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POOR ORIGINAL

IN THE MATTER OF:

THREE MILE ISLAND

SPECIAL INTERVIEWS

WITNESS: W.E. GRABER

Place - Bethesda, Maryland

Date - Thursday, September 6, 1979 Pages: 1 - 165

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WITNESS: W. E. GRABER

Room 426
Arlington Road Building
6935 Arlington Road
Bethesda, Maryland

Thursday, September 6, 1979
9:50 a.m.

BEFORE:

Principal Interviewer:

JOHN F. DIENELT
Brownstein, Zeldman and Schomer
1025 Connecticut Avenue, N. W.
Washington, D. C. 20036

Minor Interviewer:

OLIVER D. T. LYNCH, JR.

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EXHIBITS

P R O C E E D I N G S

(Witness sworn.)

Whereupon,

W. E. GRABER

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

MR. DIENELT: Good morning, Mr. Graber.

THE WITNESS: Good morning.

MR. DIENELT: Mark this as Exhibit 1.

(Graber Exhibit No. 3001 identified).

MR. DIENELT: Mr. Graber, you're here pursuant to a request from the TMI Special Inquiry Group to come and have your deposition taken. I have marked as Exhibit 1 a letter which was sent to Mr. Hirshburg, the asociate division counsel of Electric Boat Division, and a copy of which I believe was sent to you.

THE WITNESS: I have a copy of it. I read it, I understand it.

MR. DIENELT: I understand the answer to the last question, but just for the record, let me make sure that you understand the information set forth in the letter, including the general nature of the NRC TMI Special Inquiry, your right to have an attorney present here as your representative, and the fact that the information you provide here may eventually become public.

THE WITNESS: I understand.

MR. DIENELT: I want to note for the record that Mr. Graber is not represented by counsel here today. If, during the course of the deposition, Mr. Graber, you feel you want to be represented by counsel and have counsel present, just let us know and we will adjourn the deposition to have an opportunity to make arrangements to have Mr. Hirshburg here or someone else.

THE WITNESS: Okay.

MR. DIENELT: Also for the record, you should be aware that the testimony that you're going to give has the same force and effect as if you were testifying in a court of law.

Our questions and your responses are being taken down and will be transcribed. You will be given a copy of the transcript or an opportunity to review the transcript and make any changes that you deem necessary in the testimony you have given. But to the extent that changes that you make are of a significant and substantive nature, rather than merely to clarify a misunderstanding as to what you said, the changes might be viewed as affecting your credibility.

THE WITNESS: I understand.

MR. DIENELT: So I think it is important to try and make your answers as complete and accurate as you can today, so that we don't have the potential problem -- and if during

the deposition you don't understand a question and would like to have it rephrased or clarified, just stop us and tell us that and we'll try to clarify it and get at what we want to do.

Also, it's important for purposes of the way the deposition ultimately will read to allow me to finish my question or allow Mr. Lynch to finish the question, even though you know what the question is and what the answer will be, because that will enable the court reporter to take down the question and answer in the proper sequence, and it will make things a lot easier to anyone who ultimately will read the deposition.

Prior to the deposition, Mr. Graber, you handed me a document which is marked "Resume" at the top and which I will ask the court reporter to mark as Exhibit No. 3002.

(Graber Exhibit No. 3002 identified.)

DIRECT EXAMINATION

BY MR. DIENELT:

Q. Mr. Graber, I'm showing you the document that has been marked Exhibit 3002 and ask you if you can identify it for the record.

A. This is a brief resume of my educational and professional experience.

Q. Is it current?

A. It is.

Q. When was it prepared?

A. September the 5th, 1975. It doesn't talk about my association with TMI, just my professional experience and my permanent job.

Q. No, we'll get to that. Just for the record, will you tell me what your current position with Electric Boat is?

A. My job title is Manager of Radiological Control Planning and Training at the Electric Boat Division of the General Dynamics Corporation in Groton, Connecticut.

Q. How long have you held that position?

A. The title of Manager of Radiological Control Planning and that assignment? I have had approximately four years the title; the additional title including training approximately two years.

Q. Focusing on the four-year period in which you have had the substantive responsibility of this position, will you summarize briefly what those responsibilities are?

A. Primarily the responsibilities associated with the job assignment have involved emergency planning, radiological emergency planning dealing with the planning for and preparation of procedures and plans associated with response to radiological emergencies.

The duties involve coordination with people in the naval nuclear program, the State of Connecticut local officials and people inside our own company, in preparing for radiological

emergencies.

In addition to the planning phase, the training of our employees and the designation of equipment to be used in response to radiological emergencies is also included.

I think it is also important to mention that I am a senior staff member of the radiological control department, and as such I have several ancillary duties which involve the more broader base of radiological control operations in an organization operating with radioactive material, so that my duties, while primarily have been involved in that planning, I have been privy and cognizant of all of the radiological control program that was under way at Electric Boat.

In addition, we had started some preparations for expansion of our radiological control services into the commercial area, and had begun to make contacts with commercial power companies, preliminary conversations, in November and December of 1978, and more substantive conversations in January and February of 1979.

We had obtained one contract for radiological control services with Northeast Utilities in early March, 1979, to provide services to their headquarters in Berlin and to two of their reactor plants.

Q. Berlin, Germany?

A. Berlin, Connecticut.

The reason for this was that we have quite a bit of

talent within our own organization and our current workload in overhauling and refueling submarines has decreased, and we felt that we had some expertise to offer, that we needed to maintain our capability and our state of the art. And there was a buck to be made by doing this. So we made a proposal to our management and they accepted that, and we began this preliminary marketing.

Ironically, we had talked to people in GPU, General Public Utilities Service Company, Jersey Central, and had one conversation with people at Metropolitan Edison before March the 28th.

Q. For what period of time prior to March 28th had Electric Boat been involved in providing services to private nuclear power plants?

A. To the best -- in the radiological control area, to the best of my knowledge, the first -- it started with March the 12th, for our current efforts. That's not to say that we haven't for many years had contact with and discussed mutual problems with commercial power plants and other government agencies concerning radiological control programs.

Q. You testified that you had been involved in the planning for radiological emergencies. Apart from TMI, could you give me several examples of radiological emergencies which you regarded as of significance in which you or Electric Boat were involved in the response?

A. Well, there's a broad spectrum. There was, if I think about the association with other organizations, there have been occasions when, to give you a for-instance, at Connecticut Yankee -- this must be ten years ago -- they had a significantly higher level of radioactivity present in the demineralizers, and on that occasion we provided equipment only.

The company itself was involved in offering assistance to the Canadians during the Calk River event in the 1950s, I believe 1952-53, that period of time. I do not know if we were involved in SL-1. I know that one of our past employees was at SL-1, Mr. Bill Rausch, who is now, I believe, with Gilbert Associates or Burns & Roe. I'm not sure which one of those companies he went with.

There have been radiological emergencies within a naval nuclear program of a -- what I would call a minor nature, compared to TMI. Spills, radioactive equipment, spills of resin, radioactive resin, situations where high levels of radioactivity levels existed and required emergency entries into the work areas. Those type situations of high airborne activities where releases of this activity occurred unexpectedly and required response situations where individuals were contaminated, had skin contaminations, internal contaminations which required response.

Specific events would take a long time to tell you the

numbers of them and -- however, the magnitude of these problems in the light of the magnitude of the problem of TMI were significantly smaller. I don't think we have had anything approaching that magnitude.

We have had problems which required fair-sized, fair numbers of resources and people, equipment, logistics, planning, and the management of problems, but the problems that consequently -- of these problems, were considerably less than the consequences of the TMI event, even though it itself, when viewed overall, the consequences to date has been relatively minor; the potential consequences perhaps considerably greater.

Q. It would be your testimony that the radiological emergency at TMI was the most significant with which you have been involved?

A. Yes, sir. I would like to modify that somewhat. I have seen radiological levels as high as the ones which personnel were exposed to at TMI. I have seen airborne concentrations which were in the same order of magnitude to which people were exposed to at TMI. But I haven't seen those two conditions simultaneously and in as large an arena as we found when we arrived at Three Mile Island.

I have planned for events of that significance.

Q. In the context of the planning that you have done, have you written plans or proposed plans of emergency --

A Yes, sir. I worked as a principal with the Navy in preparing their emergency plan for shipyards, although my name I don't believe is any author to that document. That is a generic document. However, it required considerable research and thought processes to arrive at the final effort.

I was on the State of Connecticut task team which prepared the first draft of the State of Connecticut radiological emergency plan. Subsequent to that date, that effort was taken over by Stone & Webster and they prepared a second revision or a final revision, which we had an opportunity to comment on.

I have also reviewed the emergency plans of other naval facilities and the Millstone power station and Connecticut Yankee power station. I was involved in three short courses involved in emergency planning, one at Harvard School of Public Health, one with the NRC, the Inter-agency Radiological Emergency Planning Group at Tewksburg, Massachusetts, T-e-w-k-s-b-u-r-g. And again, at Albany, New York.

These sessions, while they were short courses, involved interaction among the participants and actual planning, while not writing the specifics, but going through the rationale, philosophy, looking at the NRC NUREG 75-111 and similar documents, to assure that the right processes went into the planning; and, specifically at Tewskburg, exercise there was a tabletop exercise using simulated data with -- I'm sorry,

that is Albany -- using simulated data and making simulated responses of emergency planners and responders.

Q. Are Millstone and Connecticut Yankee private?

A. They are private reactors.

Q. Have you been involved in the emergency planning for any private reactors other than Millstone, Connecticut Yankee and TMI, to the extent you were involved in TMI?

A. No. I would like to clarify my involvement at Millstone. That is, I have reviewed the plans that we are part of a mutual assistance pact, but we -- I did not directly participate in the writing of that plan.

Q. Is that also true with respect to Connecticut Yankee?

A. That is true, also, right.

Q. In terms of seminars or other formal educational training, such as the courses in emergency planning that you have had, are there any -- is there any formal education apart from what you have testified to and what is reflected in your resume in the area of emergency planning?

A. To my knowledge, there is no one specific curriculum developed for emergency planners. The courses which I have taken have been those that have been available throughout the Government.

There was a course available a number of years back that I didn't go to. There is some training going on today which is site-specific that I feel probably would not be too

helpful to me out in Nevada. It is more directed toward state and local people who have never dealt with radioactive material.

There have been specific courses on medical radiological emergencies at Oak Ridge that I haven't gone to, which I think are specific and didn't require that I need.

There is some work at Ohio State in general emergency planning done by a group of people, but I didn't feel, you know -- I felt that was too general. And I know of no other courses than the ones I have been to that are available.

Q. How long has Electric Boat been involved in the general -- generally in the nuclear power industry?

A. Since approximately 1951. And that involvement has included the design, construction, outfitting, initial testing of the submarines, and specifically the reactor plant, followed by periodic availability or maintenance periods, including overhaul, refueling, in several cases decommissioning or complete modification of the reactor plant.

Q. Did there come a time when, subsequent to March 28th, 1979, you went to the site of Three Mile Island?

A. Yes, sir.

Q. When was that?

A. On March the 31st. That morning I received a phone call -- do you want me to just go through this thing narrative-wise?

Q Why don't you give us a narrative, that's fine.

A On March 28th, around 11:00 o'clock in the morning, I received a phone call from one of our employees who was at Connecticut Yankee, telling me that they had heard that there had been a LOCA, L-O-C-A, at Three Mile Island.

I then called a former employee of Electric Boat who worked for GPU at GPU headquarters in Parsippany. He wasn't in, and the following day he called me back and gave me some specifics about the situation. In that interim, I had talked to our management and said that if there was serious problems, were we interested in pursuing the offering of services, whether for profit or for assistance if the situation warranted it. And they had told me that I could make that offer, so I did.

Q Before we get too far, let me back up.

Who was the employee at Connecticut Yankee with whom you spoke?

A Benito, B-e-n-i-t-o, Granados.

Q And who was the former Electric Boat employee at GPU?

A James McConnell.

Q Do you know what his position at GPU was?

A I believe he was Director of Research and Development.

Q Now, you say he called you back on March 29th?

A That's correct. And in the meantime I had talked to my management and they had agreed that if they needed assistance, that we would be willing to give them assistance

within our capabilities.

I told Mr. McConnell that. He said at that time that they were still assessing the problem, did not know -- he knew they were going to need assistance, but did not know exactly what type and how much.

We had a subsequent conversation the morning of the 30th. He gave me more details about the situation down there at that time. Still, he said they still had not looked at their overall needs in people and equipment and would keep us informed.

The morning of March 31st, about 9:30, I received a phone call at home from Mr. McConnell and he asked that we provide assistance.

I asked him exactly what they were looking for, and he said he wanted senior radiological control personnel who had had engineering background in handling radioactive material, and that they were looking for, you know, somewhere between four to 12, whatever we felt we could spare; that contractual aspects of the situation were not clear, however, they would reimburse us in some fashion and would get off a purchase order which would give us some liability protection.

