NUCLEAR REGULATORY COMMISSION

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**IN THE MATTER OF:**

THREE MILE ISLAND
SPECIAL INQUIRY DEPOSITIONS

INTERVIEW OF: WARREN R. COBEAN, JR.
and ALLAN SCOTT DAM

**Place -** Paramus, New Jersey

**Date -** Monday, November 5, 1979 **Pages** 1 - 108

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INTERVIEW OF: WARREN R. COBEAN, JR.
and ALLAN SCOTT DAM

Offices of Burns & Roe
650 Winters Avenue
Paramus, New Jersey

Monday, November 5, 1979
9:30 a.m.

BEFORE:

For the Nuclear Regulatory Commission:

HANS SCHIERLING, TMI/NRC Special Inquiry Group
BARRY HORVICK, TMI/NRC Special Inquiry Group

For Burns & Roe:

TOM A. HENDRICKSON, Assistant to the President
KEVIN MURPHY, Senior Counsel
RICHARD B. DiFEDELE, Staff Attorney

# C O N T E N T S

P R O C E E D I N G S

(9:30 a.m.)

MR. SCHIERLING: This is an interview by the Special Inquiry Group of the NRC of Mr. Cobean of the Burns & Roe organization. Today is November 5. The location are the Burns & Roe offices in Paramus, New Jersey. The participants in this interview are myself, Hans Schierling of the NRC, Mr. Horvick of the NRC Special Inquiry Group.

Mr. DiFedele, do you want to identify the Burns & Roe participants, please?

MR. DI FEDELE: Yes. My name is Richard B. DiFedele. I'm an attorney for Burns & Roe. I will only be here for the first few minutes of this interview. Mr. Kevin Murphy is a senior attorney with Burns & Roe, and he will be here throughout the interview. Mr. Thomas Hendrickson -- Tom Hendrickson, excuse me, is an Assistant to the President of Burns & Roe, and Mr. Cobean, Vice-president of Burns & Roe, who is being interviewed.

Mr. Schierling, there are two points that I wish to make on the record before we proceed, being that Burns & Roe reserves the right to review the transcript and to make whatever corrections and modifications as are appropriate to the transcript before it is deemed to be Mr. Cobean's personal statement.

We feel that this is valuable to make any typographical

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corrections or any technical corrections that are necessary. In addition to that, we wish to state on the record that this interview is subject to the confidentiality agreements reached between Burns & Roe and the Nuclear Regulatory Commission as evidenced by the letter dated September 20, 1979, addressed to Mr. Mitchell Rogovin from Mr. Glen A. Mitchell and signed by Mr. Mitchell Rogovin and returned to Burns & Roe and has been the subject of discussion and various interpretations by myself and Mr. Frampton of the NRC.

That's basically the preliminary matters that we wish to cover.

MR. SCHIERLING: Okay. Mr. Cobean will be provided with a copy of the verbatim transcript of this interview for his review, and, indeed, he will be requested to make any corrections thereto -- in particular, those of substance.

With regard to the letter of understanding on the issue of confidentiality, we do acknowledge that this agreement does apply to this interview. However, I would like to have Mr. Cobean -- I would like to ask him a question, if indeed he did read the Special Inquiry Group Notification Form, that he understands the meaning of that witness notification as modified by the letter of agreement between the Burns & Roe law firm -- law firm representing Burns & Roe -- and

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Mr. Rogovin?

MR. COBEAN: I did read the witness notification form, and I do understand what it says.

MR. SCHIERLING: Okay.

MR. MURPHY: Will you clarify whether or not Mr. Cobean has received a subpoena or is here voluntarily?

MR. SCHIERLING: Mr. Cobean is voluntarily -- it's my understanding that Mr. Cobean is voluntarily participating in this interview. Mr. Cobean is not being sworn under oath. This is an interview, which I would like to differentiate from a deposition.

However, I would request that Mr. Cobean be as frank and forthright in all his answers as he can be.

Whereupon,

WARREN R. COBEAN, JR.

was called as a witness, was examined, and testified as follows:

EXAMINATION

BY MR. SCHIERLING:

Q Mr. Cobean, let me first ask you, have there been -- have you given any previous interviews or depositions on the issue of your personal involvement in the Three Mile Island accident or the involvement of Burns & Roe in that activity, and if so, could you please identify such interviews, depositions, or other statement that you have

made?

A I gave a deposition to the Kemeny Commission about the Three Mile Island accident and recovery, a portion of the recovery.

Q Was there any additional interview or deposition that you have given?

A No.

Q Mr. Cobean, you'll recall that we, the Special Inquiry Group of the NRC, and you and other members of the Burns & Roe organization had a length telephone call on October -- I think October the 22nd in which we discussed certain issues in some detail. I would like to cover the same material today for the record so that we will have a continuous record and also use that information for the further questioning later on today.

Do you recall that telephone call, Mr. Cobean?

A I do.

Q It is also my understanding that you would also like to make a preliminary statement before we go into specific questions regarding your personal participation in the TMI response effort and that of the Burns & Roe organization.

A All right. Yes.

Q You intend to make such a presentation?

A I would be happy to.

Q Okay. Fine.

Mr. Cobean, before we do that, let me state that the time span we are interested in today covers the events on March 28, Wednesday, March 28, through about the full first week thereafter which, I think, brings us to about April the 7th, Saturday, April the 7th. We will not cover today any aspects of your involvement beyond that date.

If you feel that there are some substantial pieces of information that we should look at for the later time period, please feel free to identify them -- major aspects of the Burns & Roe activities. However, I would like to concentrate on the time before April the 7th.

We also will cover some aspects -- Mr. Horvick will do so -- that relate to Burns & Roe activities preceding the TMI accident. Mr. Horvick discussed the basic issues before we went on the record, and we will discuss that later on in the interview.

It's also my understanding that Mr. Scott Dam might provide additional information in certain areas and Mr. Murphy -- I think he will be available later on -- to participate in the interview. Is that correct?

MR. MURPHY: I understand that's correct, that he will be available later today.

BY MR. SCHIERLING:

Q Okay. Fine. You will be able to identify areas

where Mr. Dam could provide such specific information?

A Sure.

Q Fine. Why don't we make a note then, when we hit such areas. Then we can ask him the specifics?

Mr. Cobean, I think that covers about the preliminary aspects for this interview, and I would like you at this time to go ahead, to describe your activities in response to the accident.

A All right. The accident occurred on March the 28th with an initiation of a reactor trip at about 4:00 in the morning. The first inkling of the accident or the reactor trip itself occurred when I received a report about 8:30 or 9:00 that morning that Rich Brownewell, who is our site engineer at the Three Mile Island -- stationed at the Three Mile Island site -- had been unable to obtain entry into the site security area and had called the Three Mile Island office, then located at 29 Park Place in Paramus, to report that he was not at his desk and that there was -- had been declared a site emergency.

I had a previously made appointment with Mr. Wilson of GPUSC, who is the director of technical functions for that company, to discuss another subject, and so I called him as soon as I had heard about the site emergency to see if he had any further information about Three Mile Island and whether our 12:00 appointment in his office was to be kept.

He indicated that he wasn't quite sure what the details of the accident were at that juncture but that he was leaving immediately to go to the Three Mile Island site from his offices in Mountain Lakes, New Jersey. I indicated to him at that time that if he had need for Burns & Roe to help him in any fashion, please to let us know, and we would immediately devote what resources were necessary to help them solve whatever problem he saw.

The balance of the information that we received that day came from the newspapers, television, radio reports which were sketchy, contradictory, but led one to believe that, in truth and in fact, a fairly severe situation much out of the ordinary had occurred. Our Site Engineer, Mr. Brownewell, still was unable to gain access to the plant proper and thus was unable to provide us with any information for the balance of that day.

On the 29th in the morning, after having again been principally informed by the news media, I called Mr. Bob Arnold in his offices at Mountain Lakes. Mr. Arnold is a Vice-president/Generation for GPUSC. In that conversation, Mr. Arnold indicated that he suspected that the core had been uncovered. He gave no estimates of damage to the core. He did not, as I recall, discuss radioactive releases that had been occurring or the condition of the plant as a whole.

I again offered the services of Burns & Roe to assist GPU in any way they found to be essential or necessary in their handling of the plant. Later on that day, we received a request for information from a person at the site in the control room. That person's name is Ron Warren. Mr. Warren, I believe, is a Metropolitan Edison employee.

His question was: given these tank level readings at the start of the incident on the 28th, March 28, 4:00 versus these tank level readings on March 29, and assuming all of that water went into the basement of the reactor containment building, how many gallons -- I mean, how many inches above the basement level was the water level in the containment?

The answer was calculated and transmitted back by phone to some person in the containment -- correction -- some person in the control room of Three Mile Island that the number Mr. Warren had given us -- it was not Mr. Warren, as I recall, but the person receiving the message fully understood that the request had been made by Mr. Warren and would see to it that the information got to the right people in the plant.

At that juncture, which was about mid-day of the 29th, we started receiving requests for information, requests for studies, requests to answer what-ifs, and requests to provide interim designs for the Three Mile Island site from the GPU home offices in Mountain Lakes and from the

President of GPU himself, Mr. Herman Dieckamp.

I directed that we open a work order, obtain additional telephone services on an emergency basis into the 29 Park Place offices, and augment the force of 29 to 30 individuals at that Park Place location by people from -- throughout the company. Their principal resources that I drew upon to augment this for us, to keep up with the frequency and extent of the questions and demands for information and designs and procurement, came from the Forked River project which was also under my direction. However, other organizations within the company provided their resources as requested such that by the end of the afternoon on the 29th, we had established a round-the-clock effort of approximately 100 people per shift, of two shifts, working out of the 29 Park Place offices.

We received through the 29th, the 30th, and the 31st, many requests for information, many requests for procurement, many requests for design of temporary systems to do two things. One was to provide additional assurance that we could continue to remove the decay heat from the reactor core and keep the reactor coolant system under control in as far as temperature and pressure and flow were concerned, and two, to provide means and mechanisms to minimize the release of radioactive gas and fluids into the environment.

To accomplish the latter, we went on a search nationwide for large tanks of any material that could be used to house activated charcoal or store radioactive fluids. The activated charcoal, of course, would be used as a gaseous filter to remove radioactive isotopes from gas. I forget the exact number, but something like 75 to 100 large tanks were procured and were en route to the Three Mile Island site before the sun set on the 30th of March.

During the 29th and 30th, I was in frequent conversation, as were my deputies, with the organization being set up at the Three Mile Island site, the organization set up in the GPU headquarters in Mountain Lakes and Parsippany, New Jersey, and the organization established by Babcock & Wilcox in Virginia. It became apparent that it would be of great benefit to the whole unofficial organization that had been established, if Burns & Roe sent liaison engineers to the Babcokc & Wilcox headquarters in Virginia.

And so, individuals were dispatched to perform that function, and B&W was attempting to make analyses and model runs for computer analysis that involved certain details of the design for which Burns & Roe was responsible. And B&W lacked some of the information that we had in our possession, so to assist them in that mechanism, we established a Liaison Office that lasted throughout the period of time that you're interested in in Virginia. A

number of my conversations with Mr. Dieckamp on the 30th and the 31st surrounded the mechanisms available in the plant to degasify the primary coolant system.

Essentially, there are two, one of which is letdown and makeup systems which is a process in the letdown. Degasification takes place of the amount of water taken from the reactor coolant system. The other mechanism is the pressurizer spray depositing in a gaseous form dissolved gases in the gas phase --

MR. SCHIERLING: Shall we go off the record for awhile?

MR. MURPHY: Yes. I think it's best.

MR. SCHIERLING: Go off the record.

(Discussion off the record.)

THE WITNESS: The pressurizer spray depositing in the gas phase of the pressurizer the dissoved gases from the reactor coolant system, whereupon subsequent venting of the gaseous -- gas phase of the pressurizer can extract gas from the reactor coolant system.

