you mean with respect to training of a reactor operator or with respect to other purposes?

A With respect to that and other purposes.

Q The memorandum indicates "Be sure you document each mutual problem session."

Do you recall ever seeing any documentation of such problem sessions?

A No, but in discussions with the union about union people, we traditionally had a recorder there to take notes.

Q How were such notes taken?

A Longhand.

Q Where were such notes kept?

A Probably in the training department files, and if it was a disciplinary action, then it was in the man's individual personnel file.

Q I take it you do not recall having a problem session with Ed Frederick?

A No, I do not.

Q The next page indicates, the next page of B&W 463, "Jim Floyd should insure that maximum assistance is given to these individuals which are the fail and marginal fail people by the shift forem n and shift supervisor."

Do you recall ever being instructed to give maximum assistance to training of certain reactor operator personnel?

A Not specifically.

Q Finally, at the bottom of that page there is a list of suggestions made by General Physics examiner in order to prepare for the NRC exam. Suggestion C is, "Radiation monitors must all work and be in calibration" and all in calibration is underlined.

Do you recall at this time period insuring that all radiation monitors worked and were in calibration?

MR. SELTZER: This is addressed to somebody who is named Don, presumably Don Goodman.

Q Do you recall any effort made by anybody to insure that radiation monitors worked and were in

calibration?

A Yes.

Q When did that occur?

A Prior to fuel loading.

Q What was done?

A The instruments were repaired as necessary to make them operational.

Q Were the instruments broken?

A They had never been checked out from initial installation. They were not required until fuel loading.

Q Do you recall who did that work?

A John Brummer would have headed up the activity as the instrument engineer in charge and the I&C department would have assisted him in the actual repairing.

Q Was Mr. Brummer somebody who reported to you at that time?

A No.

Q Who did he report to, do you know?

A He was lead I&C engineer, and as such he would have reported to the old title of plant engineer, which by now probably had a new title.

Q Is I&C instrumentation and control?

A Yes.

Q Was Mr. Brummer a Metropolitan Edison employee?

A Yes.

Q Do you recall during the time you were supervisor of operations at either Unit 1 or Unit 2 any formal program administered by Metropolitan Edison Company to evaluate trainees for nuclear power plant operation?

MR. SELTZER: When you say trainees, what do you mean by that?

MS. WAGNER: People in training to become reactor operators.

MR. SELTZER: So people who had not yet gotten an RO license?

MS. WAGNER: People who had not yet gotten an RO license for which plant they were in training to get an RO license for, so I would include people in that who were licensed for Unit 1 but were in training for a license on Unit 2.

A The training department had programs for each and every category of job, and they were for the most part, especially in the area of reactor operators, formalized programs with weekly testing and

end-of-course type exams.

In addition, the candidates were given a final written and oral prior to sitting for the NRC exam.

Q Do you know if records of these various tests were maintained any place?

A I have no personal knowledge of their location.

Q During the time that you were supervisor of operations for either unit, did you believe that it was part of your responsibility to review these tests? I should say operator's performance on these tests.

MR. SELTZER: For all the tests or any of the tests?

MS. WAGNER: Any or all.

A I traditionally reviewed their performance on the final written and oral exams prior to allowing them to sit for an NRC exam.

Q Do you recall any instance in which you did not allow somebody to sit for an NRC exam because of their performance in the exams administered prior to that exam?

A I remember it happened. I do not remember the candidates' names.

Q Do you remember for which unit?

A Both units.

Q When that happened, what would the candidate be told to do? Was he to go back into training or was he dismissed?

A It was handled on a case-by-case instance, and if the man was only marginally weak, he could be put into an especially designed training program to correct his weaknesses, and then send him onward.

If he had sown unsatisfactory progress, he might be returned to his old job or in some cases he may have been hired into the company with the stipulation that he receive this license, and if he could not, he would then be sent back to the street as opposed to a previously held job.

MS. WAGNER: I would like to have marked as B&W 464 --

MR. SELTZER: When you said back to the street, did you mean that his employment with Met Ed would be terminated?

THE WITNESS: Yes.

MS. WAGNER: I would like to have marked as B&W 464 a series of documents entitled Progress Report Sheet.

(Series of documents entitled Progress Report Sheet marked B&W Exhibit 464 for identification, as of this date.)

Q Have you seen the documents which we have marked as B&W 464?

A I have no recollection of having seen these documents before.

Q These documents were sent to us with the representation that they came from your files. Do you have any knowledge as to why they would have been in your files?

A No.

Q Have you ever seen documents similar to this before?

A Not that I remember.

Q Have you ever heard of somebody called J. Smith who is a foreman of some kind?

A Yes.

Q Who is he?

A James Smith, and he has a middle initial because we had several James Smiths on the Island, but I think it was R. He was a shift foreman in Unit 1.

Q The first document here entitled Progress Report Sheet under the list, the column entitled

Assignments says, "Check Carol printout for JC."

Do you know what a Carol printout was?

A It was a printout provided to us by B&W, and I don't remember what its usefulness was.

Q I would like to show you a document which has been produced to us with the representation that it came from your files. The document has a file number of 9-2793-2-1 and bears production numbers W 22608 through W 22890, and it is entitled Unit 2 Systems - OJT -J.R.Floyd.

Have you ever seen this before?

A Not that I recall.

MS. WAGNER: We will recess for lunch.

(Luncheon recess: 12:20 p.m.)

oOo

AFTERNOON SESSION

2:00 p.m.

JAMES R. FLOYD, having been previously sworn, resumed and testified further as follows:

EXAMINATION (Continued)

BY MS. WAGNER:

Q Are you aware you are still under oath?

A Yes.

MS. WAGNER: I would like to have marked as B&W 465 a document which has been produced to us as being from the files of Mr. Floyd. It is called An Operational Sequence of Events and it is file number 18-2790-22-1.

(Document entitled An Operational Sequence of Events marked B&W Exhibit 465 for identification, as of this date.)

Q Have you ever seen B&W 465 before?

A I do not believe I am familiar with this annotated copy of B&W 465.

Q Are you familiar with an unannotated copy?

A Or at least a different annotated copy.

Q What is it?

A An operational sequence of events.

Q For what sequence of events?

A For March 28, 1979 at TMI-2.

Q Do you know who put together that sequence of events?

MR. SELTZER: You mean sans the notations?

MS. WAGNER: Yes.

A I am not sure who put this one together.

Q Do you have any idea whether it was anybody at Met Ed?

A I worked on a document very similar to this, but I don't know if this is the same document.

Q Were you the only person working on that document?

A No.

Q Who else was working on it?

A Ed Wallace and Bill Burley.

Q Who is Ed Wallace?

A He is an engineer with GPU.

Q Who is Bill Burley?

A The same for Bill Burley.

Q Do you know whose annotations are on the copy that you have of B&W 465?

A While paging through it, I saw one

annotation far back that was mine, but the majority of these are not mine.

Q Do you know whose they are?

A No, I do not.

Q Do you know why this document was in your files, and I mean the one with these annotations on it?

A If my annotation appears back further, I may have worked off of it.

Q You have no recollection now of having done so?

A Not off of this particular one, no.

MS. WAGNER: I would like to have marked as B&W 466 another document identified to us as having been from the files of Mr. Floyd. It is entitled Volume 2 Accident.

(Document entitled Volume 2 Accident marked B&W Exhibit 466 for identification, as of this date.)

Q Have you ever seen B&W 466 before?

A Again, probably not this annotated sequence but a similar document.

Q Do you know who put together the document, the basic document without the annotations?

A I suspect I had a hand in the sequence of

events.

Q Do your annotations appear on that sequence of events?

A Some of the annotations that appear in this sequence of events are mine.

Q Do the annotations of any other persons appear on it?

A On the actual sequence of events itself, I see no other markings other than mine on a quick cursory once-through, but I believe on the first page, November 2, 1979 draft is not my handwriting.

Q Do you recall roughly at what time period you were working on this document?

A The second half of 1979.

Q Were you again working with the two people you identified previously?

A Yes.

Q Were you working with anybody else?