On that basis, I called our weekend management representative. I went through a series of phone calls here and eventually -- and I'm not quite clear -- I don't think I talked to him, but a Mr. Elliott, who was our director of

operations, gave us authority through our chain of command to send a group of people and equipment.

Q This was all on the 31st?

A The 31st, the morning of the 31st.

So I called several of the people who I felt would be most helpful in a situation like this. And I might as well list them now: Tom Peterson, who was our chief of engineering and administration in the radiological control department. Tom and I discussed the situation and started talking about other individuals who we thought would be helpful.

Ken McIntosh was the second individual that I called. Ken was assistant superintendent of our machine shop at Electric Boat, but had been formerly involved in radiological control department in the design of tools and equipment used in working on radioactive equipment.

Mr. Richard Belton was a certified health physicist and our senior technical individual in our department.

There was another person -- and Mr. Wilbert, W-i-l-b-e-r-t, Zurliene, Z-u-r-l-i-e-n-e. He was group leader of our radiological control engineering group.

Okay, let's see. Okay. We reported to the plant and got together some of our emergency equipment, specifically portable air samplers, portable survey meters, KI pills, capital K-I, and some other emergency supplies.

We loaded them into Mr. McIntosh's van. While we were

there, the radiological control shift supervisor on duty expressed a desire to help, and so we also took him with us. And he was Mr. Ronald Sachetello.

Q. I think you might spell that for the record, if you can.

e-1 A. I'll try. S-a-c-h-e-t-e-l-l-o.

Q. Before you go on, let me go back again and ask a couple of clarifying questions.

Did Mr. McConnell or anyone at GPU provide you with any written statement of what they wanted you to do?

A. No, sir. At that time, as a matter of fact, I asked Jim and he said --

Q. Jim is Mr. McConnell?

A. Mr. McConnell. And he said, we're not sure exactly where we're going to use your people. We need a lot of help and we need some people with sound engineering background. We know we're going to need an ALARA -- A-L-A-R-A -- but we'll figure that out when you get here.

He also asked that we stop by the corporate headquarters of GPU in Parsippany.

Q. You testified that you reported to the plant and began gathering emergency equipment. In that context, the plant was the Electric Boat plant?

A. Yes.

Q. You mentioned KI and am I correct that that is the

chemical symbol for potassium iodide?

A. That's correct, iodide, iodate. There are two different compounds, both of which are similar, and I think we have potassium iodate pills.

Q. And you mentioned ALARA. Could you, for the record, say what that means?

A. ALARA means as los as reasonably achievable. It is a philosophy for maintaining radiation exposure, ALARA, or minimizing radiation exposure to all people and all pathways.

Q. Now, we have got you at or about to leave the Electric Boat plant, I take it?

A. Right.

Q. And that is on the afternoon of March 31st?

A. March 31st. We left there approximately 1:30 and drove to Parsippany, stopped in there, were met by Mr. McConnell, and Mr. McConnell took me in to meet Mr. Dieckamp. Mr. Dieckamp is president of the General Public Utilities.

Q. Is that D-i-e-C-a-m-p?

A. Pretty close, maybe a double something in that area, I'm not sure, but that is pretty close.

Mr. Dieckamp introduced himself, asked who was the team leader. Mr. Peterson and I, who are more or less equal, looked at each other and he seemed to think that I ought to be, so I said, I guess I am.

Q. He being Peterson?

A. Peterson said something to the effect, why don't you take it. And I said okay. And so I told Mr. Dieckamp that I was team leader. Mr. Dieckamp spent about two minutes with us, said that they had a hell of a mess and they were glad to know that we were coming to help.

And he said, you are in charge of health physics at the Island.

Q. Is that pretty close to a verbatim statement?

A. As close as I can make it.

And I said something on the order of, are you sure you want me to be. And he says, do you want to do it? So I said I want to do whatever you think I can do best to help you out. And he says, well, that's what I want you to do, and you report to Jack Herbein at the observation center and Jim will tell you how to get there.

Q. Do you know what Mr. Herbein's position is?

A. He is vice president, nuclear generation, Metropolitan Edison. At that time he was also the emergency operations director of TMI, which is a job title that exists in emergency planning.

Q. Did you have any further discussion with Mr. Dieckamp about the nature of your responsibilities?

A. As I recollect, he was introduced to the people and said again he was glad for us to be there and needed help and they would give us all the cooperation they could, and he,

as we were leaving, he was walking down the hall with us, and he said to me that, I'm sure if you need any more resources that you can talk to your friends in the Navy and they can give us some help.

And I said, well, I don't -- I haven't discussed it with them, but I'm sure that if we need help from them, they will provide it.

So we -- Mr. McConnell described how we should travel the rest of the trip and we got in the van and went on down.

Q. Apart from giving you directions as to how to get to the Island, did Mr. McConnell discuss with you the nature of your responsibilities?

A. No, he didn't. The only conversation I recollect having with Mr. McConnell, I did talk to him a little about that, what's going on, can you give us an idea. He said not too well, you should see Don Reppert or Tom Cremmins, and if you can't see them, Dick Dubiel.

Subsequent to then, I found out the positions these individuals held in their companies. Would you like me to --

Q. Yes, go ahead.

A. Reppert is in GPU Service Company, licensing. Cremmins is Jersey Central and I think he's chief of nuclear engineering. Dubiel is with Met Ed, assigned to TMI as radiation protection -- chemistry supervisor.

So we proceeded on, had a few discussions among ourselves

as we went down about things we should be looking at when we -- as soon as we got there. In particular, we were concerned about what isotopes were most abundant at that time in the response of the dosimetry being used on the Island.

Q What did you know about the subject at that time?

A Okay. We knew that the auxiliary building had been flooded. We knew that there were releases being made from the auxiliary building and the fuel-handling building to the environment. We knew some of the radiation levels that had been measured at distances from the plant, although these were somewhat sketchy.

A maximum number that comes to mind is on the order of 100 millirem, m-i-l-l-i-r-e-m, per hour. Say near the north gate, on the order of 15 millirem per hour. We had heard at the edge of Middletown at approximately one to three millirem per hour; in Harrisburg, these only being infinitesimal readings, and that the levels were significantly less than that, but they were the numbers that were as a result primarily of direct radiation from the unit to containment, with some influence due to the noble gases, n-o-b-l-e.

We were not sure of what the components of iodine in the release was, because we weren't sure of the pathway, whether it went through a filtered system or whether it had gone out a direct pathway.

We had heard the numbers concerning the radiation outside

the dome, outside the containment, and some of the radiation levels inside the auxiliary building being in the order of from 100 rem per hour to 1,000 rem per hour.

We didn't have a feel for the airborne concentrations in the auxiliary building. We did know that they were in self-contained breathing apparatus, which implied to us the airborne activity was in the range of 10^{-6} microcuries, m-i-c-r-o-c-u-r-i-e-s.

Q. From whom or from what source had you gotten the information you had before you arrived at the Island?

A. Friday morning, Mr. McConnell had given me some of the numbers.

Q. Was Friday morning the 30th?

A. The 30th. I had gotten some of those numbers. I believe I got the information that they were in Scott air packs from Mr. McConnell at the meeting at Parsippany.

The other information, we got some of it, of course, from the press and the media, and I think that was about the extent of the sources. We had expected some level of briefing at Parsippany, but it was apparent that they were not set up to display data. At least there was no evidence that they were set up to display data, and they were primarily acting, as I could see, as a resource center to try and get assistance more than anything else.

There was some public relations aspects of what they were

doing, but most of what was happening was they were ordering equipment, getting people lined up, that type of thing.

So I didn't mention -- but we had a call Saturday morning just before I got the telephone call, from the naval reactors office, asking how much lead we had, because we built submarines and there is a lot of lead used in submarine construction. I later learned that the NRC had asked the Navy how much lead they had, and there was a possibility that a lot of lead was going to be shipped to TMI to be used as shielding.

So I had some people working on that Saturday morning to track down how much lead we had, Electric Boat, and what size, what type, and how quick we could get it on the road.

Q. What, if anything, had you been told by Mr. McConnell or Mr. Dieckamp or anyone else at GPU, about the current organization at TMI for dealing with the radiological emergency in terms of the radiological aspect of it?

A. Only that Mr. Herbein was in charge and I was to see him.

Q. Prior to arriving at Three Mile Island, had you reviewed any of the emergency plans or radiation protection manuals or procedures which TMI had?

A. No. The only thing that I knew about TMI was that it was a pressurized water reactor. It was a Babcock & Wilcox design. On Friday we had -- I guess even on --

about Wednesday afternoon we had gotten out our references on pressurized water reactors, some data concerning pressurized water reactors, schematic of a B&W plant, and t c was about the extent of it.

Q. Wednesday the 28th?

A. Correct. The afternoon of the 28th our academic curiosity got us to looking at what kind of plant they had, and as we were getting reports through the media what was happening, trying to figure out ourselves what happened and how that might relate to us, our plant designs and what it really meant.

But I had not seen any of our procedures or their plans, had never been to the facility, knew personally, knew nobody on the station.

Q. Prior to the time that you arrived at TMI, had you and the emergency group you assembled done any planning or preparation for what you were going to be doing, apart from your meetings and discussions with Mr. McConnell and Mr. Dieckamp, your internal meetings or discussions in the van as you were driving, the gathering of equipment that -- about which you have testified, and the general reading about pressurized water reactors which you testified you had done?

A. The only thing that we had done was that we at Electric Boat, at least once a quarter, have a radiological emergency exercise, and during those exercises most of the

individuals that I was with are gathered together, along with others in the emergency control center. And we take simulated data that has been prepared by others and react to it in order to combat the problem and mitigate the conditions of it.

This is the only thing, you know, we do that I said at least once a quarter, although all of these are not reactor accidents, some of these are just radiological problems. But at least once a year we exercise and we probably do it on an average of twice a year, we exercise our emergency plan with simulated reactor plant data, releases to the environment, situations analogous to the one at TMI.

However, site-specific for our rotten situation, for our submarines and for our people, the nucleides are the same. The facilities are different, the plants are different, the people are different. But that is the only other preparation that I could think that we would have that would assist us in this type of situation.

Q. Now, you left Parsippany and went to Three Mile Island?

A. Right.

Q. When did you arrive?

A. I arrived at the observation center approximately 6:30 p.m.

Q. Why don't you pick up the chronological sequence from there?

A Okay. Needless to say, there was some confusion. But within 10 to 30 minutes, I had an audience with Mr. Herbein. He gave me a briefing of what the plant status was, some general radiological data concerning the release rate, the radiation levels that were in the auxiliary building, the current objectives of the emergency team, and those remained the same for some time.

And I'll try to summarize them. I may do a little stuttering, because I'm doing total recall. And I don't know how many objectives there were, but one of the objectives -- and these are not necessarily in the order of priority -- was to keep the plant safe by maintaining a temperature and pressure control in order to avoid further damage to the core, loss of cooling, if you will.

The second objective was to minimize the release of radioactivity to the environment.

The third objective was to make preparations for redundancy in order to protect that plant, such things as electrical diesel generators and that type of thing, the tying of redundant electrical systems, putting in redundant power supplies for vital instrumentation, that type of thing.

Also, getting the H-2 recombiners set up, the hydrogen recombiners set up to recombine the hydrogen which was in the containment building. And we were in -- I think we were in the beginning of the great bubble-squeezing operation to

attempt to reduce the size of the volume of the bubble in the reactor head by gradually squeezing it and then pulling back and squeezing, in order to reduce that bubble, reduce the hydrogen concentration, reduce the oxygen concentration and get it dissolved into the water and moved over to the pressurizer, where it ought to be.

The additional -- another objective, of course, was to minimize the exposure to employees who were involved in these recovery efforts on the Island, and the objectives were established that we would not exceed the quarterly limit for any employee for any operation.

MR. LYNCH: Whose quarterly limit?

THE WITNESS: Three rem per quarter, the NRC's quarterly limit.

MR. LYNCH: Of Part 20, of 10 CFR 20?

THE WITNESS: Well, that's got two parts to it, too. But he did not want to exceed three rem to any individual involved in the operation.

BY MR. DIENELT:

Q. Did Mr. Herbein describe these operations? Is that a complete list of the objectives or are there others?

A. That's as complete as I can remember now. There problably were some others.

Q. Did Mr. Herbein describe these objectives to you in the meeting that you had with him?

A. Yes.

Q. Was anyone else present at that meeting?

A. Not to my knowledge.

Q. What did Mr. Herbein say to you, if anything, about your role?

A. That I would be heading up the health physics organization, and as it was described to me, the health physics organization -- and would be reporting to him, that is, Mr. Herbein, on days and Mr. Sandy Lawyer, L-a-w-y-e-r, on nights.

Q. Did he describe to you what the present health physics organization was?

A. He didn't, to my recollection. He did not do it at that point. He -- I think he asked me to get with Mr. Lawyer, to get badged, to get my people badged, to get with Mr. Lawyer and have further discussions.