On the 31st of March, Mr. Dieckamp called me and asked me to join a group of engineers and scientists that he was asking to join an industry advisory group to consult with and advise him on events to control the reactor and reactor coolant system and the radioactivity at the Three Mile Island Unit-2. He further asked me to provide individuals

who were knowledgeable for consultation by members of the industry advisory group in specific areas of design criteria and installation and operation of features of the balance of the plant for Three Mile Island and to bring with us documentation that we might need such as electrical elementaries, flow diagrams, system descriptions, and copies of the final safety analysis reports for Three Mile Island Unit-2.

I advised Mr. Dieckamp that it would be of benefit to include Mr. Ed Wagner, who is the Burns & Roe Deputy Director for Engineering, as a member of the industry advisory group, as I felt his experience would be a great value to Mr. Dieckamp. He agreed to include him in the group.

Overnight, we duplicated most of the design calculations and drawings that might be needed by the industry advisory group, loaded them in our automobiles, and arrived early morning Sunday, April the 1st, at a building designated at Olmstead Air Force Base in Harrisburg, which was used as the headquarters for the industry advisory group. We were among the first to arrive. And so, we set up in a portion of the building assigned a technical library that could be used by the members of the group to provide information as required.

Included in the group that Burns & Roe brought back to this effort were individuals who were at our Washington

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Public Power System site, who had been instrumental during the course of the design for portions of the Three Mile Island plant, as well as individuals from our home offices in Paramus and in Oradell.

The industry advisory group was quickly organized to address itself to three major areas. One was to assess the core damage that had occurred and to advise as to the size and danger of the hydrogen bubble then in the reactor coolant system. This group was under the direction of Dr. Ed Zebrowski, Z-e-b-r-o-w-sk-i, of EPRI, E-P-R-I.

Another group, under the direction of Mr. Warren Owen from Duke Power, was looking at contingency factors and scenarios with a specific responsibility providing advice on degasification of the reactor coolant system. And the third segment was under the direction of Mr. Milt Levenson of EPRI, who was to attempt to outline the method by which Three Mile Island should be brought from its present situation of cooling to a cold shutdown condition.

During the next two or three days, around the clock efforts by this industry advisory group addressing these separate tasks met, analyzed, considered and provided advice and counsel to Mr. Dieckamp for his use with the plant. On the second of April, contact with Mr. Vic Stello, Mr. Mattson, was made, in which the advice was provided on the various methods recommended by the Levenson Committee on cooling the plant, cooling the reactor plant, and proceeding to the cold shutdown condition.

During these two or three days, continued requests for designs, modification studies, and questions were provided

to the Burns & Roe home offices from many sources. One source added was the industry advisory group, in which I transmitted to the home office requests for answers to questions that detailed analysis would be required to provide the answers to. In addition, continued requests numbering in the thousands were coming from other areas: Babcock & Wilcox, Mountain Lakes and the Three Mile Island site.

On about the third of April Mr. Dieckamp came to me and asked me to please join an organization he labeled TMI recovery organization, that would be set up under his direction and Mr. Bill Lee's, acting as his deputy, Mr. Bill Lee being the president of Duke Power. He wanted me to establish the organization called plant modifications, in which I would be responsible for the modifications necessary to continue to cool the reactor core in transit to the shutdown condition for long-term cooling, and to provide methods to control the release of radioactivity to the environment.

I readily agreed and proceeded to establish such a plant modifications group, and had under my immediate direction three deputies in order that control of the operation could continue around the clock.

The organization was divided into a procurement organization, a construction organization, an engineering and design organization, and a special projects organization under the direction of the Westinghouse project leader, Mike Siano,

S-i-a-n-o, who had been tasked to augment the installed decay heat removal system by installing other decay heat removal systems.

The organization that was established by Mr. Lee and Mr. Dieckamp had reporting to them three individuals or three separate functions. One is administration and logistics. Two was public and government affairs contacts. And three was the GPU operations manager, which was Mr. Arnold and Mr. Byron Lee from Commonwealth Edison, acting as his deputy.

Mr. Arnold's organization had the following elements: He had a task management and schedule group, had the technical working group, had a GPU technical support group under Mr. Wilson, had a Met Ed plant operations group under Mr. Herbein, and had a waste management group under Mr. Frank Palmer from Commonwealth Edison, and the plant modifications group under my direction.

MR. SCHIERLING: Off the record for a minute.

(Discussion off the record.)

MR. SCHIERLING: For the record, Mr. Cobean is referring to the TMI recovery organization, the structural organization of which we, the NRC Special Inquiry Group, do have a copy. So Mr. Cobean, you can go right ahead and identify the interactions amongst the different elements there.

MR. MURPHY: Are you going to mark it as an exhibit

to this?

MR. SCHIERLING: No, no.

MR. MURPHY: Okay.

THE WITNESS: The function of the management of this group was to have available to them enough resources such that around the clock operation in all of the areas were available and could be expected to be supported for an indefinite future. Routine meetings were established immediately, such that the technical working group would meet twice a day, once very early in the morning, approximately about 6:00 to 7:00 o'clock in the morning, and the other in the evening, approximately 7:00 to 8:00 in the evening.

Membership in the technical working group is as depicted on this organization chart, consisted of technical support group, Burns & Roe plant modification group, B&W task management, industry advisory group, Mr. Levenson usually represented himself, the NRC, usually Mr. Stello, and waste management group.

The function of this technical working group was to receive the output of the various line groups --that is, the technical support group, the plant operations group, waste management group, or the plant modifications group -- and agree with the proposed plans or analyses provided by those groups and to provide direction to the operations group or the plant modifications group to proceed with certain plant operations or

modifications.

This technical working group also was a source of most of the criteria against which the design of plant modifications for which I was responsible came from. The details of the criteria could and usually were supplied by other line groups. But generally speaking, the approval of the criteria was provided by the technical working group.

The industry advisory group, during this span of time -- and I'm now talking between the 4th of April through about the 7th -- reduced itself from its original number, which was approximately 100, to something less than that. By the 7th, I would guess that it might be down to as few as 25 individuals.

During this span of time, that is, between the 1st and the 7th, national priorities had been established as a result of President Carter's visit to Three Mile Island such that access into any of the national laboratories for radioactive sample analyses or calculational support or supply of technical expertise was made available to the TMI recover organization.

Furthermore, national priorities were also established for transportational assistance, such that when it was decided to install an augmenting filtration system for the off-gas from the plant, the location of fans and filter housings from the Richland, Washington, area, at one of the Washington Public Power System nuclear power plants, transportation for those bulky and heavy components was supplied by the Air Force, such

that a C-5A and some C-130s were provided for that transportation.

Those components were shortly thereafter provided and installed on top of the auxiliary building roof and cut into the stack, which is the discharge center of gases discharging from ventilation systems in the auxiliary and fuel handling buildings of Three Mile Island.

During this span of time as well, while continuing with round-the-clock operations in our home office at 29 Park Place with approximately 200 people there, we quickly built the organization for the plant modifications group up in excess of 120 people in the engineering and design portion of the plant modifications organizations.

As well, we included about 10 to 15 purchasing individuals, both buyers and expediters, to supply the facilities needed for procurement for the many designs that were being produced and installed by the plant modifications group. The function of all the modifications that were designed and produced and installed were still for two separate purposes. One was for the long-term control of the reactor coolant system and the removal of the decay heat provided by the reactor core, and for the control of the release of the radioactivity, both fluid and gaseous, from the reactor plant.

During the height of this activity, in almost every case, organizations that usually compete in the industry with each

other were working very closely together, such that in my force on the plant modifications group were members of the engineering and design group of the United Engineers and in Mr. wilson's force of the technical support group were representatives from all the nuclear steam suppliers, doing analyses cheek and jowl next to each other, and supporting each other, each one of them having access into their own home offices for additional assistance.

And in the waste management group, the operator utilities, other owners of nuclear power plants supplied their best resources to assist in that area.

It's hard to imagine a more impressive and long-lasting feeling of pride in the way the nuclear industry dropped what they were doing and came to the aid of a stricken plant and a stricken company. All natural barriers between companies dissolved and support for that company was provided with no questions asked.

Now, I might add at the same time, one of the most valuable of the contributors was the NRC itself, under the direction of Mr. Stello.

That's as far as I've prepared to go, up through the 7th of April.

MR. SCHIERLING: Thank you very much, Mr. Cobean. I think it might be appropriate to take a quick break, if you desire.

THE WITNESS: Okay. Right.

MR. MURPHY: Good idea.

MR. SCHIERLING: Off the record.

(Recess.)

MR. SCHIERLING: Back on the record.

BY MR. SCHIERLING:

Q. Mr. Cobean, thank you very much for the description and evaluation of your activities in the TMI response effort. I would like to use the information you have provided us with as the basis for some questions that I have.

First of all, let me ask you to state your full name and your position within the Burns & Roe Company.

A. All right. My name is Warren Richardson Cobean, Junior. I have a nickname called Buz. And I'm a Vice President of Burns & Roe, Vice President, Project Operations Division of Burns & Roe.

Q. Thank you.

I will make reference to the previous testimony you gave us. Mr. Cobean, when you were informed by Mr. Brownewell that a site emergency had been declared, what did that mean to you?

A. Well, it meant that they had a substantial amount of radioactivity in containment. And the way you get radioactivity in the containment is you have a leak from the reactor coolant system into containment by some method.

Q. To put that question into perspective, do you recall

any other incident where an emergency -- where the site emergency had been declared, either at TMI or any other nuclear power plant?

A. No.

Q. This was the first time that you were aware and involved -- not involved, but you were aware of a site emergency being declared?

A. Yes.

Q. That's the reason why I asked the question, did it have any meaning to you. Earlier, you stated that you were advised that there had been a turbine trip, a reactor trip. This, compounded with the declaration of a site emergency, did that have any special meaning to you?

A. Oh, yes. That there was a damage of some sort in the reactor system.

Q. Okay. You mentioned that shortly thereafter, after the talk with Mr. Brownewell, you called Mr. Wilson and discussed with him your plans for the day, the prearranged plans. And you offered to Mr. Wilson, and in that way to the GPU organization, your help, the help of the Burns & Roe Company. What was the response by Mr. Wilson to that offer? Was it to the degree, well, we don't know what the conditions are, we don't know if you -- if we need your help? Or, we can handle the situation by ourselves?

Can you elaborate on that?

A. Well, his conversation was, to the best of my recollection, that he wasn't positive of what had occurred or what the details were, and that was the reason he was going to the site, to try to find out; and that if they needed our help, they would call us right away. But he was appreciative of the offer.

Q. He never did call back to request assistance in any form, on any subject, on the 28th? I think you mentioned that on the 28th, the first specific request by GPU or Met Ed -- and I will be referring to the licensee as the GPU organization, meaning GPU, GPU Service Corporation, and Met Ed -- the first request from that organization was the determination of the water level inside the containment?

A. That's correct. Mr. Wilson himself never did return -- never did call and specifically ask that day for any information or any help. However, that's not to say that the reason that Mr. Warren was the first one to call wasn't at Mr. Wilson's urging. I don't know exactly what Mr. Wilson was doing at the time.

Q. I see. So this was actually, then, a request for assistance from someone within the GPU organization, Mr. Warren?

A. Yes.

Q. Do you know if there were any other contacts prior to that by someone else at the site or from the Met Ed offices in Reading?

A. I don't recall any contacts. I do believe on the 28th, I know that Scott Dam, the project manager, was not there. He was in Philadelphia taking care of another project that he is responsible for. So on the 28th I don't believe he talked to anybody other than the person he was traveling with, which was a GPU engineer.

And the next day, the 29th, he may have called Met Ed, Reading. But I'm not aware. I don't recall who he talked to or -- that's something you could find out by asking him.

Q. Yes. I was just going to ask you if it is all right that we ask Mr. Dam directly, since he's here in the meeting.

A. Sure.

MR. SCHIERLING: Mr. Dam, did you receive any requests for assistance from Met Ed or GPU Service Corporation on the 28th or 29th for your assistance, or Burns & Roe?

MR. DAM: On the 28th, I was in Philadelphia with Clay Montgomery, who is the project manager for some continuing work we were doing with the GPU Company on Three Mile Island. And we were in Philadelphia on another project. And he was the project manager, as I was at that time. While I had told him, Mr. Montgomery, if there was anything we could do for him, to let me know, there was no specific request for our support on the 28th. I don't remember fully all my actions on the 29th of March. It was, you know, some time ago, and I probably -- and this is my best recollection -- called around, both GPU

and Met Ed, seeing whether I could get in touch with anybody to see what was going on in the plant, as well as see whether we could do anything to help.