A It would seem like there were other people peripherally involved, but I can't remember who they were.

Q The people you recall, were they Metropolitan Edison personnel or some outside organization?

A Probably both.

Q Do you recall a company called Stafco?

A Yes.

Q Did you work with them on this document?

A I believe they were involved in this document.

Q Were they involved in B&W 465, the sequence of events that I showed you previously?

A That looks like an earlier draft of what appears in here, and whether they were involved at that earlier point in time, I don't know.

Q Do you know who hired them?

A No.

Q Do you know what they were supposed to be doing?

A I thought they were typing up the final version for us.

Q Were they professional typists?

MR. SELTZER: You mean is that one of the things they did?

MS. WAGNER: Yes.

A I don't know.

Q Do you believe that is the only thing that they did?

A They may have been involved in the technical review as well.

Q Technical review of the sequence of events?

A Yes.

Q B&W 466 appears to be Volume 2 of something or another. Have you ever seen any other volumes?

A Not that I can remember.

Q Do you believe you worked on any other volumes related to this one?

MR. SELTZER: I thought he said he couldn't recall any other volume.

A Without a better identifying title page, I can't put it into context.

Q During the time period you were supervisor of operations for Unit 2, did you ever hear of something called a pre-simulator program?

A Not that I can recall.

Q I show you a document which has been previously marked as B&W 260. It is the training section of the FSAR for Unit 2.

Have you seen B&W 260 before?

A Yes.

Q Are you generally familiar with the training programs that are described in the document?

A Yes.

Q Referring now to Section 13.2.1.1.2 called Initial Non-Supervisory Staff (RO license), the section lists several training programs for reactor operators. The first one is training reactor operation conducted at Penn State University. Do you recall such a program?

A I did not participate in such a program.

Q Do you recall that such a program existed?

A On reading this document, I do.

Q Do you recall who conducted that program, and by whom I mean which entity rather than which human being?

A I would imagine it was in the capable hands of Penn State University.

Q The section described Training Program is practical observation experience. Do you recall that training?

A On reading this paragraph, my memory is refreshed. Yes, I remember it.

Q Do you recall who conducted that training program?

A Metropolitan Edison.

Q The third section is PWR Simulator Training,

which was at the Babcock & Wilcox simulator facility. I assume Babcock & Wilcox conducted that one?

A Yes.

Q Did you ever discuss that program with Babcock & Wilcox?

A I have no specific recollection of having discussed it; however, it would have been part of my normal job function to have discussed it.

Q Section D is Unit 2 NSSS secondary and balance of plant systems. Do you recall that program?

A No, that one does not stand out in my mind even after reading this paragraph.

Q I take it you don't recall personally a course consisting of 160 hours of classroom training in Unit 2 systems?

A That is true, I do not recall that.

Q Section E is Nuclear Theory Review. Do you recall that training program?

A No, I do not recall that one either.

Q I take it, again, you do not recall participating in that?

A That is true.

Q The next, Section F, is entitled Advanced Systems Procedure and Nuclear Theory Training, and it

lists training in such subjects as emergency procedures, abnormal procedures, technical specifications and nuclear theory. Do you recall that training program?

A I do not recall it.

Q You do not recall participating in it?

A No, I do not.

Q Do you recall ever hearing that anybody else was participating in such a program?

A In these words that are written here, I can assume it was part of the normal six-week retraining cycle, but I have no recollection of it.

Q Immediately beneath Section F there is a sentence which says, "The programs described in 13.2.1.1.2-B and 13.2.1.1.2-D-F will be conducted by the TMI staff."

Do you know if that is correct?

A I know the words you read are correct.

Q Do you know whether or not that is a correct statement of what actually happened at TMI?

A No, I can't testify to that, since I can't remember the courses. I would not remember who taught the courses.

Q Were you familiar with training known as requalification training at TMI-2?

A Yes.

Q What was requalification training?

A The operation staff was on a six-shift schedule, so that one week out of six they were assigned to the training department for the sole purpose of keeping their knowledge of the plant current. It is that training program that is traditionally referred to as the requal program.

Q Is it correct that that program begins right after you get a license?

A Yes.

Q Did you participate in the Unit 2 requal program?

A Yes.

Q Page 13.2-6 under a section entitled Program Schedule indicates, "The Metropolitan Edison requalification program consists of 4 interrelated segments which run concurrently. These segments are:

"1. Operational review lecture series.

"2. Fundamentals and system review program.

"3. On-the-job training.

"4. Annual evaluation examinations."

Do you recall each of those parts of requalification training?

A Yes.

Q Do you know who conducted the operational review lecture series?

A Metropolitan Edison training department.

Q Do you recall who conducted the fundamentals and system review program?

A Metropolitan Edison.

Q Do you recall who conducted on-the-job training?

A Metropolitan Edison.

Q Do you recall who conducted annual evaluation examinations?

A Metropolitan Edison in most cases. There may have been a contractor who came in for some exams but most of them were by the company.

Q Page 13.2-7, I believe, Section 13.2.2.2 called Pre-planned Lectures, indicates that the operational review lecture series will include, among other things, lectures concerning reportable occurrences. Do you recall such lectures?

A Yes.

Q Did you ever give such lectures yourself, personally?

A I can't recall giving any such lectures.

Q But you recall having received such lectures?

A Yes.

Q Do you recall from whom you heard such lectures?

A It would be members of the training department staff.

Q What are reportable occurrences?

A Events that are required to be reported to the Nuclear Regulatory Commission by the technical specification.

Q Do you recall or can you describe for me generally what kind of events are required to be reported?

MR. SELTZER: Reported by whom? The licensee, by the vendor?

MS. WAGNER: The witness just said some kind of events are required to be reported and those kinds of events I am inquiring about.

MR. SELTZER: Are you referring to as it is referred to in this training item?

MS. WAGNER: I am referring to the witness' prior answer, whatever that referred to.

A My prior answer referenced the technical specification which only the licensee would have. Therefore, I am limiting myself to reports made to the NRC by the licensee, and they would be such things as reactor trips, releases of radiation, property damage, loss of facility time.

Q What individual or job title in Metropolitan Edison, while you were supervisor of operations, would be responsible for actually making that report?

MR. SELTZER: Are you asking who prior to the accident was responsible?

MS. WAGNER: Yes, who prior to the accident.

A Probably the chairman of the PORC.

Q Did you have any role prior to the accident as supervisor of operations in reviewing reports made to the NRC?

MR. SELTZER: Are you talking about reportable occurrence reports?

MS. WAGNER: Yes.

A In most cases, yes.

Q Do you recall whether during lectures on reportable occurences you were given materials to look at?

A In some cases, yes.

Q Do you recall ever having lectures about reportable occurrences at plants other than TMI?

A Yes.

Q Do you recall ever being given an LER or other similar document about an occurrence at another plant?

A I could not attest to the fact that it was an LER.

Q Do you recall being given anything that was a formal reporting document concerning an event at another plant?

MR. SELTZER: What do you mean by a formal reporting document?

MS. WAGNER: Something similar to an LER. Anything on which a plant reported a reportable occurrence.

MR. SELTZER: In other words, it has to be something submitted by a licensee to the NRC?

MS. WAGNER: That's right.

A I don't remember any such pieces of paper.

Q Do you ever recall reviewing such pieces of paper outside of the reportable occurrence lectures?

A I do not recall reviewing any specific licensee event report other than from our plant.

Q Do you recall generally whether while you were supervisor of operations that was a part of your job, reviewing such documents from other plants?

A As a part of my job responsibility, I attempted to stay current with the industry, but not always from their licensee event reports.

Q What methods did you use for staying current?

A Personal contacts, trade publications.

Q What kind of personal contacts did you have?

A B&W site representative would be one I was very interested in since he had contact with other units of similar design. I served on an ANS 50 committee which was people from the industry.

Q Is that it?

A That is all I can remember now.

Q What was the ANS 50 committee?

A Nuclear Power Generation Committee.

Q What was the purpose of this committee?

A We had many committees working for us, writing standards for the nuclear business, and we reviewed those various committees' work, which was normally on a piece of paper called a Standard, and forwarded them to ANSI for adoption as a national standard.