At that time there were very few trailers at the observation center and the observation center was quite small and crowded. Herbein's office was in the front corner, the only office in the place, and there were a large number of people around. I'm trying to recall who I saw next, but it doesn't come to me.

However, my people came back and we were introduced to quite a few individuals during the course of that shift. The ones I recall are -- I'll go over -- Mr. Herbein, Mr. Lawyer --

there was an individual who was quite helpful to me during the first two weeks, Rick Barley. Mr. Barley's job was kind of emergency operations center coordinator, who handled most of the inquiries, made -- he was the doorkeeper to Herbein's office. He plotted the data on the plot board, as far as reactor plant status. And he coordinated any requests from the emergency operations center, which was at that time in Unit 1 control room, I believe.

They would send over requests or ask for support, and we would try and give it to them. Barley gave me a lot of information about reactor plant status, radiation levels and such things.

The next people I met with were the health physics people. They were a group of health physics technicians who were assigned to do off-site monitoring. They traveled either by helicopter or truck, and they had specified routes in accordance with the emergency plan. They were -- their efforts were directed by the emergency operations center from Unit 1 control room.

We supplied the plan power and instrumentation.

Their data was radioed to the emergency operation center and to the observation center for plotting, and they were reporting in to the observation center for their work assignments, along with drivers.

Additionally --

Q Who were these, if you recall?

A They were a mixture of people, including NSS, Nuclear Support Services, which is a contracting firm that contracts radiological control technicians, Rad Services, which is another contracting firm. And there were people there from several other utilities -- Jersey Central, Pennsylvania Light & Power--Penn Power & Light, rather, Philadelphia Electric. I think they were the three primary sources of other utility help at that time.

Q Now, was it your understanding that these people would be directed by you?

A It was my understanding that they would be directed by me. However, when I arrived there it was obvious that they were being directed from the emergency control center, which is a reasonable way to do it.

My job was to assure that we had the people, that the people had the right instrumentation, and that they met their assignments and went their prescribed routes, gave their data to the emergency operations center.

Q Who in the emergency operations center was giving the directions to this group of people?

A I don't know.

Q Did you ever ask them?

A No.

Q Why not?

A. Well, because I could see the data that we were getting and I was told that it was being done in accordance with the emergency plan. I asked for a copy of the plan and did not get it for some period of time.

Q. Who did you ask?

A. I asked Mr. Limroth.

Q. Who is he?

A. He is the superintendent of technical services, I think is his title. In the organization at TMI prior to the accident, he was Mr. Dubiel's boss. And he reported to the station superintendent or station manager. I'm not sure whether the station manager title was in effect then or not.

I was also introduced to a Mr. Mike Buring who was -- we called him supervisor of dosimetry. That's a de facto title rather than an official one, but he was running the dosimetry program which existed. There was a trailer set up at that time where the TLDs, thermo-luminescent dosimeters, where the TLDs were issued, collected and read out -- reviewed his operation, asked him what resources he was short on. He had dosimetry readers, he had keypunch operators, and then he ran that program, and that was another part of the health physics organization.

The health physics organization on the Island was being run by Mr. Dubiel on days and Mr. Mulleavy -- that's the other way around, Mr. Mulleavy on days and Mr. Dubiel on nights.

Well, it varied, but those two guys ran the health physics operations on the station.

There was the first time Herbein and I -- I would say the next day, probably, I saw Herbein again and we started talking about organization in a little more detail, and it was the first time he started describing the organization. He said I was heading up the health physics organization, and in the description, the operational aspect of health physics -- that is, the duty assignments given to the technicians on the Island -- were under the control of Mr. Dubiel and Mr. Mulleavy, and they reported to the station superintendent or station manager rather than reporting to me.

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I had kind of a dotted line to them.

Q. And who was the station manager?

A. Gary Miller. So that they became an arm of all the operations on the Island which were under the control of Mr. Miller.

Q. Let me see if I can summarize it, and I don't want to put words into your mouth. Tell me if it's correct.

A. I understand.

Q. By the second day, now we're on April 1st.

A. Yes.

Q. Your understanding was that you were in charge of health physics and that you reported to Mr. Herbein, but that Mr. Dubiel and Mr. Mulleavy were in charge of the

operational aspects of health physics, and they reported to Mr. Miller.

A. That's correct.

Q. And they did not report directly to you?

A. That's correct.

Q. And you did not report to Mr. Miller?

A. That's correct.

Q. Mr. Miller did not report to you?

A. That's correct.

Q. And Mr. Miller did not report to Mr. Herbein?

A. Yes, he did report to Herbein. Mr. Miller reported to Mr. Herbein.

Q. What, as you understood it, were your responsibilities as the person in charge of the health physics program, but not responsible for the organizational aspect of it?

A. Okay. I was responsible for procedure review. Let me retract that. That comes up later. Let's get rid of that.

I was responsible for assuring we had the resources. I was responsible for the health physics support as far as instrumentation, technique, dosimetry, radiological engineering input into procedures, any special radiological control procedures to be put into place to be sure no overexposures. I would think that was basically my understanding of my job.

There was another group called ALARA engineering being headed up by Mr. Bachofer, John B-a-c-h-o-f-e-r. And part of

my people had been assigned to that organization. In particular, Mr. McIntosh and Mr. Peterson went with them for a while to several of their meetings. However, I pulled him back -- and let me just give you an idea of what I did on assignments.

I assigned Peterson and Belden to review the dosimetry system, assigned McIntosh to go to ALARA, assigned Mr. Zurliene and Mr. Sachetello to go to the Island and find out what the hell was going on, what they needed.

Q. They being the Island or they being the two people --

A. No, the Island, what the Island needed in the way of additional health physics support, expertise and resources.

At the time it was hard for me to get the time and perspective, but in the next several days -- and I believe -- let me refer to some of this stuff. Maybe I can find it.

Also met some NRC people that night and the next day. By April the 3rd, we were having daily planning meetings. But I would say before that -- and I don't have much in the way of documentation.

By the morning of the 2nd, as I recollect, we in our discussions between Herbein, Mr. Ron Williams --

Q. Who was he?

A. He's an engineering manager at some level with GPU, who was involved in the recovery organization. He was over Mr. Bachofer in the ALARA group, and we had a lot of interface with him.

Between conversations with Herbein, Williams, myself, and Lawyer, we felt it was very important we get the RWP systems, that the radiation work permit system, put back into effect, because without that you have no means of knowing who was entering the area, what kind of exposure they were going to be getting.

There was no real planning going into the effort.

MR. LYNCH: How did you find the health physics organization when you got there? At this time you mentioned that RWPs had to be reinstituted.

THE WITNESS: Well, my people who went to the Island came back to me and said, the way it works is, if anybody wants to go into the containment, the plant superintendent or shift supervisor in the control room, plant superintendent if he's present, shift supervisor if he's not, they come to him, tell him what they want to do and Dubeil tells them what he wants in the way of precautions and they go do it. It took a lot of time.

The control room was somewhat disorganized with trying to maintain the plant and these type of things. The only entries that were being made were those that they felt were required.

BY MR. DIENELT:

Q. Who is "they"?

A. The plant superintendent or the shift supervisor. Nonetheless, the RWP system was reinstituted, and my best

guess would be late April the 1st or early April the 2nd. In conjunction with that, and along with this objective to minimize exposure and assure no overexposures, we decided we would have what we call an organizational ALARA representative in the control room who would coordinate and be the final signator to the RWPs.

And I briefed these guys in detail on what it was that their job was.

Q. Who were these guys?

A. Zurliene and Sachetello.

Q. They were the ones who were going to be in the control room for ALARA purposes?

MR. LYNCH: Excuse me, let me ask a question on this. Since Dubiel and Mulleavy were working for the reactor operators, for the operations people, how did you exercise control with the ALARA persons there? What is the mechanism?

THE WITNESS: Bachofer was the ALARA boss and he worked for Williams. In our discussions of how to best do this, I said the best way to do it was to have my people there and that every RWP would have to be signed by them before persons would make an entry.

MR. LYNCH: Whose authority gave you that authority to set that?

THE WITNESS: Well, it would have to be Herbein's authority.

MR. LYNCH: Did he actually give you that authority or tell you to do that or what?

THE WITNESS: No, it came through the Williams circuit that I said, this is the way it ought to be, and it came and it happened that way. I never saw -- early on, there was no procedure that said ALARA had to sign, as far as I know. I know they did.

And secondly, another thing happened almost coincidental with that or simultaneous with that, and that is ALARA started the Z procedures or the procedures being written at that time for specific modifications or alterations in the plant. So that we put into place an ALARA review and an NRC review on all procedures and we put into place an ALARA organization. So we had two, one looking at paper procedures and one really briefing the workers. And I will give you the instructions I gave to my people on what you do with the worker.

First thing you do is you make sure he knows what his job is, where he's going to to do his job. For instance, if he's going down to MU-17, he knows where MU-17 is, not that he thinks it's there or it may be there, but he knows where it is, he knows, to the best of our knowledge, what the radiation levels are; and that you are assured that he's not going to exceed his quarterly exposure if he does this, as a result of this action. That he and the health physics technician that is going with him understand their signals. If there is a

stay time or if there is a signal to be given, they understand their signals. And then you can sign the RWP off.

MR. LYNCH: What is the reason for having signals?

THE WITNESS: Well, they were wearing Scott air packs and you can't always hear. And we were using the buddy system, but you didn't want both people to be in the high-risk area. So on some occasions the radiation technician would take the reading and give the guy a signal for three minutes stay time, step back and observe him and tap him on the shoulder to get him out of there in three minutes.

MR. LUNCH: Okay.

THE WITNESS: And it just -- we couldn't really -- didn't feel it was safe to not have a buddy system, because the Scott air packs were good for the order of 30 minutes or less, and they varied depending on the individual, how labored his breathing was. They were cumbersome. They were heavy. So these two fellows were put into place. And I also told them that if they felt the job was not necessary in their mind, that they should go back to the station superintendent or the shift supervisor, whoever was in charge in the control room, and discuss that.

And that was pretty well accepted. It was accepted by both Dubeil and Mulleavy, at least my people said it was, because it was offering them a help. They had to do that and they really didn't have time to do it as well as our people

were doing it, since it was our sole assignment.

Because if you look at the responsibility of the supervisor in the control room, he not only had to worry about people making entries, but he had to worry radiologically what was happening to the plant and what it meant to him. So they went into place.

Now, initially they worked for Bachofer, even though they were my people, but I felt that was the best utilization of them, and McIntosh worked for Bachofer in the ALARA procedure review. I discussed that situation with Herbein, and over the course of a day or so finally convinced him that my expertise and the expertise of my organization was in the ALARA area and that we should have that responsibility rather than Bachofer. And that judgment was based on the way Bachofer was handling the ALARA program.

I would say that he was very effective in the long-range ALARA approaches, but in the operational aspects of it I felt that the program was not as responsive as it should be. And since my people were already representing a large part of it, I asked that I get that responsibility, and eventually I was given it.

BY MR. DIENELT:

Q. When did you obtain that responsibility, as best you can recall?

A. Around April 4 or 5, I would say.

Q And Herbein told Williams --

A Told Williams and Bachofer that I had ALARA.

Q That you were replacing Bachofer with respect to ALARA?

A Right. And Bachofer was given several specific assignments in the maintenance area. He was put in charge of the iodine filter removal change, along with some other maintenance tasks, the organizational thing.

Herbein would each day ask me to get an organizational chart up that fully reflected my responsibilities, and I would spend a couple of hours each day attempting to do that; also getting reports from Peterson and Belden as to how the dosimetry was working, and had a fairly good level of confidence without detailed data review on my part, but at least talking with them, that our dosimetry was effectively measuring the dosage people were getting, that the dosimetry program was as good as could be expected in the situation we were faced with.

Attending daily planning meetings, which started on the -- the first formal print I have here is April the 3rd. There may have been one prior to that, which was a meeting of the staff, included Gary Miller, Herbein, Bill Gunn, who was a construction manager, Bob Arnold on occasion.

Q Who is he?

A He's the vice president of General Public Utilities and was kind of the overall manager of the site as we moved --

Herbein was the emergency operation director, and Arnold was kind of the senior corporate member present, had the recovery effort and really also gave direction to Herbein.

So we had these meetings and I went to those meetings to determine what was going on and what needed to be done and to discuss the health physics ALARA input into any of the plans that were being made.

The organizational charts continued to be generated until we had a -- I was unable to have a session with Dubiel for three or four days. I was unable to really get in touch with him. He was on the Island, busy in the operational aspects. I asked him to come over either before or after shifts, but many times his shift got extended, and he was working 14 to 16 hours and was unable to get in touch with me until about the middle -- around the 4th or 5th of April, when he and I had about a ten-minute discussion. And he said what he needed in the way of resources, equipment, procedures, this type of thing.