However, I can't document any of those phone calls. It's the kind of thing I would have done under similar circumstances. I have to presume I did the same thing. However, I did receive a phone call at 3:30 in the afternoon on the 29th from Ron Warren. Ron is the lead mechanical engineer for the Met Ed operational engineering group.

MR. SCHIERLING: Let me interrupt for a moment.

MR. DAM: Off the record.

(Discussion off the record.)

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MR. SCHIERLING: Let's go back on the record. Talking about the call by Mr. Warren to Mr. Dam —

THE WITNESS: Who are you addressing this to, Mr. Dam?

MR. SCHIERLING: To Mr. Dam, regarding the request for calculating the water level inside the containment, and it is inside the containment. Did Mr. Warren indicate why he wantd to have that information, what his concern was? And furthermore --

MR. MURPHY: Why don't you let him answer the question?

MR. SCHIERLING: Let me put these thoughts all together, because I think there's one answer to it. What was the answer that you did calculate, and what was your interpretation of that answer?

MR. DAM: That's many questions, not just one.

MR. MURPHY: It's too difficult. Do it one at a time, Hans.

MR. DAM: Or I'll break them up and answer them. The first question was: What did he, at 3:30 in the afternoon, when he made the first phone call, what did he exactly ask for? Which is an interpretation of your question. He asked for the water level inside the containment building. He said there was a leak of some sort. I don't remember at the time whether he said it was

from a ruptured disk from the reactor coolant drain tank, which subsequently we all found out was, in fact, one of the major sources of water into the containment building, but he did give me a level in the borated water storage tank and asked for the calculation.

I told him that I believed some time in the past we had done various calculations on water level during a complete loss of coolant accident, and had that information available. And that was about all of the 3:30 phone call, about all the time he had.

He subsequently called back at 4:30 and gave me a little more sequence of events of the accident. And some time around that same time frame -- and I don't know exactly -- he gave me various tank levels in various tanks in the plant, including the core flood tank, being the borated water storage tank, and other storage tanks.

And based on that he was interested in us doing a water balance to see how much water could possibly be on the floor in the containment building.

MR. SCHIERLING: In that calculation, did you include -- let me rephrase that.

Were you aware that there had been a transfer of water from the containment to the auxiliary building?

MR. DAM: I don't believe so, at that time.

MR. SCHIERLING: Which then would mean that the

water level you calculated for the containment building would have been the maximum water level?

MR. DAM: Based on the information we were given, which was tank levels, we had no — for example, no knowledge of how much water make-up they may have provided, which we would not know. But in general, it probably would be safe to say that would have been a maximum at the time.

MR. SCHIERLING: Did Mr. Warren indicate to you why he wanted to have that information, what his concern was?

MR. DAM: Again, I don't recall all the details of the discussion that we had six months ago. He obviously was concerned about equipment in the building, and we knew that at a certain level, instruments or equipment would start to become covered with water. Therefore there would be some concern about the operation of that equipment.

MR. SCHIERLING: When you calculated the water level, what was the number you did come up with?

MR. DAM: I personally didn't calculate it. It was calculated by the mechanical engineers group. And the number was roughly two feet. But I can't say much more than that about exact numbers.

MR. SCHIERLING: Well, when I mentioned you, I mean you, Burns & Roe Company. Did you attach any meaning to that two-foot water level?

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MR. DAM: In what regard?

MR. SCHIERLING: With respect to safety-related equipment that was at such -- that potentially could have been flooded at this time?

MR. DAM: I don't believe the two-foot level had any significance regarding safety-related equipment and the flooding thereof. The level that we started to get concerned would be much higher than two foot.

MR. COBEAN: Let me interpose an answer, that I happened to be there at this time as well. And we did look at it from the point of view of what was possible to flood out that is nuclear safety related from that level. But the fact that you have two feet of water is an extremely abnormal and usually is only the result of a LOCA, loss of coolant accident, or flooding from some other source into the containment building.

That in no way would be considered, then or now, a normal situation that you would expect to incur some time during the life of a plant. So, we were all concerned about the abnormality of the water.

MR. DAM: In fact, we had rough radiation levels inside containment which would indicate that they had a problem, that they had transmitted to us.

MR. SCHIERLING: I would like you --

MR. DAM: So, I think to emphasize what Mr. Cobean

just said, we knew that it was a serious problem at that point. Now, how serious --

MR. SCHIERLING: I would like to combine your response, your concern, Mr. Cobean, regarding a two-foot water level. Would you like to combine that or look at it in conjunction with the high radiation level which you just mentioned again, Mr. Dam? And furthermore, your awareness of the site emergency that had been declared on March 28th -- putting these observations together, did you initiate any call to the GPU management, to either advise them of your concern or have GPU address the request from you, assistance in responding to the accident?

MR. COBEAN: We did not make, that I recall, a special call to anybody other than provide the answer. We felt that the water level being there, if it, in fact, were in the containment building, is enough of an abnormality that's easily recognized by anybody. That we were certain that they would recognize the abnormality of the situation and that was the reason for their request for the calculation.

We did, however, in providing the answer, provided the answer. And I'm not certain exactly how we answered. I wasn't the person on the phone, but I do know that we had at that time, only calculated the level, but calculated whether or not any nuclear safety-related components could be

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damaged as a result of that water level.

MR. SCHIERLING: Off the record for a moment.

(Discussion off the record.)

BY MR. SCHIERLING:

Q Mr. Copean, in your earlier statements, you indicated that on midday Thursday, the 29th of March, you did receive requests for information studies, "what-if" situations, interim designs, and that these requests were made, to the best of my recollection, by Mr. Dieckamp?

A Among others.

Q Among others?

A If the Ron Warren telephone call occurred at 3:30 in the afternoon, it was some time after that call. It's kind of hard now to recollect precisely when the flood gates opened, but there was almost no respite for the request for information, for the request for studies and whatnot from the site, as well as the Mountain Lakes people, after that first call.

Q Thank you. I just wanted to have that piece of information chronologically cleared up.

You indicated that these calls came from Mr. Dieckamp and other people within the GPU organization. Did you at that time -- and I would assume that we are talking now about that early evening of the 29th -- discuss with Mr. Dieckamp the implications of the observations that we mentioned

before, namely, high radiation level, high water level inside the containment and other aspects which we discussed?

A I think we did. He and I personally talked frequently that evening and the next day, and one of the things we discussed was how we had gotten where we were. And it was obvious to me, when the radiation levels were as high as they were in the containment building, and when it was apparent that we had water in the containment floor, that we had had a loss of coolant accident.

And coupled with Bob Arnold's statement on the morning of the 29th, that it appeared that the core had been uncovered, it was apparent to me that we had had fuel failure, fuel cladding failure of some consequence. And radiation level at the dome, numbers as we were getting them, 29th, 30th, 31st -- were so high that it was apparent that a substantial percentage of fuel cladding had failed.

Q Did you make at that time, any recommendation to Mr. Dieckamp or someone else in the GPU management, recommendation regarding what they should do next, where you should assist?

A Yes, I recommended some time, probably the 30th, that they should start degassifying the loop. But it appeared that that had been part of their problem in establishing fluid flow through the core. And that they didn't appear to me at that juncture, even though I had

very, very sketchy information of what they were doing, that they didn't appear to me that they were aggressively pursuing degassification of the primary coolant system.

Q You mentioned earlier the number 29 Park Place offices?

A Yes.

Q Could you briefly describe what that office is, compared to the office we are in right now and other Burns & Roe offices?

A It's an office that's similarly configured insofar as facilities, as the office you're currently in. It is, however, considerably smaller. In that office were a series of offices; private offices; one or two conference rooms; work stations for engineers and designers and administrative people; plus a location of all of the files, which include all the design drawings, the final safety analysis report, the system design descriptions, the calculations and the records of contract awards and the like, that went into the design of Three Mile Island.

Q I'm interested in identifying the function of that office as compared to this office, or -- where were the offices of the engineering support organization for the TMI effort? Was it here? That's Park Place?

A 29 Park Place. First of all, Burns & Roe does all of their work via projects. Projects that were assigned to

Burns & Roe associated with Three Mile Island were all being performed at 29 Park Place. There were, of course, other projects there as well, all under the direction of Mr. Dam.

For example, the Oyster Creek Radwaste Modification was there. That was one of his responsibilities.

Q Okay. You earlier described the Burns & Roe technical support that was mobilized. And you made reference to the Forked River project which, if I recall correctly, ultimately became involved in the TMI support. On March 28th, the day of the accident, was there an existing TMI support organization? And how many people were involved?

A Yes, there was. On the 28th, the -- it might be of some value to try to describe for you the functions that that group was performing. First of all --

Q Let me interrupt just one moment. I mean prior to the accident.

A Yes. That's what I'm trying --

Q Okay.

A First of all, that organization had a few remaining functions to perform under the original construction contract, which associated itself with things like bringing the design drawings to the configuration as built. Second, there were a few plant modifications that had to be planned for, and for accomplishment during the

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first refueling outage, which was scheduled '79-'80, in that time frame. And those designs, procurements and packages were being assembled by that same group, but under a different work order.

And finally, there was a separate contract with Metropolitan Edison, the operator of the plant, who used their contract to provide "requests for improvements" of the design or provide facilities that were not provided as a function of the basic construction contract. Those facilities could vary all the way from a change to the design of some system, to the provision of additional office space and things of that nature.

Now, those were the three functions, three separate functions being provided by the same group at Park Place for Three Mile Island. There were, of course, that same group was also providing certain functions of the same kind to Jersey Central, another operating company of GPU for the Oyster Creek Power plant. And the number of people associated at that time, I think was around 30 to 35.

MR. DAM: 40

THE WITNESS: 40, something of that nature.

BY MR. SCHIERLING:

Q And that group did report to Mr. Dam?

A To Mr. Dam.

Q To Mr. Dam. And this is the group that first was

utilized on Thursday the 29th to participate in the information retrieval studies and interim designs that Mr. Cobean mentioned earlier?

A That's right.

Q And later on that day, you enlarged that group, or maybe on Friday the 30th, to arrive at a shift of about 100 people per shift; is that correct?

A That's approximately right. I forget exactly when it grew to that number. But it was very quickly enlarged. As I say, principally from the resources supplied from the Forked River project, which had a very large group of people available.

Q You mentioned earlier that on about the 30th of March, maybe earlier, that you initiated a nationwide search for tanks. Was that requested by someone in the GPU organization? I know you mentioned Mr. Dieckamp.

A Mr. Dieckamp personally asked for that.

Q Were you aware of the fact that Met Ed was conducting a similar search?

A We were not at that time aware of that.

Q Were you aware -- did you attempt to coordinate any of your efforts with Met Ed, not only on the search for tankage, but any other equipment? Identify and search --

A When we were aware of what some other organization like Met Ed was performing, then we were trying

to perform a similar function. We certainly would try to coordinate it. But by and large we were ignorant, in the very early stages, of what Met Ed precisely was doing.

MR. DAM: Could I add something at this point?

MR. SCHIERLING: Yes, sir.

MR. DAM: On Thursday, when I talked to Ron Warren, he mentioned that Bob Keaton from GPU was to be a key contact to accumulate information, or be a go-between for response. And on Friday morning I talked to Mr. Keaton, and we discussed in general what we were doing and what they were doing, in general terms. And subsequently, we had numerous discussions with Mr. Keaton in attempts to coordinate information and then that contact grew. And I believe Mr. Croneberger came to the contact, and we were talking to him on Friday night, I remember, about who was getting which tanks from where.

They, GPU, provided an engineer who was in our office. And he was also helping to coordinate who was buying which tanks. I believe that the industry in general, a number of groups, were looking for tankage. This information was fed back to GPU when a source had been located, so that there was at least some tracking of who was buying which tanks, so we weren't both buying the same tanks.

Now, we specifically don't know exactly what Met Ed was doing. But it was our understanding that GPU was

coordinating this.