Q What was ANSI?

A American Nuclear Society -- no, American National Standards Institute.

Q When you say you were reviewing standards on nuclear operation, I believe you said, what do you mean by that?

A Proposed standards. For instance, there is one on treatment of radioactive liquid wastes in light water reactors.

There would be a similar standard for gaseous wastes. We also included the boiling water industry as well as the gas-cooled segment of the industry.

Q Did you ever have involvement with standards concerning the qualifications for operators of nuclear reactors?

A I believe 18.1 was under our jurisdiction.

Q Did you ever have contact with standards concerning simulators for the NSS?

A I do not recall that being a current topic while I served on the committee.

Q While you were supervisor of operations for Unit 2, do you recall what the requirements were for a reactor operator, what the educational requirements

were?

A Yes.

Q What were they?

A To be a company employee, he had to be a high school graduate, and he had to have a strong background at the high school level in mathematics, including trigonometry and physics, or be willing to acquire that strong background on his own.

Q Anything else that you can think of right now?

A Not that I can think of at this time.

Q How did Metropolitan Edison find out whether or not somebody had a strong background in mathematics at the high school level?

A I believe transcripts were required, but I can't attest to that.

Q Do you know if Metropolitan Edison would test people to become reactor operators prior to hiring them?

A The whole area of pre-employment testing has undergone many changes in the last fifteen years of my employment, or sixteen or seventeen. At some point in time, we went to pre-employment testing for auxiliary operators and in a normal mode of progression would

take them up to be control room operators. Whether that was instituted while I was supervisor of operations on either unit, I don't remember.

Q Do you recall during that time whether the applicant for a position as auxiliary operator was required to have the background in math and physics that you previously described?

A Or be willing to obtain it, yes.

Q If an applicant did not have such a background but was willing to obtain it, would Met Ed teach them that, or would they have to go someplace else to get it?

A They had to go to an outside contractor, although financial assistance might have been available.

Q During the period that you were supervisor of operations, did you feel that this was sufficient educational prerequisite for being a reactor operator?

A Yes.

Q Has your opinion changed since the TMI-2 accident?

A No.

Q Do you know if records were kept while you were supervisor of operations for each control room operator which would indicate what their training at

Metropolitan Edison had been to that date?

A I don't have firsthand knowledge of those records.

Q Has anyone ever told you that such records exist?

A Yes.

Q Have you ever reviewed them as supervisor of operations?

A Not en masse.

Q Ever specifically for a given person?

A For any given person who was having difficulty with a program, I would review his lack of progress with the training department, and that would frequently involve a review of his records.

Q During the period while you were supervisor of operations, do you recall any complaints by the Metropolitan Edison training department concerning the aptitude, for example, of reactor operators being trained?

MR. SELTZER: Are you asking whether there was a comment that generally the aptitude of the trainees was not good enough?

MS. WAGNER: Yes.

MR. SELTZER: Rather than that aptitude

of a particular one was lousy?

MS. WAGNER: Right.

A Aptitude for training is very much a function of the man's personality, and since we didn't have a personality screening portion but only an aberrant behavior scanning of the person, their aptitudes for training were as varied as were their personalities. As such, some were greatly encouraged and some were discouraged.

Q When you say encouraged or discouraged, you mean by the training department or by themselves?

A Either or both.

Q You mentioned aberrant behavior screening.

A Yes.

Q When was that administered, at what period during the progress of a reactor operator?

A Pre-employment, I think.

Q If somebody came in as an auxiliary operator, it would be administered prior to that employment?

A Yes.

Q Do you know what kind of behavior is being looked for in that screening process?

A No.

Q Have you ever seen the results of any such

screening?

MR. SELTZER: These are for the people who are not hired?

MS. WAGNER: The people who are hired or the people who are not hired.

Q Any screening?

A No.

Q Are records of those screenings kept?

A It is not within my area of knowledge. I don't know.

Q Do you know who would know?

A The personnel office would know.

(Recess taken.)

Q I believe you testified previously that you recalled giving testimony to the President's Commission on the accident at Three Mile Island.

A Yes.

Q I would like to show you a transcript which I believe is yours and ask you if that is the transcript that you recall.

MR. SELTZER: What is the question?

Q Does this transcript record the testimony that you gave to the President's Commission?

MR. McBRIDE: The testimony is rather bulky.

I wonder if you can represent that this is a copy that has any marginalia or corrections marked on it?

MS. WAGNER: As far as I know, it is a true copy of the testimony. I don't know about marginalia, but I believe Mr. Floyd's signature is on the back page someplace.

A I believe that to be my testimony in front of the President's Commission.

Q I would like to refer you to page 98 of that testimony and specifically to the following questions and answers:

"Q Do you remember any of the specific complaints with respect to substantive areas?

"A No, the training department liked to teach us some transient analysis and the control room operators are normally reticent to learn transient analysis.

"Q Why is that?

"A They are rather a deep and complicated subject."

That is not the whole answer.

Do you recall being asked those questions and giving at least in part those answers?

A I have just taken the time to read the complete answer of which you quoted the first sentence, and it goes on for over two pages, and no, I don't remember answering that question in that way.

Q You do not remember?

A No. At this point in time, I don't remember having said that.

Q Do you remember what you meant at that time by transient analysis?

MR. SELTZER: He just said he doesn't remember giving this answer.

MS. WAGNER: He may still remember the phraseology of transient analysis.

MR. SELTZER: The question is do you remember saying transient analysis in answer to this question.

A I don't remember saying transient analysis in answer to this question.

Q Further along in the answer to the question, "Why is this?" the testimony reads, "We have not yet progressed to the point where we can bring it down to the operator's level and get them very excited about it. It tends to cop out in the early morning very rapidly when you bring up such a subject as that. There are

traditional areas where operators are not interested."

Do you recall that part of your answer?

A No.

Q Do you know whether no you have progressed to the point where you can explain transient analysis to the operator?

A I don't believe my reference said you can't explain transient analysis to the operator. I believe it said more to the motivation of the operator in receiving that training.

Q Do you believe now that you are further along in motivating the operator to receive that training?

A I suspect March 28, 1979 was a large motivator in that respect.

Q Your answer further reads, starting at Line 25 on Page 99, "It just seems like transient analysis has always been difficult to teach to operators, mainly because the mathematics involved is calculus and operators don't have that degree of background in mathematics, so everything has got to be a first approximation to them."

Do you recall giving that part of your answer?

A No, I do not.

Q Do you recall ever being aware that the training department was teaching transient analysis to the operators at TMI?

A To the extent that the FSAR addresses itself to transient analysis, which was primarily a B&W input, I would have expected the training department at Three Mile Island to be requiring that level of understanding of the reactor operators.

Q Requiring what level of understanding?

A That which appears in the FSAR.

Q Do you recall ever personally receiving training in that subject from the Metropolitan Edison training department?

A The operator product that comes out of the transient analysis is emergency procedures, and we received extensive training in emergency procedures which are founded on the transient analysis.

Q So I understand your answer, are you saying that the training you received in transient analysis was only training on procedures?

A That is all I can recall at this time.

Q But you believe there was something else?

A Yes.

Q Do you believe during the time you were supervisor of operations that the reactor operators at TMI-1 and TMI-2 understood the transient analyses in the FSAR of either Unit 1 or Unit 2?

MR. SELTZER: Is it clear what transient analyses are referred to in the FSAR?

MS. WAGNER: Whatever they are. I think the witness has evidenced some familiarity with the FSAR.

MR. SELTZER: I think he said to the extent transient analyses are included in the training section of the FSAR, those would be taught.

MS. WAGNER: I don't think he is referring to the training chapter.

Q Isn't it correct there is a section of the FSAR that deals with transient analysis?

A Yes.

Q Do you believe the operators understood the transient analysis in the FSAR?

A To the extent required by the NRC in the issuance of operators' licenses, they do so understand.

Q Upon what did you base that belief?

A That the NRC was issuing operator licenses.

Q Is it correct that the position of auxiliary

operator or control room operator at TMI prior to the accident was a union position?