And he told me that, you know, that basically he did not need very much, except he needed some more manpower, that the ALARA people were working out well on the shift. He needed some more assistance because there were only two men there.

I had a meeting with Mr. Mulleavy a couple of days before I met with Dubiel, asked him the same questions, got similar answers, although they do have different management styles.

So they perceive their problems slightly differently.

And Mr. Limroth and I began to interface together in trying to handle the program, and it became apparent to me that he did not perceive that he was working for me, and we had a problem with working -- when I would tell him things to do and he didn't always follow my direction.

Q. Did you raise that problem with Mr. Herbein?

A. I did. And Mr. Herbein gave me some managerial philosophy that, first of all, he told me he had confidence in Mr. Limroth; secondly, when you tell an employee to do something and he didn't do it, that he probably had a good reason for not doing it, and I should attempt to determine those reasons and work them out.

Q. To your knowledge, did he, Mr. Herbein, go to Mr. Limroth and explain, Mr. Limroth, Mr. Graber is your boss?

A. No, that didn't happen until -- it did happen finally one night, and that was around the 4th or 5th, when we had -- Mr. Limroth, I believe, went to Mr. Herbein first, and later I was called in the office and Mr. Herbein and Mr. Limroth, Tom Peterson was there and a fellow by the name of Ray Witzke -- Russ Witzke, who is industrial hygiene supervisor for GPU Company.

By that time my organization had gotten down to the support, heat physics support group, headed by Tom Peterson. I had an ALARA radiological engineering group. It was headed for one

day by Mr. Jim O'Hara from Ebasco, E-b-a-s-c-o, Services, and later he was replaced by Mr. McIntosh from Electric Boat. We had the dosimetry section. It was under Mr. Peterson. We had a section involved in respirator equipment headed by Mr. Witzke, respiratory equipment, the training of the people for respiratory use, the handling of respirators and Scott Air packs and new air systems we were ordering in.

So I had that organization in place, and then we had the operations group, which was being run by Dubiel and Mulleavy and reporting to Mr. Miller.

I made a chart with Mr. Limroth being Met Ed liaison in it, and he did not have substantial responsibilities, he felt, on the basis of that organizational chart. So he brought that up to Mr. Herbein and I was called to Mr. Herbein's office and we had a discussion about the responsibilities for Mr. Limroth and myself, and I asked Mr. Herbein, am I in charge, and he said yes.

And I asked Mr. Herbein, is Mr. Limroth in charge, and he said, no, he works for you, and he charged us with the dual responsibilities of going out and cutting up the pie that was to be satisfactory to both of us and submitting to him a revised organizational chart which had those responsibilities delineated.

At this time, the other activities that were going on were --

Q. This time is about April 4 or 5?

A. April 4 or 5. I guess it had to be a little earlier that I called the naval reactors people and discussed with them providing some additional assistance, and based on my conversation they declined to proivde that assistance to me at that time. And I described the kind of people that I wanted. Later --

Q. Did they tell you why they declined?

A. Well, they felt that maybe I wasn't the right person to be making that request.

Q. Did they say who they felt the right person was?

A. They said that maybe if we wanted to go up through channels, they might do it.

Q. Higher through GPU?

A. I think it was my impression that they would have preferred a request for assistance from NRC through DOE, and that is the way it eventually went. And I received a phone call that Mr. Miles in the naval reactors had agreed to provide us with six people and they showed up on the 5th and 6th of April.

I also got a couple of other people, one individual from Georgia Power. And this individual from Ebasco showed up during that week. As far as the radiation -- radiological control technicians, there was a manpower coordinator on the site and I took the position that for the --

Q. Who was he?

A. He was a Mr. Colitz who worked for Met Ed, and he did a lot of calling all over the country and got commitments from people to send in help.

I took the position that for the engineering staff that I was going to work with, that I needed to know the individual personally or know someone else who knew him, because I couldn't rely on anyone coming from anyone, although a few people showed up and I used them to the best of my ability. But in most cases, I either knew the individual or had a fairly good reference from someone.

All of the naval reactors people, I had good personnel reference from and they were all well qualified and hard-working people that did a good job for us. So I was getting these people.

Additionally, we were ordering equipment such as some instrumentation, waste compactors, ventilation systems, air treatment systems for breathing air, that type of thing was going on.

We were also struggling with but maintaining our roster of people who were doing the off-site monitoring, the rad tech that went up in a helicopter and went around, as far as making sure we had enough people to fill those and making sure they were properly maintained.

MR. LYNCH: Who was providing them with directions of where to go?

THE WITNESS: The ELC was providing them with that.

MR. LYNCH: What individual?

THE WITNESS: The same individual I didn't know before.

BY MR. DIENELT:

Q. Let me go back and ask a couple of questions between the 31st and the 6th, which you have been mentioning.

A. Okay.

Q. On the evening of the 31st, you testified that you met with Herbein and then you met with Lawyer; is that correct?

A. That's correct.

Q. And you also met with several other people who were involved with the health physics program?

A. Right.

Q. Who took you around or arranged for your meetings with these other people?

A. Mr. Herbein introduced me to Mr. Lawyer.

There was one other individual I haven't mentioned, a Mr. Ernie Murri, and I believe Ernie was there on the 31st.

Q. Who was he?

A. He is from NUS, capital N, capital U, capital S, which is a consultant firm. He was from there and in the organizational shakedown that occurred over the next several days, he ran the back shift. In other words, he came in

around 11:00 at night -- well, somewhere between 10:00 and 11:00 at night, and then he left usually about 10:00 or 11:00 in the morning.

MR. LYNCH: Who was back shift?

THE WITNESS: Ernie Murri.

MR. LYNCH: I mean, which back shift did he run?

THE WITNESS: Okay, he provided support as far as coverage of the off-site monitoring teams, any of the dosimetry problems that came up, any of the requests that came from the Island concerning supplies, equipment or assistance.

MR. LYNCH: He took your job over?

THE WITNESS: That's right, he took my job over on the back shift.

BY MR. DIENELT:

Q. So on the evening of the 31st, you met Mr. Murri?

A. Yes.

Q. And you met Mr. Lawyer?

A. Met Mr. Lawyer.

Q. You met some other people?

A. Yes.

Q. And my question is: Who arranged for your meetings with the other people?

A. I would say that I kind of got introduced from Herbein to Lawyer and Murri took me around to meet the people who were on station during that evening.

Q. Now, when Murri took you around, how did he characterize you to the people whom you were meeting?

A. Bill Graber from Electric Boat, who is here to help.

Q. He did not say Bill Graber from Electric Boat, who is now in charge?

e-3 A. That's right.

Q. Was he told that you were in charge, to your knowledge?

A. He wasn't told then. As we progressed, he was. I would say within the next day or so, he was told.

Q. Now, when you met these people on the 31st, did you tell them that you were in charge?

A. Yes, I did.

Q. And what kind of response do you recall having received from them?

A. Well, I think in the case of Mr. Burling in the dosimetry, he seemed to be pleased to know that he had somebody to bring his troubles to and he didn't have to go directly to Mr. Herbein or Mr. Lawyer.

In the case of individuals who were making assignments for the off-site monitoring teams, they were also pleased to know they had somebody to come to to tell their troubles to. And in the case of the other people who were in the support organizations, the NRC, in the observation area, I think that was -- I was pretty well accepted. I don't think I met

Mr. Limroth that night. I was probably there from 6:30 to 11:00 o'clock that night, back out on site the next morning around 5:30.

Q. Did you meet anyone else that night other than the off-site monitoring people, the people in the observation center, and Mr. Burling?

A. I think that is about the only groups I met.

Q. The next day did you meet Mr. Limroth?

A. I cannot say for sure, but I may have met him toward the latter part of that day.

Q. Do you recall the circumstances of your meeting, regardless of when it took place?

A. Not entirely. I don't recall that specific event. I can only characterize the relationship as it went on over a couple of days.

Mr. Limroth was relatively amiable to me. He appeared to be working on specific tasks, some of which he informed me of, some of which he didn't. There was not good communication between the two of us.

Q. Do you recall, when you first met him, whether you or someone else explained to him that you were now in charge?

A. I don't specifically recall that.

Q. When you met him -- strike that. Had you had your meeting with Mr. Herbein on the morning of April 1st, in which, as you testified, you went into more detail about what your

responsibilities were and you learned about Mr. Dubiel and Mr. Miller and their responsibilities?

Had you had that meeting with Mr. Herbein prior to the time you met Mr. Limroth?

A. I'm relatively sure I had.

Q. Am I correct that Mr. Limroth was Mr. Dubiel's superior in the organization at that time?

A. Prior to the event he was.

Q. During the response to the event, was he?

A. It was unclear to me.

Q. Had Mr. Herbein, in the meeting you had with him on April 1st, described what he understood Mr. Limroth's role to be in this organization?

A. No, no.

Q. When did you first meet Mr. Dubiel?

A. As I previously said, probably on the 4th or 5th of April.

Q. When was the first time you spoke to him?

A. On the 4th or 5th of April.

Q. Hadn't even spoken by telephone --

A. No, I'm sorry. I had spoken to him by telephone. There was a hot line, a dedicated telephone line by the Unit 2 control room and observation plotting area, just outside of Mr. Herbein's office. That phone was used by Mr. Herbein and by the other operations people who were in the observation

center. They had a walkie-talkie radio and occasionally they would say, so and so, pick up the hot line, and you could talk to him.

The phone was a high usage phone. There was not a priority system, but you limited your conversation on it unless you really had to get details.

So my conversations were limited. I would ask Mr. Dubiel if he could come over and meet me after work or before work, and I did that a couple of times, I can't say consecutively, whether it was two separate days or twice on the same day, with no response.

Now, he said he would try to get over if he could make it, and he didn't get over. The next day I asked my ALARA representative to ask him to come over, and in the course of that day my ALARA representative told me that he had asked him and he didn't come over.

Q. When you first spoke with Mr. Dubiel by telephone, what did you tell him about who you were and what your responsibilities were?

A. I told him that I was supposed to be in charge of the health physics organization and that I needed to discuss with him, you know, his operation, what his needs were, what I had observed to be problems, and to talk about resolving those problems.

And I would like to express some of those problems, because

I think they represent some meaningful information.

Q. Well, I didn't want to cut you off, and we will get to that. But I want to get chronologically down straight these events.

A. I told him that I was in charge of the health physics operations and I needed to talk to him about his problems and some of the things that I felt were problems, that we needed to resolve.

Q. What did he say in response to that?

A. He would say, okay, I understand; I'm pretty busy over here and I will try to get to you when I can.

Q. When was the first time you spoke orally or face to face with Mr. Mulleavy?

A. I would have to guess on the 2nd or 3rd. And I called Mr. Mulleavy on the hot line and told him that I was in charge of the health physics and I'd like to have a meeting with him.

Q. And what did he say to you?

A. He said fine, and at the earliest possible time he was -- he came over to the observation center and we had our meeting.

Q. Can you characterize for me what your perception of the attitude of Mr. Limroth towards you was; and if it changed, how it changed?

A. Of course, that's a highly subjective thing to try

and do. I think the attitude of Mr. Limroth toward me was that I was a relatively competent radiological control management manager, who was an outsider, not as familiar with the plant, the people, the problem, as he was; that he had certain assignments which were made directly to him by his senior management.

Q. That would be Mr. Miller in the first instance?

A. By either Mr. Miller, Mr. Herbein.

That he had other problems which he perceived as higher priority than those that I was directing myself and him toward.

And that he was going to do what he considered to be best for the company, the plant and the people.

Q. Would you characterize him as being uncooperative with you?

A. Not totally. Where we seemed to have the same goals and priorities, he was quite cooperative. He was not hostile on all occasions, although on some occasions he was, although I'm sure I was hostile on some occasions also.

Q. Did you have the impression or the view that he resented your presence?

A. Yes, but only on those occasions where we had different priorities and objectives.

When I was doing things that he thought needed to be done and I did a good job, he was appreciative.

Q Once it was made clear by Mr. Herbein in the meeting that you and he and Mr. Limroth had that you were the boss and you were Mr. Limroth's boss, was Mr. Limroth's degree of cooperativeness better?

A Yes. However, based on the past relationship I had had with Mr. Limroth, based on the discussions I had with my people, and based on the discussions I had with Mr. Limroth after the meeting, I felt that it would be difficult for him to work for me in a direct relationship, and that, where possible, I planned to give him as much autonomy and responsibility in a well-defined area, in order to minimize the interfaces we would have, because we did have that difficulty.

Subsequent to that -- at that time that we had that meeting, I considered resigning from my job there, because I was so frustrated. And after we had the meeting with Limroth, Mr. Peterson and myself and Mr. Herbein sat down and had a calmer meeting, and at the coaching of Peterson, although I didn't threaten to quit, I just said, if I'm in charge I'd better be in charge, and if I'm not tell me what I'm in charge of.