Does that help?

MR. SCHIERLING: Yes. Yes.

BY MR. SCHIERLING:

Q You mentioned earlier that on March 29th, March 30th, that there were many requests for temporary systems and procurement with the objective to provide additional assurance for decay heat removal and to keep the reactor coolant system under control and to also evaluate means and mechanisms to minimize radiation releases.

What specifically did you do with regard to those two objectives? And to whom did you feed that information, in the GPU organization?

A Well, we prepared some preliminary designs. As an example, one of them was a design laid out in the east yard of the Three Mile Island plant in which large tanks that we had located and had gotten delivered or had gotten transported en route to Three Mile Island, were to be filled with activated charcoal and provided a piping system to the various gas suppliers within the auxiliary building, such as the off gas system, such as the ventilation system itself, where these large tanks contained activated charcoal could be used to scrub out the radioactive isotopes that could be constructed out by activated charcoal, such as iodine.

MR. DAM: Could I add to that?

THE WITNESS: No. Wait a minute.

MR. DAM: Okay, fine.

THE WITNESS: Another example would be a similar type of system that was, in fact, installed. The first system I just described was never installed, even though the design proceeded to the point where an engineering change memorandum had been supplied to the construction people.

The other example is one that was, in fact, installed and used, and that is an activated charcoal system on the discharge of the exhaust -- the vacuum pumps of the turbine building, where exhaust from the condenser, which was being used to absorb the decay heat from the reactor via the steam dump system, where this particular filter system was attached to this system and scrubbed out whatever radioactivity might have gone over through the steam generator from the reactor coolant system, those kinds of things came out of requests for designs of various kinds.

The principal sources, however, of what finally did turn into designs that have been operated or are in place at Three Mile Island, came after the organization was established on-site in the plant modifications group.

MR. SCHIERLING: Mr. Dam, you wanted to add something?

MR. DAM: Very briefly. The first system that Mr. Cobean was describing with the tankage in the east yard,

I believe, was specifically for venting of the waste gas decay tanks. We were proceeding on two parallel paths, one was a design of a compressor and tank storage system which had been an option for release if desired, as well as a design to vent the waste gas decay tanks back to the containment building.

It's the latter that was finally chosen. And I believe that was something like the 5th or 6th of April when that design was stopped and we started on other designs. We were working on other designs.

I believe that was the system you were first talking about, is that correct?

THE WITNESS: Yes.

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BY MR. SCHIERLING:

Q You indicated earlier that there were efforts coming into the Burns & Roe organization from the site, from Parsippany?

A Request for efforts, you say?

Q For assistance.

A Requests for assistance?

Q Yes.

A Yes.

Q They came in from the Three Mile Island site?

A Yes.

Q From the GPU offices in Parsippany?

A Yes.

Q And also from B&W in Lynchburg?

A That's right.

Q Who coordinated at that time -- I think we're talking now about Friday, Saturday?

A Yes.

Q Who coordinated here in Paramus, the entire Burns & Roe effort? Was that you?

A Yes. Under me. However, even though I am not certain what we call them, with deputies of mine that were on and in charge of the office at Park Place on a round-the-clock basis, there was a clear leader on every shift who was responsible to see to it that the technical

group of people and administrative people who had been assigned for that shift performed their work and got the answers out to the proper individual. And those people are the, in fact, coordinators. They were on a round-the-clock basis.

Q Mr. Cobean, can you comment on the communications between Paramus and these three different elements? In particular, the availability of communications to the Three Mile Island site on the 28th, 29th, any difficulties that you had.

A Well, the 28th, I can't comment on it because I don't believe we really attempted to -- we didn't test the communications system very thoroughly other than to try to get in touch with our people at the site, own people, to which we were almost completely unsuccessul other than to finally call them at their home. Particularly Brownewell's home. We assumed because of a radiation emergency, that the control room would have been so busily involved in trying to use whatever communications facilities that they have, that that would be next to impossible for us to obtain entry into that communications system.

However,the 29th, I think, was the first time that we in fact did make contact with the control room, and therefore contact with the control room was made fairly regularly, I would say, you know, almost on an hourly basis. It was

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difficult to predict when you needed to have access into the thing. But there were additional means established by then to gain access into the control by telephone. And we did the same thing.

One of the first things we did was to establish, I think, five or six independent outside telephone lines in the Park Place offices, since it was pretty obvious that the fuel lines we had, one outside line and one through our own switchboard, was not going to suffice, particularly at night since our switchboard is usually turned off at night. So, we got these exterior lines, plus facsimiles had been changed, and those kinds of things, to get better communications facilities at our end.

Q How many Burns & Roe people did you have at the site on the 28th?

A Oh, on the 28th, I think we had four.

Q And they were under the direction of Mr. Brownewell?

A Yes. He's one of the four.

Q I see.

A That's right; isn't it? Four? Secretary and two designers, and Brownewell?

MR. DAM: Yes. Part-time secretary.

THE WITNESS: Yes.

BY MR. SCHIERLING:

Q Who initiated the Burns & Roe contact with B&W? Was that done on the request of GPU? Did you initiate it on your own? Or was it requested by B&W?

A I don't recall for sure. It could have been any one of the three things that made the first call.

MR. SCHIERLING: Do you recall, Mr. Dam?

MR. DAM: I recall getting some phone calls from B&W asking us questions. Whether that was Thursday -- I think that was Friday. I don't know whether we had called them first. I believe they called us first directly.

BY MR. SCHIERLING:

Q And when did you send your people to Lynchburg?

A I think we sent them Friday night or Saturday morning.

MR. SCHIERLING: Off the record for a moment.

(Discussion off the record.)

(Whereupon, at 12:00 noon, the interview was recessed, to reconvene at 1:00 p.m., this same day.)

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AFTERNOON SESSION

(1:00 p.m.)

MR. SCHIERLING: Back on the record.

BY MR. SCHIERLING:

Q Mr. Cobean, while you were discussing the activities of the industry advisory group, you made reference to a notebook. Could you please very briefly identify that notebook?

A Yes. It's a notebook that I usually carry around with me to write down things that I wish to remember, like directions from clients or notes that occur with meeting with other people, where frequently I will have to go back and look at it and see what was said. Just a notebook that I habitually try to keep data in.

Q Okay. The entries that you are referring to regarding the industry advisory group, did you make those entries on the specific dates when these activities took place? Or were they reconstructed at a later time?

A No. They were taken at the time that they occurred.

Q Mr. Cobean, you identified that very early -- and I think it was on Sunday -- three major activities were identified by Mr. Dieckamp for the industry advisory group to evaluate: the core damage, including the size and danger of the hydrogen bubble, under Ed Zebrowski; an effort

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under Warren Owen, contingency planning and what-if scenarios, in particular with regard to degasification methods; and Milt Levinson on the outline of alternate methods for cooling to achieve cold shutdown.

Which of these three groups did yc participate in?

A I personally participated in Milt Levinson's group with the cooling plan. I asked Ed Wagner to take part in the core damage group with Ed Zebowski because the hydrogen bubble was their particular concern, and he did that.

Q How many Burns & Roe people did go down to the Three Mile Island site on Sunday? A rough estimate.

A About 10.

Q About 10 people. And were all of these assigned to the industry advisory group?

A Yes. In one form or another. There was two of us that were members of the industry advisory group. The balance of them, including Mr. Dam, were there for purposes of providing assistance to the members of the industry advisory group on questions that they might specifically have and to run the technical library that we established.

Q How long did you stay with the industry advisory group? I think you mentioned it earlier. It was until about the middle of that week?

A About the third, I believe, of April.

Q Yes. I just see you indicated it was April 3.

The recommendations that the industry advisory group arrived at during the days that you were a member of that group, how were they integrated into the GPU response effort?

A We would have typically a meeting by group to discuss specific things. For example, the group I was on had a meeting on the second of April, in which we discussed alternate cooling schemes over the short term, and then alternate cooling schemes with or without power over the short term.

The group that I was associated with, Mr. Levinson's group, would explore all the implications of all of these various facilities and alternate procedures and then chose a series of those alternates that we favored over others in some order or priority.

At the end of that day, I believe, we had a meeting with Messrs. Arnold and Dieckamp. I am trying to recall whether or not any of the NRC people were in that meeting or not, in which the results of these -- this discussion for that day was given to them, and they took that advice and operated on it in some way. Like, for example, one of the alternates that we had for the alternate cooling scheme was eventually developed into a design and installed as a modification to the plant by the group that I was then in charge of, the plant modifications group.

So, that's the method in which they operated. The other

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individuals, the other groups, also met. Usually, we all met in the evening together with Dieckamp and Arnold and, as I said, on occasion, Stello and other members of the NRC to discuss what we had decided to do in the areas that we had explored that day.

As a matter of fact, one day, the first day, the group met with Roger Mattson, Joe Hendrie, and Dennis Ross at 6:00 o'clock. That's the first day.

Q Excuse me a moment. The first day is April 1?

A April 1. Yes. At 6:00 o'clock that afternoon. And each of our small committees gave them a report as to what they suggested in specific areas. So, typically, that's how it operated over the first couple of days.

Subsequent to that, with the establishment of the TMI recovery organization, the industry advisory group would meet with this technical working group twice a day in the morning and in the evening. And in that avenue, in that forum, they reported and received -- they reported results of work that they had done and also received tasks to perform other work in the way of analysis and consideration and requests for advice.

Q Did you in your later assignment as the manager of the plant modifications group receive direction from the industry advisory group to make plant modifications or -- let me rephrase the question this way: Did the industry

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advisory group make specific recommendations either to you or in the forum of the technical working group you just described on specific plant modifications?

A Yes, they did. They did, indeed, and frequently.

Q Do you recall any difficulties between the recommendations being made by the industry advisory group and the implementation of those recommendations? I am talking now about the time period when you assumed the position of manager for plant modifications.

Q I don't recall anything that you would label a "difficulty." Like everyone else in the technical working group, they made comments and recommendations that were not generally adopted. But that happened to all of us. All of us were trying very hard to do what we thought was best, and it was a free-running kind of a meeting in which suggestions were made along specific subject lines by the members of the group, discussed, debated, and decided upon.

And just because the industry advisory group made a specific suggestion did not, ipso facto, mean that we adopted it without full explanation and consideration by the other members.

But by and large, it was a very harmonious technical working group that was set up specifically to explore that kind of thing, using resources that each individual group, including the NRC, had in their command to help them.

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Q Mr. Cobean, while you were at the Three Mile Island site, there was a very heavy backup effort here in Paramus. Who directed that effort?

A Oh, one --

Q Is that correct?

A Yes, that's right. I was still attempting to direct it from the site. But I had able assistance from people like Howard Canter, who was specifically placed on -- he was one of the individuals in the office. He's a director of a project operations division. And Frank Spangenberg and Tip Brolin. Brolin was a project manager of Forked River. And Spangenberg is a project engineer on Forked River. And Andy Marathe, he's a project engineer on Forked River. Those individuals ran the group back here, reporting to me at the site.

Q In essence, the Burns & Roe organization here in Paramus was your backup organization for the site?

A That's right.

Q And problems that you were facing at -- facing at the site, frequently you referred them to the home office here in Paramus?

A Oh, yes, absolutely.

Q When you were in charge of the plant modifications group, from whom did you receive your directions to initiate certain plant modifications? Was that from a consensus of

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the technical working group, or was it from an individual like Mr. Arnold?

A Well, it was a mixture of both. Mostly, it was the technical working group. On occasion, a task would be started after a discussion had taken place in a technical working group. The task would be started by me, and the discussion of the technical working group convinced me that we needed to have something put together to get ready to solve that problem.

A good example of that is we installed two 2500-kilowatt diesel generators at the site at Three Mile Island to support the balance of the plant electrical power distribution system in the event of loss of power. That resulted from a direction that I gave my own -- the plant modifications group. That resulted from a discussion of alternate cooling methods with and without power that, as I say, originally started in the industry advisory group, got into the technical working group, and the discussion, the implications of a loss of off-site power were severe enough to where I thought it was warranted.

So, I put the wheels in motion, went back to Arnold and told him I had done so. And he generally agreed with the process.