A Yes.

Q Do you recall the name of the union?

A International Brotherhood of Electrical Workers.

Q Were you ever a member of the union?

A No.

Q I believe you testified previously that you did have on occasion some contact and discussions with union members. Is that correct?

A Yes.

Q Did you ever have any discussions with the union concerning promotion decisions for operators?

A The union which we have at Three Mile Island is a closed shop, and as such, employment with the company in production positions, union membership is required as a condition of employment. Promotion is fairly tightly controlled by the labor agreement between the union and the company, and therefore promotion to CRO, for instance, from auxiliary operator was not an area with great latitude. The senior qualified man received the job, and therefore, of the

men who bid the job, we picked the senior qualified man, and you notified the union that you were promoting him, but there was very little, if any, room for discussion of the issue.

Q During the period that you were supervisor of operations at TMI-1 or TMI-2, did you ever see the labor agreement between the union and Metropolitan Edison?

A Yes, a copy stayed in my desk at all times.

Q Do you know if a copy is in your desk now?

A I don't think I have in my possession a copy of the current contract.

Q Do you know where I could find a copy of the contract which was in effect in 1978?

A I would start in Mr. John Wilson's office.

(Discussion off the record between the witness and his counsel.)

A In talking about the promotion from auxiliary operator to CRO, I said that senior qualified man, and that does not just mean the senior man; that means of the qualified people, the man who is most senior is promoted.

Q I assume your use of the term man includes woman too?

A It has turned out to be that way, yes.

Q Is it correct that before Unit 2 started up, there was some discussion within Metropolitan Edison about the possibility of cross-licensing personnel?

A Yes.

Q Were you involved in those discussions?

A Yes.

Q Is it correct that there was discussion with the IBEW concerning cross-licensing of reactor operators?

A Yes.

Q Were they in favor of cross-licensing?

A The IBEW was not in favor of cross-licensing.

Q Were you in favor of cross-licensing at that time?

A At that time I was, yes.

Q Is it correct that you are no longer in favor of that?

A I don't know that I have decided.

Q Are you in doubt?

A Yes.

Q Do you recall why the union was not in favor of cross-licensing?

MR. SELTZER: You mean what is his

understanding of why the union --

MS. WAGNER: That's right.

A It is my understanding based on my best recollection that the union felt it was too much knowledge to be testable on every year.

Q Was the union taking this position with respect to reactor operators, control room operators?

A Yes.

Q Were control room operators cross-licensed?

A No.

Q Is it correct that supervisory personnel were cross-licensed?

A Some supervisory personnel were cross-licensed.

Q Starting at what position were personnel cross-licensed?

A Shift supervisors and supervisors of operations.

Q Therefore, I take it you were cross-licensed?

A Yes.

Q Is it correct that you took a course concerning the differences between Unit 1 and Unit 2?

A Yes.

Q Was that differences in systems,both

primary and secondary?

A Yes.

Q Were there differences in the procedures?

A Yes.

Q Were there differences in the control rooms?

A Distinct differences, yes.

Q Did you prefer one over the other?

A I preferred only that they be different.

Q Is it correct that the Unit 2 control room was larger than the Unit 1 control room?

A Yes.

Q Is it correct that Unit 2 was more difficult to operate than Unit 1?

A No.

Q Was Unit 2 a higher megawatt plant than Unit 1?

A Slightly.

Q Were you involved in the design of the Unit 2 control room?

MR. SELTZER: What do you mean by involved in the design?

Q Were you consulted about it?

A I reviewed the design.

Q Did you approve it?

A No, I was not called upon to approve it.

Q Did you approve of it?

MR. SELTZER: Were you asked to form or express a judgment about whether you approved of it?

Q My question is not whether you were asked to do so but whether you did so.

A I had some comments on the design after I had looked at the plans for the control room.

Q Do you remember what those comments were?

A No, I do not.

Q Do you remember generally what they concerned?

A Locations of controls in relation to meters which you needed to observe while operating those controls, the actual placement of panels and accessways.

Q Do you recall if your suggestions were adopted?

A I recall generally that some probably were accepted and some were not.

Q You do not now recall specifically any one of those suggestions?

A No.

Q Do you know if at the time that the TMI-2

control room was being designed and constructed, whether any control room operators were asked to give their opinions of its design?

A The people we were training to be the control room operators in Unit 2 had never been control room operators, so I doubt that we would have called on them to do a review. We may have called on some Unit 1 control room operators, because they had experience as control room operators. I don't know that we did, but we could have; but for a man moving into a new job, it is a little hard for him to evaluate his work environment when he doesn't know what the work entails yet.

Q Who besides you did evaluate the control room design?

A The engineers in Unit 2.

Q Were these engineers who worked for Metropolitan Edison or for General Public Utilities?

A I know in some instances where the men were employed by Metropolitan Edison Company, but I don't know who was everyone's employer.

Q Do you recall anybody other than the engineers who was involved?

MR. SELTZER: Involved?

MS. WAGNER: In the evaluation of the

design of the control room for TMI-2.

A No.

Q At any time while you were employed at TMI, were you taught any method by which you should scan the console when you were in the control room?

A I don't know that we had a preference to go from left to right or right to left, but I am sure we had a desire that the man be thorough.

Q Do you recall whether you were told that certain information available on the console was more important than other information available on the console and so should be more frequently checked?

A That seems reasonable.

Q Do you remember what would have been considered important?

MR. SELTZER: Are you asking what would have been, which sounds hypothetical, or are you asking what was?

MS. WAGNER: What was.

A In Unit 1, we marked the meter phases and the alarm windows that were associated with emergency core cooling and reactor building isolation and cooling in blue, so that they would stand out to the operator's eye.

Q You said that was in Unit 1?

A Yes.

Q Was anything similar done in Unit 2?

A We had colored some of the alarm windows to bring them to the operator's attention a little bit more easily, and I think the engineered safety features equipment which I spoke of earlier in Unit 1 was probably laid out in a little bit more logical design than Unit 2, but some of those meters may have been done in blue also.

Q When you say in Unit 2 some of the alarm windows were colored, do you remember which alarm windows?

A I remember four particular ones that were associated with the RPS channels, where any two out of the four would trip the reactor. Since those four channels are colored throughout the plant red, yellow, blue and green, we color-coded the windows to agree with the channel color.

(Continued on Page 116.)

Q Do you recall whether any other alarm windows were highlighted in some fashion?

A Turbine trip alarm came through in red.

Q What was the color through which most of them came?

A White.

Q Is there anything else that you can recall that control room operators were taught was a more important parameter than others and should be surveyed frequently?

MR. SELTZER: When you say "should be surveyed frequently," are you talking about during normal operation?

MS. WAGNER: Yes.

A I don't remember that this is what was said, but I would say today and probably would have said it 15 years ago that when the plant is at power, flow, temperature, and pressure, and power are the four most important parameters in the control room. When the reactor is shut down, some other meter might have been important, such as pressurizer level.

Q Where did you learn about the four particular things you just testified about, temperature, pressure, flow, and power, I believe it was?

A I don't know that I was ever taught that, but they always enter the reactor protection system, and, as such, they are important parameters to plant safety, parameters that are important to plant safety.

Q While you were supervisor of operations, were you aware that there was information available in the control room on a historical basis as opposed to a simultaneous basis? In other words, something which you could perceive information on a trend basis for?

A Yes, we had recorders in the control room.

Q Do you recall why some information was trended?

A I don't think I ever entertained that question before in that manner, so, no, I don't know what was the architect/engineer's or B&W's why they trended one thing and didn't trend another.

Q You don't believe Metropolitan Edison cared what was trended or not trended?

MR. SELTZER: Objection. No foundation.

Q You say you never thought about it before?

A Not in that light as to what is the philosophical basis for trending. From the standpoint of the operator, I know that I liked this parameter trended and that paramater trended, and I would have

looked that they be trended, and, in fact, Unit 1 in the B&W scope of supply, the source range level was not trended, and we installed a special recorder so we could trend it, and I think that a similar type review was done of the Unit 2 control room by me, and if there was something missing, I would have added it.