And Herbein insisted to say I was in charge, and Peterson counseled me there and said he thought we could make it work, and Mr. Herbein said, hey, if you can't make it work, come back to me.

So I went away and Mr. Peterson and I had other conversations,

and he felt that we could make it work. So I commenced to try and get another organization with that type of thing and worked on it for -- with Dave off and on --

Q. Dave is?

A. Mr. Limroth; off and on for a day or so.

And I mentioned to Mr. Lawyer -- the accessibility to Herbein was very limited, because there were a lot of other things going on, and I could spend more time with Mr. Lawyer. And I mentioned to Mr. Lawyer, perhaps a way to solve this problem was to put another echelon of command and have me have the health physics and support area of responsibility and have Mr. Limroth take the operational areas that he was more familiar with, and maybe it would be a better organization.

And I also mentioned that to Mr. Murri and that came to pass the following day. I had to report to Herbein's office, and on the way in Mr. Arnold stopped me in the hall and he said, hey, we're making some changes in the organization and we're putting another guy in above you, and we don't want you to take that as a slap in the face; we just feel that that will provide us with a better operation.

Q. When did this happen?

A. Maybe I can find out for you pretty quick. There's going to be some assumption made to determine that, because I did not have a published notice of that. What I'm going to do is try and find out when Mr. Hetrick, who was the individual

who became my boss --

Q. Mr. Hetrick? How do you spell that?

A. H-e-t-r-i-c-k.

Q. Where was he from?

A. He is from Met Ed, Reading, R-e-a-d-i-n-g. And I'm sure that that date is obtainable.

Q. In any event, it would be after April the 6th?

A. Yes.

Q. By as much as a week?

A. I don't think so. I think that it occurred around the 9th, but I'm not sure of that.

Q. All right. Let me go back again to April 1st.

A. Okay.

Q. After your discussion with Mr. Herbein, would it be fair to say that you concluded that your responsibilities were more in the nature of staff than line responsibilities?

A. That's correct.

Q. And that Mr. Dubiel, Mr. Mulleavy in charge, leading to Mr. Miller, had the responsibilities?

A. That's correct.

Q. And that Mr. Bachofer, in terms of ALARA responsibilities, had line responsibilities?

A. That was true.

Q. We are talking about April 1st now.

A. Well, I think the ALARA was not a normal line

function. It was a staff function interjected into operations to provide additional assurance that ALARA was properly done. But it wasn't a direct line function as ALARA engineering.

Q. Now, the responsibilities that you understood you had on April 1st were different from those that you understood you had when you arrived on March 31st; is that correct?

A. Yes.

Q. And in fact, at least insofar as the operational concern was involved, you were not in charge at that point?

A. That's correct.

Q. From April 1st until April 6th, did there come a time when you were in charge of the operational aspect of health physics program and the radiological --

A. No, no.

Q. -- part of TMI?

A. No, no.

Q. Did there ever come a time when you were?

A. No. Let me give you an example of the closest that I got to that situation. They wanted a primary coolant sample. We had a very unpleasant experience, significant exposure, getting one previously, and it had to be well planned. The procedure was being prepared and it had almost been completed and there was a lot of impetus to get that sample taken. I went to Herbein and said, I don't want it taken right now, we're not ready. And I controlled the pace of the operation

that way. But that's the extent of my operational involvement as far as telling people what to do and when to do it.

I had guidance from both Arnold -- well, we had in the staff meeting, Arnold and Herbein had requested their requirement to get the sample. Mr. Arnold told me that he was willing to expend up to a quarterly dose, but not to exceed it, to have that sample taken.

And I came back to Herbein, because he was in the direct operational chain, and I just didn't -- I would have gone to Arnold if I had to, but I didn't have to. And I told him, with one more day's effort, we could reduce that exposure down to a factor of three, that we had fabrication of shields, we had trained some people to do a mockup, and he had agreed to wait another day to take that sample.

The next day we weren't quite ready and I had to talk to Arnold and get another four hours out of him, and he agreed, with some consternation and some direct to me that we had better get it before the day is over.

So I became de facto in the direct line operation there. I went over to the Island, I got the people together. They weren't moving fast enough. I went to see Mr. Miller and I set the people down and I told Mr. Miller, this is what you need to get the sample. They went and did it and they got the sample. But that was the only time I got directly involved, and it wasn't just health physics, it was an entire

operation.

Q. But as you understood it, from the time you left GPU headquarters subsequent to your conversation with Mr. Dieckamp and as you understood it on the night of March 31st, after you had spoken to Mr. Herbein, you were to be in charge of the line operation?

A. Correct. The conversation with Mr. Dieckamp led me to believe I was to be in charge of the entire operation and the -- but by the 1st, when Herbein talked to me, it became not quite clear, but at least it became apparent that I had only a dotted line responsibility to the operating arm.

Q. And I have asked you about Mr. Limroth's attitude or your view of his attitude. Can you also tell me what your view of the attitude and the degree of cooperativeness of Mr. Dubiel and Mr. Mulleavy was?

A. Repeat that, please?

Q. What was Mr. Dubiel's attitude toward you as you perceived it?

A. That I was a support person, that he was a line person, that he had a line job to do and he was very busy; that he would accept any help that didn't get in the way of him running his program.

Q. Did you get the impression that he thought you were meddling or that he resented your presence?

A. It's difficult -- at that time I had that impression.

Since I learned the man, I really don't think that was the motivation that he had, because he's a very -- he's a very intense person in doing his job and he is like that to people that -- his boss and everybody else.

He singly attacks his problems. He was not uncooperative in that meeting. He was terse and short, but not uncooperative. He told me in five minutes as much as any man could tell me about what he was doing and what he thought the problems were, and he may have even said something like, I'm glad you're here to help type thing. But in no sense did -- I mean, it was pretty well-known, based on that conversation, that he was in charge of what he was doing and he was going to do it in his best judgment the way he thought it ought to be done, until somebody replaced him. And I don't think that I would have gotten very far -- and was not in a position to give him guidance, except against equipment, procedural requirements, and technique.

Q. Would you characterize Mr. Mulleavy's attitude as being the same as Mr. Dubiel's?

A. Yes, but Mr. Mulleavy is, again -- personality-wise, much more amiable, receptive type of person to guidance and assistance and that type of thing. Perhaps the end result is not a whole lot different. Just because somebody listens to you and spends a lot of time doesn't necessarily mean that he ends up doing much different than the guy who did it quickly.

And I think in the long run I see that now, that spending a lot less time with Dubiel and more with Mulleavy, that the final result is not entirely different.

Q. From March 31st to April 6th, with the exception of the time when you had a line responsibility, if you will, with regard to the collection of the sample, did the nature of the activities which you engaged in change substantially?

A. I guess I would have to say not markedly. There were some areas where perhaps earlier on I was trying to have my influence felt in the direct loan, that I backed off from over that period.

I think there was a problem, a problem in getting some of the techniques, some of the things that were being done in the field, done the way I wanted them done. And at first, I felt the responsibility that they way they were being done was mine, and as time went on I didn't feel that direct responsibility.

However, I still felt that I was going to do what I could to make those things happen.

Q. During this period, a number of the people who had come with you from Electric Boat were in effect working directly under individuals; is that a fair statement?

A. That's correct.

Q. And some of them had line as opposed to staff responsibilities?

A. Not really. That interjection of the ALARA guy in the RWP circuit was -- I don't know what you would call it. You couldn't call it a direct line function, but it wasn't the line chain. You know, if -- do you understand what I'm saying there?

Q. You testified that you had attempted to prepare or you had prepared some organization charts, is that correct?

A. Yes.

Q. Do you have any of those?

A. I just -- have you got them, Ollie? I don't think I have them with me.

Q. We have one.

A. I probably have some.

Q. Well, let's mark --

A. Let's play with yours for the time being.

Q. This will be 3,003.

(Graber Exhibit No. 3,003 identified.)

MR. DIENELT: I mark a three-page document as Exhibit 3,003. I show it to you.

THE WITNESS: Okay.

BY MR. DIENELT:

Q. Mr. Graber, I ask you if you can identify this.

A. Okay. This has got a date of 4/9 on it, which seems reasonable. The recovery organization chart on page 4 --

MR. LYNCH: I think the 4/9 date -- don't be too

sure that's what this is.

THE WITNESS: I'm not sure.

MR. LYNCH: I thought it was 4/4. I notice that it has been cut off.

THE WITNESS: Oh, well, there's one up top there. You don't have any more of it on that?

MR. LYNCH: You have the originals, don't you?

MR. DIENELT: No.

THE WITNESS: Nonetheless, in the --

BY MR. DIENELT:

Q. Well, let me ask you, is it your understanding that the second and third pages of Exhibit 3,003 were at the time -- the first page was prepared a part of it or attached to it, attached to the first page?

A. I would say that they appear to be about the same time frame, looking at the organization.

Q. Well, let's focus on the first page.

A. Okay.

Q. What is that, if you know?

A. Okay. In that organizational evolution that was occurring, this represents two specific arms of what I would call a radiological control or health physics program. The two arms are radiological health, which is a staff function that deals with respiratory, bioassay health physics procedures, engineering support for health physics and radiation exposure

assessment.

The radiological engineering arm, ALARA, deals with the application of engineering principles to reduce exposure through the use of temporary shielding, special equipment and tooling, portable ventilation and/or engineering techniques.

Also at that time, the use of an own-shift ALARA representative who prepared the final review of all RWPs prior to the performance of work.

Q. Did you prepare that chart?

A. Yes.

Q. Did you prepare it on or about April 9, 1979?

A. If we are loose with the 9th, yes.

Q. How loose do we need to be?

A. I'm not certain of the date.

Q. Is it your handwriting that wrote 4/9/79 at the bottom?

MR. LYNCH: No, that's mine.

THE WITNESS: I wrote a date up at the top which is not discernible. That appears to be my handwriting up there.

It looks to me like on -- from looking at a copy of a record of an NRC-Met Ed meeting held on 4/11, that a Mr. Jay Thorpe attended this meeting, and I believe he was made the supervisor over myself and Mr. Limroth.

BY MR. DIENELT:

Q. And when did this meeting occur?

A. That occurred on 4/11. And he had an assignment for a couple of days.

MR. DIENELT: Why don't you mark this as 3,004 and maybe this will help us.

(Graber Exhibit No. 3,004 identified.)

THE WITNESS: And then Mr. Hetrick took that responsibility and succeeded Mr. Thorpe in that assignment. And I don't know the date. I don't have a date here when Mr. Hetrick took over that responsibility.

BY MR. DIENELT:

Q. I have marked as Exhibit 3,004 an organization chart. I would like you to look at it and tell me if you can identify it.

A. Okay, that has Mr. Thorpe as -- it appears to have Mr. Lawyer and Mr. Thorpe as the health physics manager, with Mr. Lawyer being the senior individual.

Q. Did you prepare that chart?

A. No.

Q. Have you ever seen that chart before?

A. Yes.

Q. Do you know when it was prepared?

A. Well, I see here my initials and the date 4/15/79.

Q. Would that indicate when you had received it?

A. It would indicate when I had received it. Again, this particular organizational chart reflects my organization

similar to Exhibit 3,003. And this reflects the organization as I recall it, as far as my organization goes, up until around May the 6th.

Q. It would be fair to say that your recollection is that, some time after April 15th, Mr. Thorpe was replaced with Mr. Hetrick?

A. That's correct.

Q. At this point do you have any sense of how soon after April 15th that was?

A. No.

Q. Looking at the organizational chart which is marked as Exhibit 3,004, can you tell me what Mr. DiNuzzo is?

A. Mr. Dinuzzo is radiological control manager from the Bettis, B-e-t-t-i-s, Atomic Power Laboratory in West Mifflin, Pennsylvania. He was one of the naval reactors DOE personnel that was sent to assist us, arrived on site between the 4th and 5th of April, and I used him as my back shift coverage.

Q. Mr. Murri doesn't appear on this chart. What happened to him, if you know?

A. I believe Mr. Murri left because he had other commitments at that time.

Q. At what time?

A. Around the 14th or 15th of April. I may have --

Q. Did Mr. DiNuzzo in fact take Mr. Murri's place?

A. That's correct in effect.

Q. Looking at the chart which was introduced as Exhibit 3,003, is it fair to say that that chart preceded Exhibit 3,004?

A. I would say the handwritten chart preceded. 3,003 preceded 3,004.

Q. Mr. DiNuzzo also appears on that chart and Mr. Murri does not, correct?

A. Mr. Murri does not appear on either of those two charts.

Q. Now, would it be your testimony that, some time prior to the time when the chart that has been introduced of Exhibit 3,003 was prepared, Mr. Murri had in effect been replaced by Mr. DiNuzzo?

A. To the best of my knowledge.

Q. On Exhibit 3,004, there are certain handwritten notations. Is that your handwriting?

A. That's correct.

Q. Does "EB" stand for Electric Boat?

A. Yes, sir.

Q. From the date of the organization chart that's Exhibit 3,004 until May 6th, could you describe the nature of the interface between health physics operations and health physics engineering, if any?