Similarly, other people, like Wilson, for example, would feed to me specific criteria of particular modifications

that his analysis individuals had decided upon needed to be done. And using that criteria, we would start the work on the design.

That issue would always, however, come up with a technical working group in which the process was discussed there and general agreement that we were going to use our resources in that fashion was reached by all members.

Now, for example, say, the NRC was always at those meetings, and I don't know that there was a specific single task that we performed that they did not have something to say about, that they didn't, you know, agree with the idea.

Q So, in essence, then, the technical working group was actually an executive body that initiated analysis efforts, plant modification efforts, all the major activities and also cleared these activities within that recovery organization?

A That's right. That's correct.

Now, they didn't initiate all. As I say, all of the analysis effort frequently in the large group managed by Mr. Wilson, analysis would be initiated down there, but it would bubble to the surface and be discussed with a technical working group. It would usually result, perhaps, in a change in procedure or a change in data that had previously been given, or a modification criteria.

I might say the same thing would be true in a waste

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management group, what I just described for the technical support group. They would also do analyses, come to the surface of the technical working group, and criteria would be given to my group for design and installation.

Q Mr. Cobean, while we were off the record, we discussed the extent to which the Burns & Roe Company availed itself of the -- you might call it "connections" that were offered by the Federal Government and, in particular, by the White House. Can you elaborate on that? Did you ever utilize that avenue in obtaining either manpower, other resources, equipment, transportation?

A Yes. I discussed earlier on the record a description of a ventilation cleanup system, filtration system that was designed and installed on the roof of the auxiliary building, and the delivery of the components of which came from Washington State, flown there by the Air Force.

The arrangement for that transportation was made by a Burns & Roe buyer calling a certain contact number that had been given to us at the Three Mile Island site staff for assistance. That buyer called and asked permission or assistance in getting that stuff delivered, that materials be delivered from Washington State in the next day or so. Subsequently, the Air Force was directed by the White House to load it on their planes and fly it to Harrisburg.

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Q You mentioned earlier that United Engineers did provide manpower assistance to your plant modifications group. Is that correct?

A That's correct, yes.

Q Were there any other personnel from other organizations, utilities, architect engineers that participated in your group?

A Yes, there was. There were some Gilbert Associate individuals, particularly in planning and scheduling, with part of our organization. General Public Utilities had some of their people in our organization, particularly in the civil structure -- in the construction and purchasing parts of my organization.

Catalytic formed some of the -- formed most of the on-site direct supervision of construction. Let's see. Westinghouse supplied a substantial group of engineers and designers to design the augmented decay heat removal system. They also supplied an organization that did the principal decontamination of the diesel building and the auxiliary and fuel-handling basement. And I believe that covers it.

Q It gives a very good indication that there were many organizations. I had gathered from your earlier statement that maybe United Engineers was the only other organization there. And that certainly was incorrect?

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A Yes.

Q You mentioned that Catalytic directed the crafts' effort to do the actual implementation of the modifications that had to be made. Did you give the directions to Catalytic about what had to be done?

A Yes. We did that in a method called "using the engineering change memoranda system," that had been established by Burns & Roe and GPU during the initial construction days on Three Mile Island, wherein we would present to Catalytic via this mechanism an approved drawing and instructions on how to install that piece of equipment or that system.

It was an attempt to engineer, provide fully engineered steps for them to perform. There was enough cross-pollination and daily contact -- even better than that, even hourly contact -- between the Catalytic superintendents and our engineers that if any questions arose as a result of interpretation of a drawing, why, our people helped them or corrected the drawing or modified the drawing to make it clearer.

Q So, it was either you yourself or someone within your organization directly dealing with the superintendent of the Catalytic organization?

A Yes.

Q Do you know of any conflicts, or can you comment

in general on the morale or attitude of the workers at TMI? I am talking about the Catalytic work force to participate in that effort, in the response effort. For example, did you always have enough manpower available on an overtime basis or whatever it might be to indeed get the job done?

A The morale of the people I thought was extremely high, both from a point of view of the superintendent as well as the actual workers, trades people. There seemed never to be enough -- precisely enough people available to do all the jobs that we wanted to do, simply because we were trying to do them in such an extremely short period of time.

For example, the long-term modification to cool the B steam generator is a design that includes pumps, heat exchangers, demineralizers, and large pipes and cross-connection into existing plant systems into this modification. That modification alone normally should take somewhere between six to 12 months to accomplish. We tried to do that in three weeks. And it's that kind of a demand that was awfully hard to keep up with.

So, where we were short of people, we worked people overtime and we worked them as hard as we thought was safe for them. And we worked them as consistently as we could.

Finally, when we got to a single point where we realized that we had taken certain trades and worked them long, very

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long hours for long periods of time, we specifically gave them a day off to get some rest, because we were afraid they would start making mistakes. And we could not, with that kind of a schedule, afford mistakes that had to go back and be fixed.

Q Do you recall any requests that you had, either for personnel, for equipment, analysis, you name it, that either your organization, be it at the site, plant modifications, or that Burns & Roe here in Paramus, was not able to meet?

A Yes.

Q And if so, what did you do about it?

A Well, there's only one request that I'm aware of that we were not able to meet that we were asked to do. And that is, at the same time that we were doing the engineering design and installation of the B steam generator modification, we were asked to perform a similar design, an installation on the A steam generator on a schedule that was 2 to 3 weeks to complete.

There was no way that I could meet both requirements.

The B steam generator worked, had proceeded a couple of days in advance of this request and was well on the path towrads completion of the design portion of it, particularly the mechanical design portion of it.

When Arnold and Wilson requested that we also do the A steam generator and do it in a couple of weeks, I indicated that I just could not. I could not meet that schedule. I could do it, but I couldn't meet that schedule.

And so they assigned that function then to Gilbert, Incorporated, to do the engineering and design and procurement of the A steam generator.

It was subsequently stopped a few days later well in advance of the completion of the entire engineering and design of it.

However, the procurement had been completed of the major components, like heat exchangers and pumps. But it was never installed -- because at the time, it became apparent

that they couldn't meet their two-week requirement, either. And so it was just stopped.

That's the only time that I can recall ever having been requested to do something that I ended up saying that I couldn't do it on their schedule. I could do it, but I couldn't do it on that schedule.

Q Mr. Cobean, we made reference to a TMI recovery organization throughout this interview, which came about, it's my understanding, about Tuesday or Wednesday of the week following the accident.

Can you comment on the operation of the TMI recovery organization prior to this organization and thereafter?

I'm interested in interaction amongst people without this organization and with an organization, its effectiveness.

A Well, I can only comment insofar as I viewed it. Before this organization, there were just strictly two phases that I was involved in. I was in a position to observe.

One of which is where we were operating out at the 29 Park Place office and responding to requests for information, requests for analysis and design and procurement from a multitude of sources.

The second phase is where I joined the Industry Advisory Group back in Pennsylvania.

So, my [illegible] is at least limited to what I had contact

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with. I don't think that there is any doubt, however, that the imposition of the TMI recovery organization and the resources that had been assembled previous to that, the organizational efficiency substantially improved -- less duplication of effort, I would imagine, would have to ensue because it all comes from one place now.

And all of the people, all of the organizations working on all of the problems were reporting through one organization.

Whereas before, a lot of organizations were involved. And I would imagine it would be awfully difficult for Mr. Dieckamp or Mr. Arnold to keep track of everything that was going on.

It was for that reason that this organization was established, though.

Q Do you think the participation of the Industry Advisory Group was of benefit to the recovery organization? And I would like you to address that issue, if you could, from two aspects: One, you as a member of the Industry Advisory Group; and secondly, you as a manager of the plant modifications group.

A Yes. I think they were of great benefit. I believe in addressing the three areas of concern that were originally assigned to the Industry Advisory Group, and as a member of that Industry Advisory Group, I know that they

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assigned what our country considers some of the most experienced and best talents into those areas in an organized, disciplined fashion to look at things in a methodical way, such that resolutions could come out of that.

Whereas before, perhaps those exact same subjects were being looked at by B&W by themselves, by GPU by themselves, or in conjunction with somebody else, by NRC by themselves in reaching separate conclusions or based on different data I think that assembled in the Industry Advisory Group, was enough talent such that it merited and deserved and obtained the respect and the consideration of the licensee, GPU, as well as NRC in what they had to say.

Now, as a member of the plant modifications group, they were a source of a substantial number of suggestions, as were the rest of us, that I thought were particularly meaningful in their recovery operation.

I think it was a very definite asset to the recovery from TMI.

Q Can you recall any or some specific incidents where you, as the manager of plant modifications, said let's go and ask the Industry Advisory Group was they think about this approach or what methods they would recommend?

A Yes. Back to the B steam generator system. One of the functions of the plant modifications group that I

established was that the -- not only was my group supposed to supply the design and the hardware and the installation, but we were also supposed to supply a detailed operating procedure of the system that we were modifying as we were modifying the plant, the system that we modified after it was modified.

Two separate procedures.

And the B steam generator, the process of putting the B steam generator cool-down system on the line, so to speak, such that you cut it in and act as a cooling heat sink for the steam generator concerned me from the point of view of waterhammering, in that we were going to introduce into the B steam generator substantially cooler water.

And I wanted the industry advisory group to look at the planned procedure that we had put together to see whether or not that is the optimum way of bringing that system on the line.

So, they accepted that requirement and did a study on it for us. That's a specific example.

But they did that for other people as well, that sort of thing.

Q Thank you. One of my last questions. You mentioned before that requests came to Burns & Roe and task assignments were made for specific activities.

Did that procedure apply to both activities at the site

and at Paramus? And if so, can you explain on the method of task assignments, can you explain that a little bit more?

A Well, before the establishment of the TMI recovery organization on the site, as I said before, those tasks and requests for information and help came from all sources to a central organization at 29 Park Place.

When we established the recovery organization at the site, they continued to supply requests for information and data again from three sources to the home office at Paramus.

There was an attempt on my part to try to get those assignments to be assigned to the home office, to be assigned via myself.

At least I considered doing that that way.

But it was pretty apparent to me that that could unnecessarily burden the system with delay, just to try to locate where I was, because sometimes I could not be very easily obtained.

One of my deputies, however, could

So I established a system such that when an assignment came into the home office, they would let me know on a daily basis, twice a day, what they would assign, what they were working on and what the progress was and what their status was.

So that by facsimile, they transmitted to me twice a day, once in the morning and once in the evening, a status of

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where they were on all the jobs they were working on in the home office.

Those status reports would also identify who had assigned that task to them.

Q Were these only tasks assigned to Paramus by the site or did that also include tasks that were assigned maybe by Prasippany or Paramus and you are aware of all of the support activities that were going on?

A Yes, sir. After we established this organization in the site, task continued to be assigned to the home office from Mountain Lakes, from Parsippany to a lesser degree. But the principal person at Parsippany who was assigning things was Mr. Dieckamp and his immediate staff subordinates.

But we would also get them from B&W from time to time.

Q You mentioned earlier that Burns & Roe did keep a record of all these assignments?

A Yes.

Q And that does exist?

A Yes.

Q In the Burns & Roe files?

A Yes.

Q Would you have an index to these task assignments that were made through the time period of interest to us today? That would be through April the 7th.

A I think so. I don't know what you mean by an index. We have a number and a task.

Q A summary sheet?

A Title, usually. And it may have some other data by who assigned it and when it was assigned and when it was answered.

Q Would it be possible for me to look through that particular record?

A Certainly.

Q Okay. Was, at any time, and again, I'm talking only through April the 7th, was at any time during that time period the issue of reimbursement mentioned by the Burns & Roe Company, by GPU in your recovery efforts?

A Between Burns & Roe and GPU?

Q Yes.

A No, not to my knowledge. Not during that span of time. It was subsequently, but not then.

Q But not then?

A Yes.

Q Mr. Cobean, we covered quite a bit of territory. I would like to ask you at this time if there's anything else that you would like to add to the information that you have provided us with today, be it on a specific nature or be it on your impression or evaluation of the recovery effort, again, during the time through April 7th?

A Well, as I said in my opening statement, I thought and summoned it all up. I thought that the organization and support that the industry gave to the stricken company and stricken plant was phenomenal. And it demonstrated to me the very close and seemingly single objective, which is success and safety on the part of the industry that we all seem to have inherently.