Q Do you recall now what kind of things you liked as an operator to see trended during the period before the accident?

A On the B&W plant, the makeup tank level and pressurizer level have to be trended in order to have a visual display of inventory. I already mentioned the source range, but the intermediate and power ranges become just as important when the plant is in those power ranges.

Condenser vacuum is very convenient to have trended. When you are losing vacuum, it is nice to see how fast you are losing it.

Q Why do you like to see that?

A You don't have too much time before the turbine is going to trip on you. That makes a lot of work.

Q Why does the condenser lose vacuum?

A For any number of four reasons, all of which

are mechanical failures.

Q In the Unit 2 control room, was there a utility printer?

A Yes.

Q What was its function?

A To print out on demand by the operator from the B&W supplied 855 computer by Bailey Meter Company parameters of interest to him for which he needed a hard copy of the information rather than a CRT or digital window display.

Q Could he get information on the utility printer of any parameter in the system?

MR. SELTZER: What do you mean "in the system"?

MS. WAGNER: Nuclear steam supply system.

A It is not a printer; it is a typewriter. But other than that, I don't know of any nuclear steam supply system parameter that he could not ask out on that machine.

Q If he were to ask it out, would he get the contemporaneous information or would he get some kind of trending information?

MR. SELTZER: Are you asking whether he could get out historic information for every parameter?

MS. WAGNER: I am asking in general was historic information available or was it only simultaneous, current information?

A For the most part, it was snapshot-current information. There were several parameters which were ten-minute averages of data, so those would have some historical flavor to them when they came out, and in addition, there was a daily output which the operator did not always take out and possibly a computer man did that, took out 24-hour summaries of selected data points.

Q Who selected the data points?

A The PDO output was specified by B&W.

Q What did you do with the 24-hour summaries?

A Sent it to Lynchburg.

Q Do you remember what parameters were available as ten-minute averaged parameters as opposed to just simultaneous parameters?

A Reactor coolant system loop temperatures could be taken out as either snapshot or ten-minute average data.

Q The operator would make that selection?

A By selecting a different point.

Q Do you recall anything else?

A No.

Q Do you believe there were others?

A Yes, I believe there were others.

Q Did you know prior to the accident at Three Mile Island that you could get information from the utility printer concerning the temperatures of the thermocouples from the tail pipe leading from the pilot operated relief valve?

A Yes.

Q Is it correct that those temperatures were also available on a strip chart in the control room?

A There were several multipoint recorders in the control room which were installed as backup to the 855 should it fail, and I don't have a clear enough memory to say that those temperatures specifically were on any of those multipoint recorders.

Q Did you ever hear of something called the sequence of events review?

A Yes.

Q What was that?

A It was a history of selected plant parameters that were recorded on a variable time interval from ten minutes before a reactor tripped until 10 or 20 minutes after the reactor tripped, and the

closer you were to time zero, the time of the reactor trip, was the closer the data was packed. In other words, you might have one-minute data points from five to ten minutes going in either direction away from time zero, but between five minutes before and five minutes after, you might have had the 30-second data.

Q Do you recall some or all of the plant parameters which were selected for that --

MR. SELTZER: Selected when?

MS. WAGNER: At the time he was supervisor of operations for Unit 2.

MR. SELTZER: That question assumes they were constant.

THE WITNESS: I believe they were. It was the cold leg temperatures, the hot leg temperatures, four power range channels, two intermediate range channels, main steam pressure, main steam temperature, feedwater flow, steam generator levels, main condenser vacuum, and I may have missed several.

BY MS. WAGNER:

Q To the best of your recollection, reactor coolant system temperature and pressure were not available on the sequence of events review?

A I said reactor coolant system temperatures, cold leg, and hot leg.

Q How about pressure?

A Yes, three channels of that.

Q Where did you learn how to use that instrument, the sequence of events review?

A From either [illegible] Meter Company or Babcock & Wilcox Company.

Q That is the only place?

A I forget.

Was the question directed to the computer or the sequence of events?

Q The sequence of events.

A That was taught to me by one or the other of the two companies.

Q To the best of your recollection, Met Ed did not teach you how to do that?

A No.

Q Did Met Ed teach you anything about the computer?

MR. SELTZER: The computer you are on now?

MS. WAGNER: Yes, the computer.

A Yes, Met Ed did teach me some things about the computer. Some of our programs are in there as well

as NSSS supply program.

Q Do you remember what some of your programs were? And by "your," I assume you mean and I mean Met Ed programs.

A Yes. We had a control rod position printout. That came out on the programmer's typewriter. We used that to complete a surveillance requirement daily when we were at power. I may have learned some of these finer nuances of the machine from our computer programmer as the years went on.

Q You mean Met Ed's computer programmer?

A Yes.

Q Who was that?

A Originally,it was Bob Waschig and, eventually, Bill Fels.

Q Have you ever heard of the operator group trend recorder?

A Yes.

Q What was that?

A The group trend was a selected parameter or groups of parameters which could be demanded out of the machine on variable time interval, and the variable time was probably up to an hour.

Q What kind of parameters were available?

committee but I was not active as a member.

Q To the best of your recollection, did that committee operate on the same basis as the Unit 1 committee, i.e., it was in existence sometime during start-up and it terminated at the time of commercial operation?

A Yes.

Q Have you heard of a committee called Technical Review Committee?

A I have heard of so many committees, but that one doesn't stand out in my mind.

Q Do you have any recollection of whether or not you were a member of that committee?

A No.

Q Are there other committees which you believe you were a member of but you can't remember the names of right now?

MR. SELTZER: Are you talking about during the period he was supervisor of operations before the Three Mile Island catastrophe?

MS. WAGNER: At any time he was at Three Mile Island prior to the famed catastrophe.

A Within the context of Metropolitan Edison Company committees, I don't recall of any others that

I served on.

Q Were you on any General Public Utilities committees?

A No.

Q During the time that you were a nuclear engineer, did you maintain any files?

MR. SELTZER: What do you mean by "maintain"?

Q Did you keep any files?

MR. SELTZER: You mean did he have any papers in his possession?

MS. WAGNER: Does he have any papers in his files in his possession? Haven't you heard of files?

A The files that exist today in my office --

MR. SELTZER: She is asking during the period you were nuclear engineer from '68 to '70, did you have any paper?

THE WITNESS: Yes.

Q Paper which you kept as opposed to paper which flew in and out of your office?

MR. SELTZER: You mean during the period that he was in that position, was there any paper that he kept?

MS. WAGNER: Yes.

A I think some of that paper is still in my office today.

Q During the time that you were supervisor of operations for Unit 1, did you keep paper in your office?

A Again, the personal files that are in my office today could have had some additions made to them while I was supervisor of operations on Unit 1 and also on Unit 2.

Q Did you, while you were supervisor of operations, keep a file of your correspondence,either incoming or outgoing?

A There was a period of time when I had a writer's file.

Q Do you still have that writer's file?

A I don't know if it is in my desk or not.

Q Do you have any idea where it is?

A No.

Q Do you recall, during the time when you were supervisor of operations for Unit 1 or Unit 2, specifically any types of files that you did maintain or keep in your office?

A There were many files kept in my office that were departmental files, and those have been preserved as part of the plant history but they were not

personal files.

Q Did you keep any personal files?

A Not so as to be recognizable. I did not have a filing system which I relied on for the retrieval of information. I may have stuck pieces of paper in a file folder and put it in my drawer, and in that sense it was a file.

Q Have you been asked at any time by your lawyers or by anyone working for your lawyers to produce documents for the purposes of this litigation?

A I have been asked by lawyers, whether they were mine or not, I can't say, to produce documentation for this litigation.

Q When were you asked to do that?

A I don't recall the dates.

Q Do you recall the years?

A It seems like I got a letter from Mr. Arnold which said I should not destroy any personal files back in September '79 or '80 region. So from that point forward, I did not destroy any paper. Anyone who has asked to have access to my files has been given carte blanche.

Q Do you recall whether anyone has had access to your files for purposes of producing documents for

A Everything that was available on the 855 computer, I think could be programmed into that. Some of the balance of plant equipment, I am not sure that is true, but I would try it.