A. Health physics operations are charged with the

day to day performance of work, surveys, the normal tasks associated with a line organization. The health physics engineering is charged with responsibilities in the support area of reviewing the dosimetry system and assuring that it was operating properly, preparation of new procedures that might be required for health physics, procuring and callibration or allignment of instrumentation and the assessment of the exposure, radiological assessment, which was the exposure to personnel at TMI, as accumulated over time.

The rad engineering group was almost entirely involved in looking at the ways to reduce exposure, which at that time we had gone to three shift representatives that were reviewing RWPs and signing them, and then we assigned the other ALARA engineers to specific tasks such as the development of the tooling and equipment for taking primary samples such as the procedures and techniques, equipment used for resolving the iodine filters in the ventilation system, that type of effort.

So that we were support functions in a staff position, and the health physics operations were a line function performing and working in the field.

Q. What means, if any, were there for coordination between those two functions?

A. There were daily staff meetings held. The maintenance of coordination that I had with people in the field was talking to my ALARA shift representatives and discussing

with them what was happening in the field, and they kept us pretty well abreast of what was occurring.

The interface between perhaps the individual, Mr. Sachetello, what was in the health area through observation, what was going on and the observations of the ALARA engineering people who were involved in the specific tasks of primary cooling sample -- and at that time another major task being the change-out of the filters in the ventilation system.

Q. Who attended the daily staff meetings?

A. Generally, I did, Mr. Thorpe, either one of the three superintendents, Mr. Limroth, Mr. Dubiel, Mr. Mulleavy, Mr. Porter. And I would say that attendance was not 100 percent every day. But also Mr. Witzke, who was usually there.

MR. LYNCH: Was that Porter, Sid Porter of Porter-Geartz?

THE WITNESS: Yes.

BY MR. DIENELT:

Q. And that is what "PG" stands for on the chart?

A. Yes.

Q. You testified that you became involved in obtaining a sample. Was that prior to April 15?

A. Yes, sir.

Q. Did the people who collected the sample work for you at the Electric Boat or were they Met Ed people?

A. No, the team leader or the principal individual

involved in the primary cooling sample, sampling, was a Mr. William Pitka, who is a Babcock & Wilcox employee. He is a radiochemist. He trained along with our assistants, a group of Penn Elec, Penn Electric Company employees, who had been sent to the site to offer assistance.

Mr. McIntosh from Electric Boat was the cognizant radiological control person, ALARA person present. He designed the shielding and put into the procedure those radiological concerns to assure that the exposure would be minimized; also procured, installed some remote reading instrumentation. So we could get radiological levels prior to entering the room, because we weren't sure what the radiation levels would be based on the previous survey and sample.

So that there was only one Electric Boat individual involved in that effort and the other people were, as I say, [redacted] from B&W, the Penn Elec employees who were the actual people to take the sample, and a [redacted] who is -- works for the Nuclear Support Services, Inc., a radiological control technical consultant firm.

[redacted] involved in the planning and discussion of the sampling at that time.

Q What level of exposure or amount of exposure did the people who collected the sample have?

A This is recall and I have to cage it or couch it a little bit. To my recollection, it was on the order of

580 millirem total to all personnel, with the highest exposure being on the order of 220 to 250 millirem to one individual.

Q. As best you recall, what was the date?

A. Date of that sample?

Q. Yes.

A. I would say that it was around the 9th, but it is the first sample taken after the 29th. And there is -- I mean, we can pin that down by going to look at the sample records. It could have been sooner than that.

Q. Do you have any copies of the original charts which you prepared, other than Exhibit 3,003?

A. I had them. I think they're still at TMI. I thought I gave you some more.

MR. LYNCH: That's all.

THE WITNESS: You just looked at some --

BY MR. DIENELT:

Q. Do you have any organization charts which you did not prepare, other than Exhibit 3,004?

A. I don't have them present.

Q. Okay.

A. I may or may not have them in my file.

Q. Going to the second page of Exhibit 3,003, there appears to be another kind of organization chart. I wonder if you can tell me if you know what that is?

A. That is a larger -- it's an overall organization

which brings into several upper echelons of management there, starting with the president of GPU. And it describes or attempts to describe the entire organization at the site.

Q. Am I correct that the box at the bottom of the page labeled "HP" is where you fit in on that organizational chart?

A. That's correct.

Q. Did you attach that organization chart to the first page of 3,003 when you prepared the first page of 3,003?

A. No. What I did -- there was an individual, a Christman, who was responsible for the organizational charts. And I submitted to him by handwritten chart. He was responsible for preparing all organizational charts, and I visited with him from time to time, and to get a real good look at the organizational charts at TMI, if you visited Paul and looked at his records, he should have the evolution of organizations as they occurred from time to time.

Q. How do you spell his last name?

A. Christman, C-h-r-i-s-t-m-a-n.

Q. Did you attach the third page of Exhibit 3,003 to the original copy of your handwritten organization chart?

A. Again, I don't think so. I think they came to me in a package in that form?

Q. "They" being the second and third page?

A. All of them, after I submitted my original to Christman.

Q. In other words, Christman took your original as it was and as you recall it, attached the two printed pages to it and returned it to you and presumably circulated it to others?

A. That's what I recollect.

Q. You testified that you had asked for a copy of the emergency plan. Do you recall whether you did that on the night of the 31st or the morning of the 1st?

A. It was closer to the morning of the 1st.

Q. Who did you ask for a copy?

A. I asked -- I'm not sure who I asked. It would seem logical that the people who were with me at that time in the organization, Bob Heffner, who was Jersey Central radiological control technician, who aided me a lot in the clerical and administrative division, in addition to setting up the shift roster for the people, he would have been the guy I talked to, either he or Dennis Troutman, who is from -- I think he was from Pennsylvania Power & Light. I didn't get that.

Shortly after that, I did get a full set of TMI health physics procedures, but I didn't get an emergency plan with that. I didn't get the emergency plan until probably almost to the point of where we were out of the full emergency phase of operation.

Q. From whom did you ultimately get the emergency

operation?

A. I think Mulleavy got it for me.

Q. And from whom did you get the radiation protection manual and the other health physics documents?

A. I believe one of my engineers, either Mr. Zurliene or Mr. Sachetello, obtained those. They developed a better working relationship with the plant because they were in the plant there and I think they obtained those for me.

Q. Did you review the health physics procedures?

A. Yes, sir.

Q. Early in your testimony you indicated that you had some comments or reviews on the adequacy of the health physics operation at TMI; is that correct?

A. Most certainly.

Q. Could you tell us what they are?

A. Well, I guess that's better to discuss in a narrative also, because, you know, that changed with time.

We found that, as concerns the emergency, there was a lack of paperwork that would support the emergency, such as those survey sheets which would be used to write down the results of radiation and airborne surveys, so that they could be maintained chronologically, reviewed for trends, used to make composite survey results. And there were no such survey sheets available.

What was done out of expediency was to take the three-level

floor plans of the auxiliary building and write numbers on them over a piece of plexiglass, and then with time those numbers would get erased or worn off by an elbow or written over. And you didn't know what date the numbers were taken. So there was a difficulty in getting good data.

And it's understandable that there is a problem as far as -- there is as much data as you want, but if we had had some good survey sheets in anticipation of the problem, perhaps the early data could have been better understood.

I think that by not having that, it represented a problem, made it much more difficult for an individual to know what radiation fields he would encounter.

There was sketchy data. And so you had to go down and send a technician with him. There were occasions when people got more exposure than they should have because fields weren't well-defined. And you have to trade off the costs in rem received in comparison to cost in survey to do the work. But that system was very poor and we were not able to effect improvement of it in the early days.

Today, we're using basically the same system. However, we do have better reproduction facilities. We do rake sketches of detailed areas because the levels are down several orders of magnitude from what it was at first. But by not having the prepared sheets and having those available, we lost a lot of information and we had to operate at a considerably higher

level of risk than we wanted to.

So that was one of the problems.

MR. LYNCH: Excuse me. You mentioned expediency of the situation. Do you recall the time that you were at TMI, was the health physics program ever in the chain of a life-threatening situation? In other words, was there any time when you could abrogate the health physics program because the situation demanded that you act very quickly?

THE WITNESS: There was one occasion, and I don't think it was in a life-threatening circumstance. However, it was in a circumstance of significant potential for a major release of radioactivity.

When they lost one of the main coolant pumps, it stopped operating. And the shift supervisor or the superintendent who was in charge of the control room at that time directed that a team, two people, go into the auxiliary building to either isolate or open up a cooling service water valve to one of the main coolant pumps. That had to be done on the one that stopped and then done again on the one that started.

On that occasion, the previously measured radiation levels were in the order of 500 to 700 rem per hour. I received a phone call from Wilbert Zurliene, who was the ALARA representative in the control room, and he said that, we are making an emergency entry into the auxiliary building, that we have been directed by the station superintendent or the shift

supervisor to have those people go in, and there is a potential that they may exceed their quarterly dose.

I briefed them, if they carry out their mission properly, they probably would not exceed the dose, but there is a potential for quarterly dose here if they don't. So as a result of that phone call, I notivied Mr. Herbein that that was happening.

He already knew it was happening, but I notified him about the exposure potential and I went over to the Island. Two individuals made the entry and came back out there. Their exposure was on the order of 1.6 rem from what they did. We, by that time, the second entry to do a similar thing on another pump was being prepared, and the briefing -- we debriefed those two fellows and briefed two new fellows, and their exposure was maybe 6 or 7 rem.

MR. LYNCH: Is 1.6 rem in excess of the quarterly dose?

THE WITNESS: No.

MR. LYNCH: So what you have described here really is not an abrogation of any protection?

THE WITNESS: It wasn't. However, it was --

MR. LYNCH: It was an emergency situation or was perceived to be so?

THE WITNESS: It was perceived to be an emergency situation in that the cooling system leaked massive

quantities, particularly when they are not in the line. You have to isolate them when you isolate the cooling pumps, and it was perceived by the station superintendent to do that. There had been a discussion between first an NRC inspector and one of my people, one of my ALARA people, later between an NRC individual and myself, and then later between myself and -- at a staff meeting -- the staff, but in particular to Gary Miller on who had the authority to make the decision for someone to exceed a quarterly exposure or to go to the 25 rem or to exceed 25 rem.

I told the NRC inspector that we had no procedure for that, that in my mind's eye you could not have one that would handle all of the potential situations; that the senior competent individual present would have to make that decision. And I discussed that with the staff and with Mr. Miller, who was running the operations in the field, and we agreed that that -- that's the way we would approach it.

But there was never -- the only life threats that I was aware of was an unfortunate situation where an individual became overcome while wearing a Scott air pack and he did not have to have resuscitation, but he was in distress and had to be taken from the control area, outside of the control point.

And that was not an abrogation of health physics; it was some several factors that led up to it, but it didn't represent

an abrogation of the program.

MR. LYNCH: But other than that, you didn't perceive of any that would justify this lack of --

THE WITNESS: Lack of health physics program?

MR. LYNCH: Yes.

THE WITNESS: No, I didn't see anything that would justify it.

BY MR. DIENELT:

Q. Was there a lack, in view of the health physics in your view, of the health physics program?

A. There was a health physics program in place. You know, as to --

Q. Was it adequate in your opinion?

A. No, it was not adequate in my opinion, although I am not sure that, given the same set of circumstances without the Monday morning quarterbacking we were doing -- now, it could have been --

Q. You said you had reviewed the health physics manual?

A. Yes, sir.

Q. That had, among other things, the radiation protection manual known as 1,003?

A. Yes, sir.

Q. And the procedure on personnel dosimetry?

A. Yes, sir.

Q. The procedure on self-reading dosimetry usage?

A. Yes, sir.

Q. The procedure on the TLD system operation and callibration?

A. Yes, sir.

Q. It had an emergency planning procedure?

A. Say again?

Q. Did it have an emergency plan and procedure for off-site radiological monitoring?

A. Did what have it?

Q. The health physics manual or book or document that you received?

A. I did not see that.

Q. But you saw the others?

A. Yes, sir.

Q. Were they adequate? Were the plans adequate, as opposed to the implementation of them?

A. The health physics manual, otherwise known as radiation protection plan, is merely a description of the philosophy and some of the organization and controls that are used.

To me, it's not very germane to anything other than an introduction of what they've got there. So I don't think it is adequate or inadequate.

Q. So what you are saying, it is not really relevant

to the question of adequacy?

A. It's not relevant, really, to the question of adequacy. It is a general description as far as their procedures. The procedure on self-rating dosimeters I felt was adequate. There were some problems on maintaining exposure, using that procedure and using a white card system. Those problems were primarily based on the fact --

Q. What is the white card system? Excuse me.

A. They have a file of white cards which an individual enters his own exposure on and that, in normal times, that is used to maintain your accumulated exposure.