And when an organization like Three Mile Island gets in trouble, everybody in the country that could help, that was asked to help, immediately did.

Q I think what is important to mention here, too, is the point that I attempted to address earlier. And that was that the Burns & Roe Company very early into the -- very soon after the accident offered its resources and made itself available in support of the recovery effort.

And I wonder if you could comment on the fact that, indeed, you did not become actively involved until Friday? Would it have made any difference, in your opinion, if you had number one, information available on Wednesday and how things would have gone differently if you had participated earlier in the recovery effort?

A That requires a lot of supposition.

MR. MURPHY: It's a lot of speculation there.

BY MR. SCHIERLING:

Q I realize that. But the fact is that Burns & Roe

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did become actively involved, starting late Thursday and definitely Friday.

And, indeed, I'm asking Mr. Cobean to speculate. But I also think that because of his experience and understanding of the events at TMI, that he probably can have an opinion on how your earlier participation --

Q Well, my guess is that the answer to that question is to an awful degree, dependent on the role and the time that that role would be played by me or anybody else in Burns & Roe, or the Burns & Roe organization as a whole.

You see, within a few hours after 4:00, the damage had been done. And at the time that we first got involved in the thing, the degree of the damage perhaps was recognized only to the fact that damage had been done, but had no idea as to the scope of it.

So, in the role as a plant modifier or the role of a manager of engineering, it would be hard. I would be hard-pressed to argue that an earlier assignment of Burns & Roe in that role would have had substantial -- made a substantial difference.

However, all of us are very bright when it comes to looking back. And my personal background is one principally of operation of power plants, of nuclear power plants.

And had I been placed in a role in a control room, I believe that I would have done -- that I would have caused

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in a control room, in a position of authority, I believe that perhaps the sequence of events would not have followed precisely the way that they did.

MR. HENDRICKSON: Might I add to that that Bus is speaking from his own personal experience in the Navy nuclear propulsion program as a plant operator. Operating power plants is not a role of architect engineers under any circumstance.

BY MR. SCHIERLING:

Q I certainly do appreciate that. But I think Mr. Cobean has some unique qualifications to comment on that. And I think we can let it suffice with these statements.

Before I finish my line of questioning, I have one last question. Did you have any problems interacting with the Babcock & Wilcox Company?

A None at all. None whatsoever.

Q Did you have any interaction with Babcock & Wilcox?

A Oh, yes. Yes, indeed. A lot, as a matter of fact. One of our particular modifications was a modification in which they helped do the baseline design with us at the Three Mile Island site. And that is the modification which we've labelled TS 6B Mod, which is a pressure reactor coolant system, pressure and volume control system.

That's a specific example of a very close cooperation we had to have in the area of specific plant modifications.

In the area of analysis and the area of answering "what ifs," of which there were lots, our cooperation and necessity of cooperating between us was almost constant and was very willingly and completely given, one company to the other.

Q I do not do this on purpose. But it seems that I always have one more question. I hope that this is the last one.

You assumed a rather unique role, and by "unique," I mean that you are not a member of the GPU organization, that you were from another organization and yet, you were n' ed and assumed the responsibility of an element in the recovery organization.

While you assumed that role, did you identify yourself as a -- or did you feel the need to identify yourself as a Burns & Roe employee, as a member of the recovery team, as a member or a GPU effort?

A All of us went out of our way to identify ourselves only as members of the recovery team, not irrespective of our company's affiliation.

Q In other words, that identification or that association lost its identity, became a secondary nature?

A Yes.

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Q And primarily, you are speaking now, of course, how did that interact, for example, with other outside executives like the Mr. Lees, Byron and Bill Lee, Mr. Owen? It was a universal --

A Well, everyone knew who everyone else was. For example, Byron Lee, everyone knew he was from Commonwealth Edison. But he was a part of this team and helped this team everywhere he could. Not as a Commonwealth Edison vice president, but as a member of the team.

And the same thing could be said about the other Lee, Bill Lee, or could be said about Frank Palmer, who was the waste management director.

All of us were trying very hard to play a role of contribution and all of us, of course, represented other companies, which we drew upon.

For example, Mr. Lee, Bill Lee, Duke Power, offered one of the Oconne plants to be used a a guinea pig to determine whether if, in the configuration we found ourselves in on about the 3rd of April, 3rd or 4th of April, would natural circulation start up in the B&W plant, because there was a question in B&W's mind whether or not they had enough verification of this computer program under the conditions that we found ourselves in at that time to know whether or not the computer program which predicted natural circulation to occur, whether or not that could really be verified,

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whether or not we had enough data to be sure enough.

He offered his plant at the cost of over a million dollars to run that experiment for them. And at the last moment, B&W said, we believe that our computer program has had verification enough and that the test is not needed.

So that's the way a member of this organization used his own resources, whatever it is.

For example, I was on the phone daily with both Tom Hendrickson and with my boss, Ken Roe, to let them know what was going on. And I was constantly being provided with support from them.

If you need anybody or you need anything, let me know.

And, for example, one of the first things I suggested as a member of the technical working group, since I had a relatively unique opportunity to do something similar to TMI recovery once before at the Chalk River plant after their accident, I said don't make the same mistake the Canadians did at Chalk River, at which in the first couple of days, all of the qualified operators that knew the plant very well had been overexposed and they could not be used again for another year.

And so, they did that. They said -- they immediately bought in on that and one of the things that Tom did in the home office, he put together a list of volunteers from our company who would go in to be used for a one-shot basis.

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As an example, if somebody needed to go take a sample that was in a high radiation area, why, we would have one of those people do that.

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Q When you made that recommendation, you said, "Don't use all" -- what were the words, "the most qualified operators of the plant."

A Right.

Q Were you talking about Met Ed operators?

A Yes, I was.

Q You were making that recommendation?

A To the Mechanical Working Group.

Q To the Mechanical Working Group?

A Yes.

Q Okay. While you were the manager here, did you experience any difficulty, let's say, from employees of another company to report to you as a member of the Burns & Roe organization -- Company A, who would say, "Look, this is not the way we do business at home."

A Well, not really. Not any real problem at all. If you had any problem at all, it might be with specifically one individual and the clients in the GPU office, but that's it. But that didn't last for more than five minutes. It's not worth commenting on it.

Q Mr. Cobean, I think your comments have been extremely frank and I think will be very helpful to us in preparing our report showing the role that the industry did play in the response to the effort.

I personally do not have any additional questions. Do

Do you have any items you would like to explore, Barry?

MR. HORVICK: No. Nothing.

MR. SCHIERLING: I want to thank you for your participation, Mr. Cobean. I think we can go off the record.

(Discussion off the record.)

MR. MURPHY: Are we going to receive a letter from you forwarding the transcript of Mr. Cobean for him to review and prepare errata and sign?

MR. SCHIERLING: Is that the normal procedure?

MR. HORVICK: I'm not sure what the procedure is. People have been able to correct their transcripts, but I'm not sure what the procedure is.

MR. SCHIERLING: I will let you know when you will receive a copy of the transcript.

MR. MURPHY: It may not be necessary. Mr. DiFedele told me that he has ordered a transcript, so if that's the case, you'll have to verify that. If that is the case, then when we receive the transcript that he's ordered, we'll give it to Mr. Cobean. It should be sent to -- send it to me, Kevin Murphy, at 550 Kinderkamack Road.

THE WITNESS: Or Oradell, New Jersey, zip 07649.

MR. MURPHY: We'll have the errata prepared. We find mostly it's typographical errors. He'll sign it as his unsworn testimony, and we'll send it to you.

MR. SCHIERLING: Fine. It is our practice, unless I'm mistaken, that the individuals participating in the depositions or interviews will be provided with a copy.

MR. MURPHY: I see. Well, fine.

MR. SCHIERLING: In that light, you will receive a copy.

MR. MURPHY: Well, that may have superseded any request to purchase it. If we're going to get one anyhow, we'll wait to receive it from you. No sense in it. And then we'll prepare the errata and send it to you at the Rogovin, Stern & Huge office at 1730 Rhode Island Avenue, N.W., Washington, D.C. Is that correct?

MR. SCHIERLING: That is the mailing address of the Rogovin Company.

MR. MURPHY: Want us to send it to the NRC at a different address?

MR. SCHIERLING: I do not know. I will let you know.

MR. MURPHY: Okay. We'll get the instructions in your transmittal letter, right, Hans?

MR. SCHIERLING: Right.

MR. HENDRICKSON: Off the record.

(Discussion off the record.)

MR. HORVICK: I guess we can go on the record now. This is a continuation of the interview.

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MR. MURPHY: It's not a deposition at all.

MR. HORVICK: It is a continuation of the interview conducted previously with Mr. Cobean. We'll be questioning Scott Dam.

Whereupon,

ALLAN SCOTT DAM

was called as a witness, was examined, and testified as follows:

EXAMINATION

BY MR. HORVICK:

Q Let's see. Mr. Dam, have you read the witness notification --

A Yes.

Q -- form, and you understand it?

A Yes.

Q Okay. Mr. Dam, could you tell us what prior testimony you've given regarding Three Mile Island?

A I've given no testimony on the record.

Q Okay. And I would also like to get this on the record.

Mr. Hendrickson, you have given testimony.

MR. HENDRICKSON: Yes, I have.

MR. HORVICK: In front of the President's Commission. And just to get it on the record, that testimony does in part cover this issue of the AEs' role?

MR. HENDRICKSON: It covers it extensively.

MR. HORVICK: And the utility's operating license and decision to go into commercial operation. Okay.

To get into the --

MR. HENDRICKSON: This might be helpful. The testimony was, as I remember, on Wednesday and Thursday, August 1st and 2nd of this year.

BY MR. HORVICK:

Q Okay. Now, Mr. Dam, were you at the TMI site for the full calendar year, 1978?

A Was I at the TMI site?

Q Yes.

A No.

Q Well, were you involved in any of the pre-op or start-up tests at the site?

A No.

Q Okay. What was your involvement with TMI, then, during 1978?

A I became the Project Manager for Burns & Roe in March, 1978. Burns & Roe at that time was still involved with the construction, design and construction contract for the Three Mile Island Unit-2.

Q Could you tell us more specifically what your duties were as Project Manager?

A The Project Manager is responsible for the overall

operations in the company, as Burns & Roe, for the project, for the project being for the design of the Three Mile Island Unit-2. Burns & Roe was responsible for the balance of plant design.

Q Let's see. Was there any significant change in the character of your duties after TMI-2 gained its operating license of February 8, 1978?

A Again, I say that I became Project Manager in March, after they had the operating license.

MR. HORVICK: Okay. If we could go off the record one second.

(Discussion off the record.)

MR. HORVICK: If we could go back on the record, then. At this point, for the record, I would just like to identify the authors of these questions as Larry Vandenberg, V-A-N-D-E-N-B-E-R-G, and David Evans.

MR. MURPHY: Employees of whom?

MR. HORVICK: They are both with the Task Group of the Nuclear Regulatory Commission dealing with precursors to the TMI-2 accident.

MR. MURPHY: From where? From the government? From the NRC offices or --

MR. HORVICK: Yes. They are with the NRC. Right. They are.

MR. MURPHY: Okay.

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BY MR. HORVICK:

Q If we could just back up a second, Mr. Dam, some of the questions I've asked up to this point, you have responded to them as an individual. If we could look at some of these questions in a larger context, if you were not personally responsible for certain pre-op and start-up tests during 1978, are you aware of any other B&R people under you or any other divisions of B&R that were involved with these tests?

A Burns & Roe provided an engineering liaison service during the start-up test program. In that regard, we had an engineer assigned to the Test Working Group. His name was Rich Brownewell.

Q If we could just discuss your attendance at any monthly meetings conducted by the GPU Project Manager, were there any such meetings that you know of, and did you, indeed, attend them?

A During the design and construction of TMI Unit-2, there were monthly Project Managers' meetings of which the GPU Project Manager, the Burns & Roe Project Manager, as well as the constructor -- and I believe B&W is the reactor manufacturer -- attended. They were typically held at the TMI site. I believe shortly after the operating license was obtained, those meetings were stopped as far as the design project goes. There were subsequent meetings called the

monthly Project Managers' meetings held on the site, but they dealt with first refueling project items.