Q To the best of your recollection, could you obtain on the operator group trend recorder a trending of the temperatures on the thermocouples at the pipe leading from the PORV?

MR. SELTZER: You mean was it programmed prior to the accident so that could be done?

MS. WAGNER: That's correct.

A I don't have a recollection of ever having set up that kind of trend of those parameters, but I expect the machine would give me that if I asked it.

Q Do you believe it did give you information concerning the parameters for the reactor coolant drain tank?

A I don't know. In fact, I guess I would think not on second thought, since the level on that drain tank had to be manually inputted to the computer in order to do the leak rate calculation, so I would think that at least drain tank level was not an input to the 855. I don't know about drain tank temperature and pressure.

Q Was there any instrumentation in the control room at TMI-2 from which you could determine if you didn't know it already whether or not HPI had been actuated automatically or manually?

A You mean to differentiate whether the actuation was automatic or whether the initiation was manual?

Q That's right.

A The alarm printer, the alarm typewriter associated with the 855 computer, I believe, would have told me which it was.

Q Is the alarm typewriter something which keeps going automatically, or is that something which you have to ask for information?

A It attempts to live in real time responding to plant conditions, but sometimes the alarms come in so fast, the typewriter can't output them that quickly, and it gets behind real time, but it has a very good memory, and if things quiet down, it will eventually catch up.

Q It will just continue to record things whether or not anyone asks it to?

A Yes.

Q Have you ever heard of the memory trip

review?

A Post-trip memory review, yes.

Q What was that?

A Everything I had previously said about the sequence of events, I think applies to post-trip memory review, and we haven't yet talked about sequence of events.

Q Let's start on the sequence of events review.

A Sequence --

MR. SELTZER: What is the question?

Q The question is, assuming everything you have previously said about the sequence of events, in fact, is concerning the post-trip memory review, what was the sequence of events review?

A The sequence of events review was a history of digital contact operation of analog data such as we had in the post-trip memory review. The digital information that came through on the sequence of events was timed down much faster in time than the alarm typewriter. The alarm typewriter prints out the time to the nearest second whereas the sequence of events could differentiate between events that were greater than 400 milliseconds apart. It was also automatically initiated. Its memory was automatically

retained on a reactor trip, so that you could go back in time, and if you had four or five entries on the alarm typewriter that came in on all the same second in time, you could go back to the sequence of events review and down to 400 milliseconds you could sort them out as to which came first, and so it was helpful in analyzing what happened in which sequence in the plant, and, therefore, was called a sequence of events.

(Recess)

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Q Have you ever heard of the operators' special summary?

A It does not ring a bell with those words.

Q Do you know of any other programs, I guess, which would provide trending information of one sort or another other than the ones that we have spoken about already?

A No.

Q This may reflect some of your prior testimony. Was there a multipoint recorder in the control room at TMI-2?

A Yes.

Q Is that something you already told me about?

A Yes.

Q Which one was that?

A There were several on the panel with the clock.

Q How do the multipoint recorders work?

MR. McBRIDE: Which one?

MS. WAGNER: I assume they all work in a similar fashion.

Q Do they work in the same basic fashion?

A Yes. Normally up to 24 points come into

one recorder with one printing wheel, and it cycles through however many parameters are programmed into it and prints them out one at a time, and you have a mess on a piece of paper.

Q Were the operators at TMI-2 taught to use the multiple recorders?

A I have no personal knowledge that says they were or were not.

Q Were you taught to use them?

A I guess if you learned to read one multipoint recorder, you can read any multipoint recorder. I don't know where I ran into my first one anymore.

Q Did you ever have occasion while you were in the TMI-2 control room to use information from any multipoint recorder to look at it?

A Yes, on the radiation monitors.

Q Is it correct that while you were supervisor of operations for either unit, you spent much of your time at work in the control room?

A Yes.

Q What were your normal working hours as supervisor of operations for Unit 2 or did they change?

A Eight to five.

Q Is it correct that there are a number of books in the control room which are in one fashion or another logs of events which occurred in the control room?

A Yes.

Q Is one of those the shift foreman's log?

A Yes.

Q Do you recall ever reviewing that log?

A Yes.

Q For what purpose would you review it?

A Format accuracy.

Q Would you ever review it for purposes of finding out what had gone on the day before?

A Yes.

Q I take it from the title, the shift foreman's log was written in by the shift foreman?

A Yes.

Q Was there also a book called the "CRO Memo Book"?

A Not that I know of.

Q Was there a CRO log of some kind?

A Yes. That was called a "CRO Logbook."

Q Did you ever have occasion to look at that?

A Yes, one of my responsibilities was to review that log on a weekly basis.

Q What was the purpose of your review?

A Again, accuracy in format.

Q How would you review it for accuracy?

A I could spot-check certain incidents that I knew had happened, that it was being kept.

Q Are you familiar with something called the "Superintendent's Memo Book"?

A Not by that title.

Q By another title.

A I don't know of any other logbocks that are maintained in the control room.

Q Is there any compilation of memoranda from the superintendent of the plant which is kept in the control room?

A Yes. I believe there is, called a "Superintendent's Memo Book."

Q Did you ever have occasion to look at that?

A The superintendent normally routed his memos to me since I was a department head, and I guess I read them as they crossed the desk probably before they got into the book.

Q Do you know why a book of those memoranda was kept in the control room?

A For ready reference.

Q Do you know if control room operators or senior operators were required to review that book on any regular basis?

A I don't remember if that was required reading or not.

Q Was there a book in the control room called the "Revision Review Book"?

A Yes.

Q What was that?

A Revisions to operator emergency procedures that were deemed pertinent to the operation staff were put into that book along with a sign-off list that each man should initial when he read the proce change.

Q Who was responsible for insuring that t book was kept up to date?

A The supervisor of operations.

A Was there a book in the control room called the "Reportable Occurrence Book"?

A Not that I remember.

Q Do you recall that such a book was

maintained anyplace on the site?

A I would have suspected the PORC chairman to maintain it.

Q Do you know if there was any requirement that the control room operators or senior reactor operators review such a book on a periodic basis?

A Not that I can remember at this time.

Q Did you ever review the shift test engineers' log?

A It was not my custom as supervisor of operations to read that log unless I was looking for a specific piece of information.

Q Did you ever have such an occasion?

A Yes, frequently.

Q Where was that log maintained?

A In the shift test engineers' office.

Q Did you ever have occasion to review start-up logs?

A I don't understand what you mean by "start-up logs."

Q Do you recall whether there were any other logs which were connected to the start-up other than shift test engineers' logs which you would review?

A I don't remember any such books.

Q Is it correct that when you first worked at Three Mile Island, which as I recall was in 1968, that there was no simulator available for training with respect to the Babcock & Wilcox nuclear reactor?

MR. SELTZER: Anywhere in the world?

MS. WAGNER: Anywhere in the universe.

A I knew of no such machine.

Q Did there come a time when you became aware that such a machine was being constructed?

A Yes.

Q How did you become aware of it?

A I think it was while we were in Lynchburg in 1969 for the B&W technology course that the cardboard mock-up of that simulator was being constructed, and I was familiar with that cardboard mock-up which was being used for instrument placement decisions and things of that nature for the actual console which came into existence about the time B&W moved into Old Forrest Road.

Q Did you ever see the cardboard mock-up?

A Yes.

Q Did you ever make any comments about it to B&W personnel?

A Yes.

Q Do you remember any of them?

A No.

Q Do you recall if any of them were suggestions as to the placement of certain indicators, for example?

A That was the primary purpose of the cardboard mock-ups' existence, and I probably had some comments.

Q Did you develop an understanding at this time of what in a nuclear power plant was going to be simulated on the simulator?

A To some extent, yes.

Q Can you describe for me generally what your understanding is?

A No, it is too long ago.

Q Were you aware prior to the accident at Three Mile Island that the simulator did not simulate the condensate polishing system at TMI-2?

A Yes.

Q Were you aware that it did not simulate much of the secondary system at TMI-2?

A Yes.