That system was developed and designed to be used by Met Ed employees who routinely are involved in operations, who are well aware of their exposure, well aware of what they are doing, and I suppose in my terms could be trusted to enter the data on a reliable basis, not necessarily trusted from a malpractice point of view, but individuals who understand the seriousness of what they are doing and need to do it in an accurate way.

It is also based on the fact that you have one control point. That means one point of entry or exit, so that all people pass through it. We found ourselves with multiple control points with numerous visitors who were not familiar with that system, and that system was not being maintained up to date. There was a lot of concern -- I had a lot of concern

early.

We turned into a daily TLD readout system, which was a horrendous problem in administration and logistics. It also was kind of self-serving in an exposure control program, because it subtracted anything less than 10 every day. So you could have subtracted a lot of exposures of people.

MR. LYNCH: 10 millirem?

THE WITNESS: 10 millirem. So we ran this and those decisions were made very rapidly in the first couple of days. We ran that system for less than a week, and we went to, I believe, weekly developing, weekly readout of TLDs, and then eventually to monthly readouts of TLDs.

I had several of my people look very hard at the accumulated exposure by individuals and give me a sense of what was happening and how good we were on records, and I got the feeling that we were pretty good, but we couldn't prove it. You couldn't see all the data and forms you needed to see.

One of the things we started was this dose assessment program, and we had a couple of people from Jersey Central, and then later Hilbert from NULS, N-U-L-S, Atomic laboratory at West Milton, New York, started setting up a dose assessment program to keep track of exposure. And we set that up manually at first, and we only concentrated on the Met Ed employees and maintenance people and operators, because they were the population truly at risk from an exposure point of

view.

We wanted to control it so they could make it through this year and the next year without having special limitations placed on those people and end up having to retrain operators and retrain those individuals.

Q And your testimony is that the program that existed at TMI was not adequate for this purpose?

A No, not for tracking exposure in an e mergency situation.

Q How soon after March 31st did you implement changes in the program?

A We had people assigned to make those changes within severa.. days. Our first attempts were not very good at getting a system that would work and replace the one they had. We had some reluctance on the part of the station people, station management and station employees, to change from their system. And we did develop a way of tracking the exposure within a couple of weeks. However, it was a passive system. That is to say that it did not allow the technician in the field of having assurance of how much exposure the individual had day to day and used an additional clerk to make sure he didn't exceed a limit.

MR. LYNCH: By the way, when did you think they went off the emergency phase and into the recovery phase?

THE WITNESS: That is a slippery --

MR. LYNCH: Bracket?

THE WITNESS: Well, I have to say that some areas went off earlier than others. We continued our off-site monitoring program while we did some other things that were off of it.

The full Z procedures, which were emergency procedures prepared by the station, some of those didn't stop until maybe last month. As far as -- and whether this is official or not, I would say from a de facto point of view it occurred on or about May the 6th.

MR. LYNCH: Okay. But as far as this controlling, day to day controlling of exposures, when would that have become an easier thing to do? No longer justified, no longer having a situation justified by emergency conditions where you were --

THE WITNESS: Well, I think administratively it can't be done there. The white card system can't work with the numbers of people that you have at the station, even now.

MR. LYNCH: Okay. Some other system?

THE WITNESS: Some other system could have been used, in my mind, could have been used as soon as April 1st.

MR. LYNCH: What other system would that be?

THE WITNESS: Ticket system. The system we have in place today, which is not a ticket system, it is a daily tab run, distributed to control points. But a ticket or a card,

you know, an individual ticket that is filled out by the health physics technician or the tab run system that we have evolved to presently, either one of those systems could have been in place and worked certainly in the first week.

MR. LYNCH: But they were not?

THE WITNESS: No, they were not.

BY MR. DIENELT:

Q. Would you have recommended that they be implemented that early?

A. As far as I'm concerned, there should never be a loss of accumulated control data, whether you have an emergency or not. There is no reason why you couldn't recover that data by one day. You could have the event and then, by the next day, you should have it. You should never be out of control on an exposure system out of that system.

Q. TMI was out of control?

MR. LYNCH: Of small populations, not of thousands of people, but the operating population that you had to work with?

THE WITNESS: The accumulated exposure system at TMI was not responsive. It was a passive system. It was not responsive to control and exposure during those first several days.

BY MR. DIENELT:

Q. So it was out of control, as you put it?

A. I would have to say that.

Q. And when did you perceive it was out of control?

A. Well, I think I perceived that on the 1st, when we found that we had those overexposures that occurred on the 29th, when we looked into the white card situation and found they were not current, when we found the RWP system was not being used. And we began to try and put what we could of those systems back into effect as soon as we could.

Q. You began that on the 1st or attempted to begin that on the 1st?

A. And I believe the RWP system went into effect on the 1st or 2nd.

Q. There were some systems that were adequate that had simply been ignored?

A. That is correct.

Q. And other systems that were inadequate?

A. That's correct.

Q. Now, the systems that were inadequate that had been introduced were the RWP system and --

A. That's right.

Q. -- and what else?

A. I think that is the primary system, the RWP system. I can't say from my own knowledge what other systems were not being followed.

Q. Did you learn from people whom you brought with you

from Electric Boat that there were other systems that were not being followed?

A. Not -- what I would have to -- how I would have to state this is that -- see, whenwe got there, we didn't know their systems and we did not have time to learn it. We went in. My people began to -- on the RWP system, they learned that system and put it into effect.

MR. LYNCH: It was not in effect when you got there?

THE WITNESS: To my knowledge, it was in effect.

MR. LYNCH: Was there any health physics program in effect when you got there?

THE WITNESS: Yes.

MR. LYNCH: For controlled exposures?

THE WITNESS: Yes. There was a briefing system.

MR. LYNCH: Explain.

THE WITNESS: Something had to be done. The shift supervisor or the station superintendent told the people, got together Dubiel or Mulleavy or the people who had to do the work, told them what they had to do to control the exposure, and they went and did it.

MR. LYNCH: Did he look at what the previous exposures were to those individuals?

THE WITNESS: I can't say, because I didn't observe it. It would appear that they did.

For instance, well, maybe with one exception -- no, it

would appear that they did, because they didn't have, you know, [redacted] didn't get exposed -- one of the overexposed individuals. He was not utilized. He was held back. If you look at the exposure of Met Ed employees, it's not a bad performance, with the exception of the recent overexposure events we had last week.

But the planned exposure people -- Mr. Miller, once Mr. Hilbert got his assessment into effect, he met with Mr. Miller --

MR. LYNCH: But that is by date --

THE WITNESS: The 12th.

MR. LYNCH: So in the early days, say the 28th through the --

THE WITNESS: The format of the system was not apparent in those early stages. My people did it at the RWP level.

MR. LYNCH: Yes.

THE WITNESS: And that's why they were on station. That was one of the things they were charged with, to make sure that the people who went through there didn't get overexposed. That was not a part of your formal procedure. That was a tack-on we put in there to stopgap these problems.

MR. LYNCH: You mentioned the white card system that was not effective, and then two of the steps that would have been effective, and as a matter of fact one of them is in

place now.

THE WITNESS: In place today.

MR. LYNCH: Were those systems suggested to Met Ed?

THE WITNESS: Yes. In the -- we had several sessions, planning sessions, and the responsibility was given to -- initially to a Mr. Richard Bowers, who is a health physicist from NUS, to come up with a dose assessment program. And he was working for me that week, and my briefing to him said I wanted to know what the exposures were and to make sure we had a system that was not on passive, but also was active in assuring you didn't get overexposed, and planning and exposure conservation.

He worked on it less than a week when he had a commitment. Then that assignment was made, not by me, by others, to Mr. Don Ross, who was superintendent of Oyster Creek, who was there assisting. And Mr. Ross started a program to do that. His program was tab run-oriented, but it was similar to what they had at Jersey Central and did not seem to fit our site.

So then I had Mr. Hilbert take it over and he went into this manual system I described to you earlier, which was what you might call an interim way of maintaining exposure until we could put a better one in place. And eventually we went to their computer people and came up with a special program to put one into place that is both active and passive.

But Hilbert's was passive and relied on the shift

supervisor and the supervisors and the individuals exposed. That is not, in my opinion -- that's not the way to have a high degree of assurance. You're going to have some exposure problems.

BY MR. DIENELT:

Q The current procedure is not --

A No, the interim procedure. The present system is. If your data is right and all of the things work.

MR. LYNCH: The current system -- would you explain your current system?

THE WITNESS: Okay. The current system is related to the RWPs, which are made out daily. The RWP is pulled every day and the exposure by a pencil dosimeter -- is a self-reading dosimeter -- is entered in a tab run at the end of the shift, and by the following shift there is a printout with the man's exposure by self-reader, and then adds to this previous exposure by a day and calculates what it is for the quarter. So you have an up-to-date self-reading exposure, plus how much he received each day, which can be tracked won by his RWP.

And you have a total accumulated exposure for that individual, which will assist you in maintaining his exposure ALARA.

MR. LYNCH: Does that have other information on it, too, like suitability of respiratory text, qualifications?

THE WITNESS: It has qualifications. It has the latest bioassay data, whole body counts, not numerically but either acceptable or unacceptable, symbolically. And it also either has or will have shortly MPC hours.

BY MR. DIENELT:

Q. What are MPC hours?

A. They are the exposure which an individual gets to airborne activity. Just as we are limited to whole body exposure, we also have other limits for how much airborne activities you can breathe. And when it gets up to a certain level, the licensee is required to fill out a record of how much exposure the individual got, and so you have to keep track of that well.

The previous system for that was cumbersome and was not suited for large numbers of people going into a lot of high airborne areas. So that also had to be upgraded.

MR. DIENELT: Off the record.

(Whereupon, at 12:50 p.m., the hearing was recessed, to reconvene at 1:30 p.m. the same day.)

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AFTERNOON SESSION

(1:30 p.m.)

MR. DIENELT: We're back on the record now.

There was a mix-up with the court reporter, as a result of which we do not have a court reporter for this afternoon's session, and we have secured a tape recorder on which we will attempt to record the rest of Mr. Graber's testimony today.

We have discussed this with Mr. Graber and as I understand it, he is agreeable to this procedure.

Mr. Lynch, who administered the oath, is still here. And Mr. Graber understands that he is under oath. I want to make sure that that is the case, Mr. Graber.

THE WITNESS: I do understand that.

MR. DIENELT: And this procedure is acceptable to you?

THE WITNESS: That's correct.

MR. DIENELT: We will go forward now.

Whereupon,

W. E. GRABER

was resumed as a witness and, having been previously duly sworn, was examined and testified further as follows:

EXAMINATION -- CONTINUED

BY MR. DIENELT:

Q We were discussing the inadequacies or the deficiencies in the health physics program at TMI as you

understood it.

MR. LYNCH: I think I ought to identify the tape first.

MR. DIENELT: All right, fine.

MR. LYNCH: For the record, this is the tape of the deposition of William E. Graber. The date is September 6th, 1979. The time is 3:15. We have started at tape 000.

Okay.

BY MR. DIENELT:

Q. Mr. Graber, we were discussing deficiencies or inadequacies in the health physics program, and you had described several which you had perceived during the period subsequent to March 28th. I would like for you to continue with that discussion, and if it's possible for you to do so I would like for you to break down the discussion in essentially two parts.

I would like for you first to address problems or deficiencies which might be characterized as problems with the design of the program or the procedures as they were written or prescribed; and then, after we have exhausted that subject, I would like for you to turn to problems of an operational nature, as opposed to problems in the design of the procedures. So could you start with any problems that you perceived or became aware of in the design or the actual procedures for the operation of the health physics program?

A. Okay. The procedures as they existed prior to the accident and as they related to the work prior to the accident, as far as the adequacy of those procedures, the subjective evaluation would be that the procedures did not say who did what when, but they did state perhaps the requirement that something be done, and in some cases what equipment you use, how the equipment is used when that action is taken. Additionally, in some instances the procedures did not have action levels for abnormal circumstances as compared to what would be normally expected, that is, what action would be taken by whom, should an abnormal occurrence be recognized.

Q. What you're saying is that they were not sufficiently detailed?

A. They were not. In my opinion, they were not sufficiently detailed. They relied highly upon the training and the familiarization of the individual health physics technician and his supervision and direction and the surveillance of him by his supervisor, in order to assure that the program was effective.

So that those were the types of inadequacies that I felt existed. The procedures had been written for normal conditions and many of them were not applicable to, of course, the high degree of abnormality that we found ourselves in when we arrived, after the emergency. But even before that, if I were doing an assessment of the procedures and their adequacy,

my comments about who does what when, abnormal occurrences, and the recognition and response to them, are still germane to the adequacy of a good operational health physics program.

Q. Can you recall an example of the way in which the procedures did not adequately specify who would be required to do what and at what time?