Q In the course of any of these meetings that you've just mentioned, was there talk of some kind of a target date for going into commercial operation?

A Yes.

Q Could you tell us what the import of those discussions was?

A I don't understand your question.

Q Okay. Was the issue a question of time or GPU people saying, "We need to get into operation, commercial operation," within a certain period of time?

A I don't remember the discussions phrased in that manner. The date of commercial operation really was not something that either the Project Managers or specifically Burns & Roe were particularly concerned with. It as more of a financial consideration or whatever. We had target dates for various things that we were doing, and certainly the commercial operation date was mentioned. But more importantly, we were talking about a target system operation date of when the plant would be at full power.

MR. HENDRICKSON: I think if I might elaborate on that, the commercial operation date is not technically oriented. Obviously, the plant must be completed and tested and accepted before that. But the date is a utility matter,

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not something -- commercial operation is a utility matter, not something the architect engineer is involved with directly.

BY MR. HORVICK:

Q Right. We're just trying to pick up as much information as we can in this area. I think if something was passed on to you, you could perhaps tell us about it. In fact, can you specifically recall what the discussion concerning commercial operation did have to do with? Apparently, you weren't pushed in terms of time, but whatever discussion you did have along those lines, can you remember what the thrust of such discussions were?

A There were a variety of dates, again, to target system operation, 100 percent power, which we were working for and various completions of tasks. By the time of initial criticality, there were not too many Burns & Roe related tasks that were required to be done to support 100 percent power. And during the spring and summer, various dates were mentioned as far as target dates for 100 percent power, starting like in June of '78. I think that answers what you're looking for.

Q Yes. I think that does. Let's go on then. Which GPU Service Corporation and Met Ed people did you regularly work with or discuss plant problems with when you became Project Manager?

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A I believe — and this is a recollection — that when I became Project Manager, Dick Heward, H-E-W-A-R-D, was the GPU Project Manager for the design and construction. Shortly thereafter, I believe that John Barton became Project Manager, and I don't remember the dates on any of these changes. After Barton, Clay Montgomery became our contact as the GPUSC Project Manager.

With regard to Met Ed, we had a number of contacts in the Gary Miller site organization as well as with Met Ed, Reading, and that group is headed by Dick Klingaman, and there were many individuals involved in all of the organizations.

Q Let me ask you, specifically with regards to commercial operation, did you ever have any discussions with any of the people that you've just mentioned regarding commercial operation? Even more specifically, a need to get the plant into commercial operation by a specific date?

A Again, this was over a year ago, and I don't remember the discussions at all regarding commercial operation. It was a date that was being mentioned at various times. But as far as a Burns & Roe target date, it really didn't play a factor in our work. It was more of a general interest.

Q Let me ask you, had you ever heard anything about a May 31, 1978, target date for TMI-2 going into commercial

service?

A I believe I said first of June, but May 31 could have been the date as well.

Q All right.

A That was the date, I believe, that was chosen very soon after initial criticality.

Q Do you have any insight as to why that date was specifically picked?

A No.

MR. HORVICK: If we could go off the record for one second.

(Discussion off the record.)

MR. HENDRICKSON: Back on the record. I'd like to amplify Mr. Dam's responses to these questions by saying that architect engineers do operate in accordance with schedules for all projects. And there is also a schedule or pressure on us by all clients to get the power plants finished and on the line and generating electricity.

In the case of the Three Mile Island project and GPU, we have had schedules throughout and operated and did our work in accordance with schedules. And there was schedule pressure by GPU, as there is from all clients, but there was no undue pressure. We did the job completely and thoroughly, and all requirements that we were aware of in the course of the design and testing program for the plant.

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I might also add that our contract with General Public Utilities is a standard architect/engineers contract. It is unrelated to meeting particular schedules or goals. We were paid for our work with a multiplier to meet our costs and a modest fee.

MR. HORVICK: Off the record again, please.

(Discussion off the record.)

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MR. HORVICK: Back on the record.

Mr. Hendrickson, in view of what you have just said, we have looked in Mr. Cobean's deposition taken by the President's Commission. At page 154 of that deposition, Mr. Cobean testified that, "The client was always concerned about meeting a commercial operation date. That was his principal goal in life, to make that commercial operation date in some way."

Could you speak a little about Mr. Cobean's statement? Does it in any way refute what you just said?

MR. HENDRICKSON: No, I don't believe it does. If you read the entire section of Mr. Cobean's testimony, you will see that the gist of his remarks are roughly the same as mine. And that the particular quote is taken out of context.

Mr. Cobean was indicating that all clients are properly concerned with the timely completion of their plants and placing their utilities in commercial operation. But, there is no one who has concern, to our knowledge, on the part of General Public Utilities and in no way were short-cuts taken to our knowledge, in the completion of the Three Mile Island Unit No. 2.

BY MR. HORVICK:

Q Okay. Going on, Mr. Dam, you stated that you weren't -- that commercial operation dates were not a major concern of yours. But, to the extent that you did know about the target dates for commercial operation, did you report them to your

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superiors? Was there any discussion about these dates? Was it an important issue with your superiors to know about such dates?

A. The commercial operation date that was discussed previously was certainly mentioned to my superiors, Mr. Cobean, again, for general interest. I don't remember any lengthy discussions with him or anyone else in particular regarding commercial operation.

MR. MURPHY: Ask another question.

BY MR. HORVICK:

Q. Okay. We are moving into a new set of questions here relating to the April 23, 1978, transient. Were you on the site when the main steam safety relief valves failed to recede?

A. No.

Q. Could you tell us where you were?

A. No, because I don't remember there I was. I remember I was not in the office.

MR. MURPHY: Do you have a date when that happened?

BY MR. HORVICK:

Q. April 23.

A. I would have to check a calendar back then of where I might have been.

MR. SCHIERLING: Do you recall that particular transient?

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THE WITNESS: Yes.

MR. HENDRICKSON: According to my calendar, Scott, April 23, 1978 was a Sunday. Would that help?

THE WITNESS: I think Ron Toole called me at home that Sunday, as a matter of fact, asking me some technical questions regarding the safety valves. And I remember taking some data on a notepad that was hanging up on the wall in the basement.

BY MR. SCHIERLING:

Q. Did he identify to you the reason for that call?

A. That's the call I am thinking of, he was asking for some information regarding the safety valves. It may not, in fact, be that same call.

Q. I just wonder, Mr. Dam, assuming that April 23 was, indeed, a Sunday, you mentioned that you did become aware of the main steam safety valve not receding. Were you involved? Was Burns & Roe involved in any follow-up action on that transient?

A. Yes.

Q. And if so, what were the activities?

A. Our main activity was -- first started out with an evaluation in detail of the main steam safety valves that were provided by Lonergan Company, how they were supposed to perform, and how in fact they were performing, along with various reviews to determine what corrective action or additional testing

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should be undertaken with regard to the Lonergan valves.

Subsequent to that time, after numerous meetings, discussions, tests, et cetera, it was concluded to replace Lonergan safety valves with a different designed valve. And Burns & Roe provided the design for those modifications.

Q. Was that activity requested of you by the GPU organization?

A. Yes.

MR. SCHIERLING: Why don't you go off the record?

(Discussion off the record.)

BY MR. HORVICK:

Q. Back on the record.

Do you remember any discussion about the May 31, 1978, commercial operation date in regard to this transient?

A. Only that late in May, the date was changed. But I don't even remember what the date that they changed it to was.

Q. Do you have any knowledge of what kind of factors went into that change of date?

A. Only that the plant was not going to be operate at 100 percent power because the safety valves were being replaced.

Q. But you personally weren't involved in any of those discussions?

A. As we have talked, commercial operation was something

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the utility was involved with, not Burns & Roe.

BY MR. SCHIERLING:

Q. These safety valves that we are talking about, are they within the scope of supply of Burns & Roe or of the NSSS vendor?

A. Burns & Roe specified the valves based on the B&W design requirements. And purchasing was done by GPU, as was all procurement activities for the balance of plant equipment.

BY MR. HORVICK:

Q. Okay. Mr. Dam, we have another question here based on Mr. Cobean's deposition taken by the President's Commission. At page 157 of that deposition, Mr. Cobean testified that it was important to GPU for accounting reasons, if for no other reason, to try to get the plant on-line commercially before the end of 1978.

We are aware from your testimony up to this point, that you had very little import or discussion regarding target commercial operation dates. But do you know anything at all about this kind of reasoning in regards to a commercial operation date?

A. Time out.

MR. HENDRICKSON: Off the record.

(Discussion off the record.)

BY MR. HORVICK:

Q. Mr. Dam, based on our questions and answers up to this point, it is obvious that you know very little about the

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various target dates for commercial operation that GPU and Met Ed arrived at in 1978. Could you just summarize your role surrounding this whole issue?

A. Again, the commercial operation dates were mentioned at various times, at various meetings. However, there was no direct on Burns & Roe with those dates.

The one side issue with regard to commercial operation date was the date that work started for the Metropolitan Edison Company under our continuing services agreement for updating drawings under their contract, versus updating them under the GPU contract. That was one of the principal -- one of the principal reasons to know the commercial operation date.

The work we were doing was task-type work resolving reopen items. A number of those continued after the commercial operation date, which were GPU's responsibility. Some were turned over and became Met Ed responsibility, and we worked on those for Met Ed.

Q. Is that all you have on that?

A. Unless there is something else you want me to say specifically.

Q. That sounds fine. Why don't we just put the lid on that issue.

Hans, why don't you take over with some of these questions regarding the valve itself?

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BY MR. SCHIERLING:

Q. Okay. Mr. Dam, we talked about before, the April 23 failure of the main steam safety valve, relief valve. And you indicated already that you were directed by GPU to prepare design changes in case that valve would have to be replaced. Is that correct?

A. Yes.

Q. When were you advised or requested by GPU to initiate that effort?

A. I don't recollect. It would be in the timeframe of May, 1978. But I don't remember what exact date.

Q. Specifically, what did you do, look at other valve designs, evaluated those with regard to their applicability, or what was involved?

A. I think, as I said before, we first started out looking at the Lonergan valve to see what should be done to make the Lonergan valve work. In addition, a test valve was taken by Lonergan and modified by them to attempt to make the valve recede with the specified limits.

As a back-up to Lonergan not performing, Burns & Roe did a number of studies looking at valves of size and types which could be installed in place of the Lonergan valves.

A decision was reached sometime in May, I believe, that GPU wished to proceed with the detailed design of a replacement valve. And that was done.

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Q. It is my understanding that there was a meeting on May 23rd at the TMI site on that particular issue between Burns & Roe, Lonergan and GPU. Did you attend that meeting?

A. I attended numerous meetings. I could have, very easily, attended that one.

Q. If you did not personally attend it, is it correct to assume that you probably had someone else attend that meeting?

A. Yes.

Q. Okay. Were you aware that there were other valves intended to be used for the Forked River project at about the same size as the Lonergan valves, but made by a different manufacturer, and that they would be available in November of 1978?

A. Yes, although that date was in question. At various times, Crane Company would not give us a firm date. In fact, I don't believe their valves had even started fabrication in May.

So, any date that Crane would have given, would have been a questionable date.

MR. SCHIERLING: Off the record.

(Discussion off the record.)

BY MR. SCHIERLING:

Q. Back on the record.

Mr. Dam, could you please address the whole issue of these

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safety release valves with respect to the availability of the Crane design that were not into manufacturing yet for the Forker River project, the Dresser valves, and the Lonergan valve? Which one was finally opted to be installed at the TMI-2 unit?

While we were off the record, we mentioned three valves; is that correct? Dresser, Lonergan, and Crane?

A. Okay.

Q. Which is the one that was finally selected?

A. The Dresser valve was selected.

Q. And that Dresser valve was obtained from where, from another nuclear power plant or was it specially ordered for GPU before TMI-2?

A. The valves were in the Dresser shop. They had been ordered by Commonwealth for one of their projects. And I don't remember which project. But they had not yet been shipped.