Q Would it be correct to say that one

limitation of the simulator was that it would primarily represent the primary system?

MR. SELTZER: Are you saying that the simulator could not simulate transients initiated by secondary side upsets?

MS. WAGNER: No, I am suggesting that it did not represent the secondary side.

'Voided' meant 'boiled'

(Record read back.)

A That was not its only limitation but that was one of them, yes.

Q What were its other limitations or some of them, if you can recall?

A It did not represent the energy removed from the pressurizer on a stuck-open valve on the top of the pressurizer. It did not recognize the reactivity effect of the voided water in high pressure injection, and it was deficient in the use of the plant computer, what in our control room was a Bailey 855, which was colloquially referred to as half of an 855 at the simulator.

Those are some of the more important limitations that I remember.

Q When did you become aware of the

limitation with respect to the simulator's recognition of the effect of energy removed from the pressurizer?

A On or after March 28, 1979.

Q How did you become aware of that?

A By trying to simulate the Unit 2 transient on the simulator.

Q How did you go about that?

A It varied during the course of the day, but basically, I put the plant at 100 percent power, 98 percent power, and tripped off the main feedwa pumps, which I knew to be an initiating event or thought I knew to be an initiating event, and tr to get the reactor coolant system pressure to go into the area of 1,000 to 1,200 pounds, and as t day went on, I learned that the PORV had been st open, and so I simulated sticking it open after it was called on to operate, and I also knew that the emergency feedwater had been delayed, and so I did a parametric study based on different times of starting the emergency feed system, which at the simulator is an auxiliary feed system, just a different name. The systems are similar in the plant and in the simulator.

Q At what point in the sequence you just

described during the day, which I take it was March 28, 1979, is that correct?

A Yes.

Q During what point in the sequence did you become aware of the limitation of the simulator with respect to the energy removed from the pressurizer? Which of these things that you described did you know by that time and were using in your attempt to simulate the accident?

MR. SELTZER: What do you mean by your phrase "by that time"?

MS. WAGNER: By the time that he found out about this limitation of the simulator.

A I am not sure it was crystal-clear to me on that day that energy was not being removed from the top of the pressurizer.

MR. SELTZER: In the simulator?

THE WITNESS: In the simulator.

A It became apparent on reflection that that was a limitation of the simulator, so while I inputted the data to my mind on that day, I can't tell you when it was exactly I formulated the concept that it was lack of energy removal that was preventing plant pressure from dropping so rapidly.

Q Have you ever simulated on the simulator the transient which occurred at TMI on March 28, 1979, given all the data which is now known from various sources?

A Not with all the data that is now known, because I'd have to do that tomorrow, but I have since been back to the simulator for a four-hour training program which was designed to do exactly what you say with the knowledge that was available at that time.

(Continued on the next page.)

Q Prior to that training session, had you ever had the occasion or the ability to attempt to simulate that accident on the simulator, using all of the data which is known today about the accident?

A No.

Q What is a parametric study?

A In this case, I knew -- I was told that the emergency feedwater had been delayed ten or twelve minutes, and so starting at ten minutes and working in one minute increments in each direction on consecutive runs, I tried to see how varying the time of start of the emergency system would affect the plant pressure.

Q And you mean then by a parametric study varying the time at which some parameter --

A In this particular case, that is what I meant.

Q Have you ever told B&W that their simulator was deficient with respect to energy removal from the pressurizer or a representation of that situation?

MR. SELTZER: Objection. Your question implies that he would think that B&W was not already aware of the deficiency and needed to be informed by him. So I object.

MS. WAGNER: I am not suggesting what B&W

knew or didn't know.

A I have no recollection of ever having communicated that to B&W.

Q When did you learn that the simulator was deficient with respect to representation of the reactivity effect of HPI?

A That was very early in the machine's life. I was at B&W for a meeting, and at the end of the meeting, at 4 o'clock or so in the afternoon, I went down to the simulator. Phil Griffin was the instructor there at that time, and I think that was one of the things I simulated that evening, to initiate HPI with the plant at 100 percent power, and while the pressurizer level recognized the water being added to the system, the reactimeter associated with the simulator did not recognize the reactivity effect of the Boron.

Q Did you tell B&W about that limitation?

A Phil Griffin was standing there and helping me do the simulation. I am sure he was aware of it.

Q When did you first become aware that the computer used in the simulator was, I think you said half as good or something as the computer at TMI?

A I think that was something that B&W told us in our first training session on the simulator, that

they didn't have the capability with their plant computer that we would have with ours.

Q How many times have you been to the simulator for training prior to the accident?

A Something very close to once a year since it has been in existence.

Q Was that for both initial license training and requalification training?

A Yes.

Q Did you think the simulator was important with respect to requalification training?

A It was the best tool we had, even though it had its shortcomings.

Q Were you in favor of the decision in 1978 to limit attendance at the simulator to once every two years as opposed to once every year?

A No.

Q Did you ever discuss that with anybody at Met Ed?

A Yes.

Q Did you ever have occasion prior to the

(Continued on the following page.)

accident to request that B&W simulate a particular event on the simulator?

A Yes.

Q Can you tell me when?

A No.

Q Do you remember what it was that you wanted simulated?

A Reside the request to see and observe and participate in the normal programs of transients, I once asked to take the simulator to full power without using the turbine generator.

Q Were you granted permission to do that?

A Yes.

Q Did it ever happen that you heard about an event which occurred at TMI or some other nuclear power station which you thought should be simulated on the simulator so that your operators would see what it looked like?

MR. SELTZER: When you say it should be, are you asking did he ever ask that an event be shown on the simulator?

MS. WAGNER: Yes.

MR. SELTZER: This would include either at Lynchburg or speak with someone from Three Mile

Island?

In other words, the request could be made either in Lynchburg or at the Island?

MS. WAGNER: Yes, made any place.

A I think I probably made such a request, but I can't recall specifics.

Q Do you recall in general what B&W's response was if you made such a request?

A For the most part, cooperation.

Q Did auxiliary operators at TMI attend simulator training?

A No.

Q Normally in the sequencing of CRO training for pre-license trainees, would the simulator be one of the first things they did or one of the last things they did, or somewhere in the middle?

A One of the last.

Q Was there any reason for that, that you understood?

A Yes, it was our desire to have them as knowledgeable as possible prior to sending them to the simulator so that they would be able to learn more from the simulator.

Q Is it correct that when CRO's were at the

simulator, they used TMI's emergency procedures?

A Yes. Whenever possible, sometimes our procedures had to be modified slightly because a switch didn't exist on a machine or something, but we actually worked with our procedures in our hands.

Q Did you ever see a transient simulated which involved, as part of its elements, a loss of feedwater?

A Yes.

Q Did you ever see one which involved a total loss of feedwater; that is, including main feedwater and auxiliary feedwater or emergency feedwater?

A I don't remember seeing a simultaneous loss of both main and auxiliary feedwater.

Q Did you ever see simulated a casualty in which --

MR. SELTZER: Were the two of you focusing on before the accident in your last question?

MS. WAGNER: All of my questions should be understood to refer to before the accident unless I specifically ask you after the accident.

A I think the last one you said have you ever seen, and to me that implies after the accident.

MS. WAGNER: You are right.

MR. SELTZER: Let's clarify so you and the

witness both understand the same time period.

Q I understood your last answer to mean that you did not see a total loss of feedwater on the simulator prior to the accident.

A It was ever.

Q It was also true prior to the accident?

A Yes.

MR. SELTZER: Except I thought he has seen the Three Mile Island accident simulated since the Three Mile Island accident, and since that was a loss of both main and auxiliary feed, I wonder --

MS. WAGNER: Now you are testifying for the witness.

MR. SELTZER: That doesn't refresh his recollection about whether he has seen both a loss of main feed and auxiliary feed without suggesting what the answer might be.

MS. WAGNER: Of course not, no. I think now that we know what your testimony is --

MR. SELTZER: He had testified earlier that he had seen the Three Mile Island accident simulated. Do you want to comment on that?

THE WITNESS: Yes, I would like to comment

on that. Prior to the March 28, 1979, I had not seen a simultaneous loss of both main feedwater and auxiliary feedwater on the simulator.