Q. And these are the valves that were then ultimately installed at TMI-2?

A. That's correct.

Q. How much time did you have to complete that task?

A. It was not so much as how much time we had, it is how much time it took to do it. Nowhere do I remember being given: you have to have it done by a certain date. It was how fast can you do it. Look at various options so that the

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endproduct can be done in a reasonable -- as quickly as possible. But I don't remember ever being given a date that it had to be done by.

Q What effort, was it considered a rush job, then, for Burns & Roe?

A It was considered --

Q To the extent that other work had -- other scheduled work had to be dropped in order to accomplish this task?

A It was considered our highest priority task. And as many of the staff that were needed worked on that in deference to other work items which had lower priority, particularly the items that weren't due until the first refueling outage, which was the predominat workload of our group at that time.

Q The original valves that were in the TMI-2 safety relief valves, they were Lonergan valves?

A That's correct.

Q They were designed according to Burns & Roe specifications?

A Burns & Roe provided what is called a performance specification. That is, we provide the set pressure, the blowdown percentage, other characteristics that the valve has to be made to. However, we do not tell a valve manufacturer how to do his valve design in our specifications.

Q Why was this design selected, rather than a more common design used in the nuclear industry? Let me ask you:

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Is, indeed, the Lonergan design one of the lesser used valves in the nuclear industry?

A. I can't speak for the whole nuclear industry.

Q. To the best of your knowledge.

A. It is not -- I don't believe at that time it was the prevalent design in the power industry. However, there was good precedent, I believe, for that valve that was chosen.

MR. HENDRICKSON: Let me give also a partial answer to that. This is from so long ago that I may not have it all exactly right.

But the Dresser valve was an outgrowth of the relief valve failure that had occurred.

THE WITNESS: You mean the Lonergan valve?

MR. HENDRICKSON: In one of these Virginia plants.

THE WITNESS: Which valve do you mean, the Lonergan valve or the Dresser valve?

MR. HENDRICKSON: The Lonergan valve. The original Three Mile Island design was an outgrowth of one of the failures that had occurred a number a years ago at one of the nuclear plants, one of the relief valves. It was a VEPCO plant, that's right.

And the feature that Lonergan had provided in this valve was a double discharge, which balanced or tended to equalize unbalanced loads that were prevalent with the other designs. And this was considered at the time a new and desirable

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feature.

However, relief valves are very difficult. And there are not very many suitable facilities for testing valves. Unfortunately, this was the first chance for a full test of this design. And it did not perform well.

We therefore had to alter the Three Mile Island plant and install valves similar to earlier designs that did have, as I recall, unbalanced loads. Am I correct, Scott?

THE WITNESS: That's correct.

MR. HENDRICKSON: And design the supports and piping to accommodate the unbalanced loads.

THE WITNESS: The Lonergan valve was a much simpler valve for installation and had much reduced loads on the piping system. And therefore was a highly desirable valve.

There were 12 Lonergan valves that had to be replaced by 20 Dresser valves.

So, the valves -- the Lonergan valves, while they were larger, had much less forces on to the valve stem and their attachment to the piping.

MR. HENDRICKSON: If the valve had performed properly, it would have been a very desirable valve.

THE WITNESS: In fact, the Forked River valves you mentioned before designed by Crane, were essentially the same as the Lonergan valves. That is, they were double discharge T size orifice valves.

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MR. HENDRICKSON: Right.

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MR. HENDRICKSON: Right.

BY MR. SCHIERLING:

Q You mentioned that the 12 Lonergan valves, the original Lonergan valves at TMI-2 were replaced by 20 dresser valves.

MR. MURPHY: He mentioned it.

BY MR. SCHIERLING:

Q You mentioned that, Mr. Dam. In that selection of the Longergan valves, the fact that they were quite a few less, did cost play any role in the selection of these valves, to the best of your recollection?

A Yes, the Lonergan valves were less expensive than either Crane or Dresser at that time. And a technical evaluation as well as a cost evaluation was done on the bids. And as I remember from looking at the history -- I was not on the project at the time -- a thorough evaluation was done, prior to placing the order with Lonergan.

Q There's one final question that probably will require you to go back into your memory, your recollection. Please try to do so, if you can.

You participated in various meetings, I'm sure, on the schedule, although commercial operation is not of interest to you, to Burns & Roe. But meetings where, indeed, schedule was discussed. And based on your prior testimony, the information that you have given us, you probably did not

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have any -- you appeared to have not had any input into these discussions; however, do you recall that ever issues were discussed relating to what aspects of the TMI-2 plant could be safely deleted or postponed in order to get the TMI-2 unit on-line by the end of 1978?

A No.

Q You do not recall that any tasks that still were not completed at that time could be postponed to beyond commercial operation?

A I don't believe that's what you asked the first time.

Q That's what I meant to ask the first time.

A Now, I'm confused about your question.

Q I'm asking if there were any TMI-2 related tasks, safety-related, that were deleted to beyond the commercial operation date of December 1979?

A I don't remember any commercial operation date, safety-related.

Q '78, I'm sorry.

A '78. Any safety-related items that were not completed before commercial operation where there was a reason or need to have them completed. There were, as you know, licensing commitments made in the operating license for safety-related items, which would be done at the first refueling outage, which was per the agreement of

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Metropolitan Edison and the NRC. Those were the only items that I know of that were scheduled out after commercial operation.

MR. SCHIERLING: Did you want to add something to that?

MR. MURPHY: I think you meant to say deferred, rather than deleted.

MR. SCHIERLING: Deferred.

MR. MURPHY: Deferred beyond the commercial operation.

THE WITNESS: I know of no items that were deleted.

MR. SCHIERLING: Deferred or postponed, that was my intent.

MR. MURPHY: Right.

BY MR. SCHIERLING:

Q Is there anything else that you would like to add on this line of questioning regarding the need -- the rush to go into commercial operation by the end of 1978?

A From Burns & Roe's standpoint, I don't remember any particular rush as it affected Burns & Roe. There were numerous discussions I'm aware of within the GPU system on work breakdown between Met Ed and GPU, and who was going to do what and be responsible to what, relative to commercial operation.

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But as it affected Burns & Roe, I don't really know of anything that would show a rush.

MR. HENDRICKSON: Scott, there was a contract-related issue before commercial operation date. I believe our work fell under the original new construction contract. And there was a continuing services contract between Burns & Roe and Metropolitan Edison and obviously at some point, tasks that still needed to be done, whether it's the parking lot or the glass or whatever it is, might be carried on on the continuing services contract, rather than new construction contract.

THE WITNESS: In fact, I did mention the drawings. The responsibilities were pretty well-defined in November and December, which items were going to be GPU response and which items were going to be Met Ed response. And in fact, we had already started working with Met Ed on some tasks, when Met Ed wanted to make some planned improvements on the neutralizing system, for example, and for make-up water in the secondary plant, things of this nature, which Met Ed said it was their responsibility, because they were not part of the original designer and construction.

GPU did carry over past the first of the year, various items which were of a peripheral nature.

MR. HENDRICKSON: I believe, isn't it true, that

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both contracts are still open today and work is still being done by Burns & Roe under both contracts, both the initial construction and the continuing services contract?

THE WITNESS: That's right.

MR. SCHIERLING: I think that completes this line of questioning. Do you have anything else to add, Barry?

MR. HORVICK: No. I think we've covered all the issues and that's it. Thank you very much.

MR. MURPHY: I have a request before we go off the record, and that is that the pages of Mr. Cobean, Mr. Cobean's interview, be identified from the beginning of his testimony until it ended. Those pages within Mr. Cobean's interview that reflect Mr. Dam's few answers and questions -- answers to questions be identified, and then pages of Mr. Dam's interview be identified from beginning to end after Mr. Cobean finished. And those few pages where Mr. Hendrickson answered. Otherwise, we're going to go crazy trying to get this thing properly reviewed, since it's not going to be broken down. It's all going to be in one package.

MR. SCHIERLING: Back on the record.

Whereupon,

WARREN R. COBEAN

was recalled as a witness and, having first been duly sworn, was examined and testified further as follows:

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BY MR. SCHIERLING:

Q At the suggestion of Mr. Murphy from Burns & Roe, we would like to ask you, Mr. Cobean, two questions on some prior testimony you had given. We are referring to the testimony that you gave for the President's Commission. And we are referring to a statement on page 154 where you testified, and I quote: "The client was always concerned about meeting a commercial operation date. That was his principal goal in life, to make that commercial operation date in some way."

Now, this is a statement, indeed, out of context. But you --

A Also, it doesn't reflect the change that I made to this thing. Did you realize that?

Q No. I didn't realize that.

MR. MURPHY: Is there an errata?

THE WITNESS: You bet there is. This doesn't read English. The client was concerned about getting through. There are certain things you have to do in designing and building and testing a power plant that let you get through. He was never trying to skip any of the steps of getting through. But he wanted to get through.

Why did he want to get through? He wanted to get through for a lot of reasons, principally, because they needed the power, and second of all, that by being through they could

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go -- they could declare that the plant was in commercial operations. That means having completely designed the plant, having completely constructed the plant and having completely tested the plant. Then, they could declare commercial operations.

Now, from an economic point of view, that had two benefits to him. One is that he started generating electric power for the thing, and two, he could get, hopefully, the cost of that plant in the rate base for his area and stop incurring additional -- and start paying off the debts that he had incurred in designing and constructing and testing the plant.

So, that's what I meant by --

BY MR. SCHIERLING:

Q Could you explain to me what you mean by saying "getting through"?

A Well, I put it that way because I thought it was the simplest way of saying it.

Q Getting through what?

A Getting through the job of designing, constructing, and testing the plant. There is, as you know, a design to complete of a plant. That plant has to be constructed to that design. That plant then gets tested on a piecemeal basis, continuing to add parts until at the end, you have the whole plant being tested simultaneously as an

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integrated plant.

Now, upon completion of all the pre-planned and pre-ordained tests, meeting all the criteria for the test data, test data recorded during those tests, then the plant has successfully been tested. After having been successfully designed and completed -- constructed -- that's what I mean by finishing, getting through.

Q Mr. Cobean, the second statement on page 157, attributed to you, have you looked over that particular statement?

A Yes.

Q Let me repeat it here. "It was important to GPU for accounting reasons, if for no other reason, to try to get the plant on-line commercially before the end of 1978."

I think in your previous statement you gave us your interpretation of that, of this statement here, what it means to get to on-line commercially.

Did Mr. Scott Dam provide you with any input to make that statement?

A If he did, he did it in a very offhand way. I don't remember anything. As I said in the following question and answer, I have been and am still in almost constant contact with a number of people within GPU. And I am certain that that's the principal source of information.

However, Dam could have contributed to it. I don't

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recall.

Q Mr. Cobean, you mentioned earlier that the first statement had been corrected by you; is that correct?

A I'm almost positive it has, because the last sentence does not read good English. And one of the things that I tried to do when I was correcting my testimony, as you see, was to try to pick up that kind of --

MR. MURPHY: Let's take a look and see if we have the errata in the back.

THE WITNESS: No, we don't have the errata. We've got part of the errata.

MR. HORVICK: My copy does have it.

THE WITNESS: It is not corrected. I missed that one, sorry. It doesn't read good English, though.

MR. SCHIERLING: I think that we'll, first of all, straighten out the record with regard to the errata sheet. And secondly, it amplifies the statement that Mr. Cobean made in the earlier testimony.

Would you, Mr. Murphy -- do you have any additional comments on this particular issue now? I do not see any need to have Mr. Cam address the same questions again. I think as far as we are concerned, the information provided by Mr. Cobean suffices.

MR. MURPHY: I'm very satisfied that the issue has been fully covered.

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MR. SCHIERLING: Okay, with that statement, I think we have obtained the information that we wanted to obtain today.

Again, Mr. Cobean, I want to thank you for your participation and all the information. That's it.

Mr. Cobean, one final comment I would like to make is, in case there should be any need to obtain further information, either from you or someone else in the Burns & Roe organization, we will let you know about it and arrange for any additional interviews or depositions, if they should be required.

That's it.

(Whereupon, at 3:30 p.m., the interviews were concluded.)

* * *