Q Did you ever ask to see such a simulated casualty prior to the accident?

A Not that I recall.

Q Had you ever heard of such an event occurring in real life at some plant?

A Not that I can recall.

Q Did you ever see a casualty in which the pressurizer heaters failed to operate? This is on the simulator and prior to the accident.

A I don't remember seeing that casualty on the simulator prior to the accident.

Q Did you ever see a casualty in which pressurizer level indication failed?

MR. SELTZER: All indications of pressurizer level?

MS. WAGNER: All indications, prior to the accident.

A I believe we had drills on pressurizer instrument failures high and low but not total loss of pressurizer level instruments.

Q The casualties you can recall, what were

you to do if pressurizer level indications failed high?

MR. SELTZER: Objection. No foundation. He said he never saw all indications fail.

MS. WAGNER: I am talking about the casualty he did see in which pressurizer level indication failed high. Whatever one he is talking about.

A Let me start out by saying on the simulator there are three channels of pressurizer level instrumentation. All three are used for indication. Only one is used for control purposes.

Traditionally, the instructor would fail the one that was used for control function, and if the level failed high, it would close off MUV 17 and stop making up water to the primary system,which meant that your other levels which were still indicating would start going low, and if you were unfortunate enough to not recognize it, it would eventually get down to where the heaters would cut off on low level, so --

MR. SELTZER: What is the question?

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Q I am asking what would happen in such a casualty?

A I don't know that I ever saw it progressed that far. I was able to identify the cause of the upset and select another channel for control before I got too deeply involved in the transient.

Q How did you recognize the cause of the upset?

A I might have been looking at the meter when it failed high. I may have gotten a high level alarm on the pressurizer in looking at the three-level instruments. Two of them were indicating normally and one was failed high. These would all be helpful signs to direct my attention to the problem.

Q With respect to indication of pressurizer level, was the simulator an accurate representation of the TMI-2 control room?

A With respect to the indicators and the instruments that fed those indicators, I believe it to have been similar if not identical in that there were temperature compensated level channels in the instrument's response. However, to a break in the top of the pressurizer, their behavior was very much different.

Q But the indications were the same kind of indicators?

A Yes.

Q Did you ever see an overcooling event on the simulator?

A Yes.

Q What did you see on the simulator as the symptoms of an overcooling event?

MR. SELTZER: Do you recall what you saw on the simulator?

A I don't recall. I can only reconstruct.

Q Go ahead and reconstruct.

A While we didn't call them overcooling events in those days,-- that is a more recent term -- what is implied is too much feedwater flow, and we saw that whenever we failed the feedwater valves open and basically putting too much water into the steam generators causes a drop in the primary system temperature and level indication in the pressurizer. The cold water working through the moderator temperature coefficient tries to and does, in fact, raise reactor power level to the high power trip set point, at which point the reactor is shut down automatically by a trip, and if the excessive feedwater is still flowing into

those steam generators, you will suck the bottom o
the pressurizer and cause the bubble to shift. Wl
the bubbles shifted on the saturation curve, I do r

What does this mean?

Q During the sequence you just describe
did happen to reactor coolant system pressure? Did it
decline?

A It probably moved in both directions.
Initially from the excessive heat removal, it would
drop. If the reactor were able to make up the power
deficit before it tripped on overpower, pressure might
try to rise back up until the trip took place, at which
place, pressure would continue to drop.

Q Did it ever occur that you saw a simulator
situation in which the overcooling continued to the
point where pressure reached the actuation set point for
the high pressure injection system?

MR. SELTZER: On an overcooling event?

MS. WAGNER: Yes.

MR. SELTZER: Does he recall seeing that?

A I don't recall that.

Q Did you have an understanding prior to the
Three Mile Island accident that such a sequence of events
could occur, that an overcooling could result in a
depressurization to the point of HPI actuation?

A Yes, but not from the simulator, from the plant itself.

Q Did you have an understanding as to why HPI would actuate in those circumstances?

A Yes.

Q What was the reason?

A It automatically actuates at 1640 pounds per square inch in the reactor coolant system.

Q Did you have any understanding as to why it was designed to do that?

MR. SELTZER: Why HPI was designed to automatically actuate at 1640?

MS. WAGNER: Yes, in the overcooling situation.

MR. SELTZER: Objection, no foundation that it was designed to automatically actuate at 1640 for overcooling.

MS. WAGNER: He did say it would actuate at 1640 during an overcooling.

MR. SELTZER: That doesn't mean it was designed to do it for overcooling events.

MS. WAGNER: I am saying why it did that during overcooling events. Obviously, if it happened, it was designed to happen.

MR. SELTZER: I object. That syllogism doesn't follow.

A The 1640-pound set point is based, to the best of my knowledge, on a loss of coolant accident, and once the set point is in place, the instrumentation does not recognize what causes the pressure to drop; it merely responds to the drop in pressure.

Q Did you have any understanding prior to the Three Mile Island accident that a drop in pressure during an overcooling would require the addition of inventory through the HPI system in the same way that such inventory would be required during a loss of coolant accident which caused pressure to go to the HPI actuation set point?

(continued on next page)

MR. SELTZER: You said would be required. Required for what purpose?

MS. WAGNER: Any purpose.

MR. SELTZER: You mean did he understand in an over-cooling transient there was some useful purpose that was fulfilled by turning on high pressure injection?

MS. WAGNER: At the 1640 psig set point, that's right.

A I don't know that the set point was critical in that instance, but inventory was needed as I reconstructed the transient on the simulator. I think I said if the over-cooling were not terminated rather quickly, the pressurizer would go dry, and that is a definite sign of a need for additional inventory in the reactor coolant system.

Q Is it correct that you saw a simulati of an open PORV on the simulator?

A Yes.

Q Do you remember what you learned were the symptoms of an open PORV?

A You mean the symptoms on a simulator or the symptoms of our procedure which we were using on the simulator?

Q The symptoms on the simulator.

A I think they are the same but I may miss one or two of them. An open PORV would be indicated by a drop in plant pressure, an opening of MUV 17 in response to the dropping level that we thought would exist prior to the accident at Three Mile Island, and a low pressure or variable low pressure to temperature trip, and eventually, HPI.

Q Did anyone ever tell you prior to the Three Mile Island accident that high reactor coolan drain tank pressure was a symptom of an open PORV?

MR. SELTZER: Are you asking whether in the B&W training at the simulator he was told that?

MS. WAGNER: Yes.

A I don't remember that explicitly, but it is part of our procedure.

Q You did know that prior to the accident?

A Yes.

Q Is it correct you can't recall what the source of your information was?

A I think the source of that procedure was B&W supply draft procedure.

Q But the source of your knowledge?

A The source of my knowledge, I don't remember, whether it was from simulator training or from the procedure.

Q Did anyone ever tell you either at the simulator or elsewhere that elevated temperatures on the thermocouples leading from the PORV were an indication of an open PORV?

A Yes.

Q Where did you learn that?

A Again, it was in our procedure. I don't know the genesis of my knowledge.

Q When you saw the casualty of an open PORV on the simulator, what were you told was the appropriate action to take?

A Close the block valve.

Q Why is the appropriate action the closing of the block valve?

A It stops the loss of reactor coolant.

(Time noted: 4:45 p.m.)

James R. Floyd

Subscribed and sworn to before me

this day of , 1982.

C E R T I F I C A T E

STATE OF NEW YORK)
: ss.:
COUNTY OF NEW YORK)

I, JOSEPH R. DANYO, a Notary Public within and for the State of New York, do hereby certify that the foregoing deposition of JAMES R. FLOYD was taken before me on Thursday, February 18, 1982;

That the said witness was duly sworn before the commencement of his testimony and that the within transcript is a true record of said testimony;

That I am not connected by blood or marriage with any of the parties herein nor interested directly or indirectly in the matter in controversy, nor am I in the employ of any of the counsel.

IN WITNESS WHEREOF, I have hereunto set my hand this 22 day of February, 1982.

Joseph R. Danyo

I N D E X

E X H I B I T S

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