A. I can recollect looking at a procedure for taking of gas samples and the procedure for taking of air samples, and that was just a technique of taking that sample. It did not appear to me that the frequency was indicated and the representative zones were indicated, that is, the air sample is taken in an area of representative breathing zone, that type of thing.

More specifically, in the dosimetry procedures there was a considerable amount of detail left out in the dosimetry procedures. That is to say that much of the work that is done in the dosimetry program is done by the computer, and there's nowhere that you can go and get a description of who does what to make those things happen. You get a computer printout that says something, but it's not very easy to determine how those things get in the computer and what the computer does.

They were two examples.

Subsequent to that time, we have written some procedures for the dosimetry section in more detail, so that they can do their job and you have a degree of auditability, that is,

you can go back and see whether the things were done, and you can take a relatively unfamiliar person that is technically competent and have them read that procedure and use it properly to get the proper data.

Q. In this context, who is "we"?

A. The Electric Boat personnel that I had assigned working in the dosimetry section.

Q. You wrote a new procedure for that?

A. We wrote a series of procedures for the dosimetry section. To my knowledge, these may not have been incorporated yet into the station procedures, but they were given to the new dosimetry supervisor that works there and he is reviewing those.

Q. Who is the new dosimetry supervisor?

A. Mr. Ira Seybold. That's I-r-a S-e-y-b-o-l-d.

Q. Did you or other Electric Boat representatives write any other or contribute to any other procedures which were submitted to Met Ed?

A. During the early days right after the accident, we wrote a procedure on the control of contaminated personnel. The existing procedure in place did not take into account contamination of an individual with radioiodine, and we were experiencing some of this kind of contamination. So that we did write a procedure on establishing the limits for control of a person who might get contaminated with radioiodine. We

wrote the procedure on the use of instrumentation that was used to monitor for radioiodine. I'm sure there were several others that I don't recall in the earlier days that we wrote in that area.

Subsequent to that, we have written some other procedures which deal with airborne sampling, radioactive material control. They're the only ones that I can recall right at this time. I might --

Q. Were you requested to write those procedures?

A. Well, the ones in the earlier days, we just went ahead and wrote them, because we felt that they were needed. They were brought up in the daily health physics meetings as a requirement. Either we brought them up or the NRC brought them up. We wrote them and turned them over to the Met Ed people to have them go through their administrative approval circles. That's the way we've handled all these procedures, that we write them and we give them to the Met Ed health physics people, and they take them through their approval circuitry.

In the design business, I think that was -- that was the inadequacies that I was aware of. I might add two other things: that there is a copy of an audit which I have not seen, that was performed prior to the accident by NUS, and I know that that -- I think it arrived at the site about one week before the accident. It may be helpful to you to get a copy of that

and look at it.

Q. How did you encounter the NUS report?

A. I believe Mr. Nealy of the NRC mentioned to me that there was such a report. I heard about that well after the accident, probably June, July, some time in that period.

Q. I asked you if you would give me some examples of inadequacies in the procedures, and you did so. Now I'm going to ask you if you can recall any procedures which you examined and evaluated that you regarded as grossly inadequate?

A. I cannot recall any procedures that I would put in that category.

Q. You also testified that some of the procedures did not give adequate instructions for dealing with abnormal occurrences; is that correct?

A. That's correct.

Q. Was that true of most of the procedures or only a few?

A. Those -- I would say that only a few. But there are only a few procedures that really govern operations. Many of the procedures dealt with callibration, the use of a piece of gear, an administrative circumstance, so that --

Q. With respect to those procedures that deal with operations, is it your testimony that most or all of them did not adequately deal with abnormal occurrences?

A. I'd have to say most. I wouldn't say all. I think

that, for instance, the exposure control procedure that they had in place did deal with abnormal exposure.

Q. And you characterize what happened at Three Mile Island on March 28th and after as an abnormal occurrence?

A. Certainly.

BY MR. LYNCH:

Q. Did they follow that procedure when you were there?

A. On overexposures?

Q. On abnormal exposures.

A. The procedure I was alluding to was the procedure that controls exposure. I don't think they followed it in the case of the taking of the primary sample. I wasn't there, but you know, information that I have gotten since then indicates that that procedure -- you know, the overexposures could have been prevented.

Q. What was the source of that information that you received?

A. Primarily documentation that I have read and NRC publications.

Q. Okay.

BY MR. DIENELT:

Q. One of the procedures that you discussed earlier today dealt with monitoring the exposures. You described the white card system that had been used and the subsequent system that was adopted. Is it fair to say that you regarded

that system or procedure as inadequate in its design?

A. I think that I stated this before. I would say yes, but only in the fact that it -- it was designed for a small number of people, for relatively low-level exposures, and people who were familiar with the plant and familiar with their system. And when you get a large number of people, higher exposures, the system would just -- and multiple control points -- the system wouldn't function well.

I think that was true in the case of the way the samples were counted and many other areas, that we became overwhelmed with the amount of data that had to be taken, had to be written down, had to be reviewed and acted upon; and so that we had a tremendous problem in getting that data in the form.

I mentioned the survey. We didn't have survey forms for that data. Our samples were running behind. There were many, many samples taken. It was hard to get results. There was a lag in it. And then it was hard to get them all in one place and see them, to see what trends we were experiencing.

Q. Is it fair to say that all of the problems to which you just referred can be summarized as problems arising from the abnormal occurrence, rather than in the day to day operations?

A. I think that to some degree that's true; to another degree, it's not altogether true. Since I'm dealing in a

subjective area, I would not have wanted to operate my health physics program with those procedures in a normal situation. Now, that's based on my background and the type of program I come from and the kind of level of detail that we require in our procedures to make them auditable, to make sure our people understand what's expected of them, and to be able to train and get people in the field who can perform to them.

BY MR. ~~LYNCH~~: DIEM17

Q. Now, let's turn to the operational, as opposed to the design problems, that you perceived. You testified about a problem with respect to RWPs. My first question is whether you have anything that you'd like to add to that discussion?

A. Okay. The RWP problem that we talked about earlier was the fact they weren't using it. Then we started using it and we added a band-aid system onto it, if you will. By having an ALARA operational representative review that RWP and have a debriefing with the workmen.

The RWP system as it existed before the accident and as it exists today, since we have gotten back to a more normal mode, we don't have an ALARA, a formal ALARA review of the RWP. I feel that there can be some improvement to that. I guess that I can't be very specific about it at this point, but it has failed us since then.

It depends on whether you use the RWP -- you know, what the use of the RWP is supposed to do, whether it is an

all-inclusive document or whether you're relying on some actions being taken and not indicated on the RWP. But I think that there have been some changes to the RWP that I'm aware of, which have made it a better document. And I'm sure there can be some others.

I would say that it's not -- certainly not grossly inadequate. Any procedure you write can be looked at and improved on, and I would guess I'd put that in that category.

Q. Would it be fair to say that the main problem with the RWP system during the period between March 28th and the early part of April was that it simply was not in operation?

A. That's correct.

Q. In your view, was that the most significant operational problem with respect to the health physics program that existed during that period?

A. No. I think the most significant health physics problem that existed -- and of course, I wasn't there until the 31st, but from the 28th to the 31st I suspect this condition existed, and from the 31st for some time thereafter and even today, the major problem or some of the major problems that I perceived that existed were the character of the radioactivity that we were dealing with, both chemically and from a radionuclide point of view, it's different, it's not well understood; the accuracy of our instrumentation, the efficiency of our instruments for the different nuclides, the

beta component as far as the different energies of the beta; and, carrying it a step further, where the activity is in the plant, how it can get out of the plant, and being relatively sure that when you go to do a task, that you have evaluated all those aspects and are in a position to have a reasonable degree of assurance that you're protecting the workers, you're protecting the environment, you're minimizing the exposure.

There was, as I said earlier, a lot of data, some of it -- it was very difficult to get it in one place, very difficult to get it in a conditi where you could trend it. We made some attempts to look at that data early on, look at how our dosimetry responded.

We had reasonable assurance in those days, when we were dealing with the xenon and the iodine, that we had a pretty good fix on it.

Since that time, we have had considerable analysis of primary coolant and other liquid forms, a little less analysis of some of the airborne forms, the (Inaudible) surface forms. And we don't have a centralized technical evaluation center that is looking at that kind of information and following each pathway that that activity can take and assuring us that we have the right way to measure it, that we understand it and we can control it and we can protect the people from it.

We've had a couple of surprises that have come up. One surprise high airborne activity period occurred, I believe,

on June the 30th, July the 1st. It was the end of the month, where we had very high airborne activity and a a fairly significant beta component. We knew that there was beta there and I don't think the health physics technicians knew to the level they should have known. I'm not sure the health physics supervisors knew to the level they should have known.

In my organization we knew something about it, but we were not as far into it as we should have been, not as knowledgeable as we should have been on that subject.

The problem was -- the consequence of the problem was not highly significant, although initially it was thought to be. I believe initially we thought we had at least (Inaudible) it would expose people to 25 MPC hours. Upon a thorough evaluation, it was determined that we'd only exposed them to 2 MPC hours.

The latter event, which happened about ten days ago, where there were some people who received exposure, beta exposure to their extremities and to the skin of their whole body, in excess of limits; and that case was a result of a very high beta component, at least either a high beta component or a low-penetrating gamma, low-energy gamma component, that had not previously been measured in the magnitude that we saw it.

What I'm saying is that the sampling that is being done is not always being done in the best interests of health physics; it's being done to look at core damage, to look at the

treatment of the liquids, and from those points of view, but is not being -- not always being analyzed and not always being reported back to the health physics people so that they can understand what it is that they're dealing with and appropriately handle it.

Q. What other operational problems?

A. I think the one I alluded to earlier, that of good formal surveys with formal survey data being reported, recorded, maintained and reviewed. I believe that significant improvement has been made as far as the air sampling and the trending of air sample results in the containment -- I mean in the auxiliary building -- At least from a gross sense and from an iodine component, there has been considerable improvement made there. And there is improvement under way to look at the cesium and the strontium components of the airborne activity.

More work needs to be done to look at some of the other -- the possibility of other nuclides being present.

Q. Earlier you testified about a lack of survey sheets being prepared and the use of plexiglass, which was subject to being erased, instead. Is this part of the operational problem that you've just described as a need for formal surveys?

A. I believe they had formal surveys before the accident. But what happened was they had them for individual

cubicles, individual rooms. When the accident occurred, we had a massive building involved and those sheets were no longer applicable. So it was not a question of a prior program being inadequate in that area; I think it was more of a question that the accident resulted in a bigger problem and not having the data sheets to support that, or the survey sheets to support that.

Q. Do they have those survey sheets now at Three Mile Island?

A. They are using the floor plans at each elevation for the large indications of radiation levels, and they appear to be adequate. When they plan to go into an individual cubicle, they make more formal sheets of those. I think that the data as it is done today is not to the same level of detail that we do in our program at home, that is, that Electric Boat does on our survey sheets. And I think that it could be improved.

But that's a subjective thing. It's not grossly inadequate, but it could be improved.

Q. What other operational problems or inadequacies did you perceive, if any?

A. The control of radioactive mater al in the early days was not disciplined. The plant normally, in normal operation, radioactive material does not leave the protected area. During the early days it left it. All of the samples

were outside, and shortly, in the first few weeks of April there was radioactive material being moved about the site to temporary storage areas. That was not well controlled. We had an event where some of this material was inadvertently carried out on a truckload of trash and ended up in a landfill adjacent to the site.

We've had other examples where samples have been certainly not well accounted for, maybe misplaced, difficult to find. And the system was not well controlled.

Again, you had a situation where in normal operation this didn't happen. The procedures were not adequate for the emergency situation and there was a need to develop a new procedure to control this handling of the radioactive material. That has been completed and is in place and I believe is working adequately. But that was another accident-related situation where a procedure was adequate for normal operation, not adequate for an accident.

Q. Are there any other operational problems?

A. I guess the only other category that I am not -- I did not observe to any great degree, but as my staff reported to me from time to time, that they felt that some of the work practices by the technicians in the way they handle swipes, air samples, some of the frisking procedures in the early days -- the term "sloppy" was used. That is, there was not a high degree of discipline used in frisking, swipe counting,

handling of swipes, handling of air samples, and these type of things.

And that was reported to me not by one individual, but by several. Now, I will have to say that these people who reported it to me had not been at TMI before. They were used to a more disciplined program and they came from either Navy yards or from our shipyard, where we are more disciplined in this area than I have observed in most of my visits to commercial power stations.

Q Have you had an opportunity to observe the activities of line people at TMI such that you can venture an opinion on the level of their competence?

A By and large the people that I have interfaced with mostly -- if we're talking about health physics people?

Q Yes.

Q By and large, the people I have interfaced with have been their supervision, a few technicians but for very limited periods of time. I have observed some of the contractor technicians in doing, in the earlier days, doing very simple radiological control procedures, such as monitoring, off-site monitoring. And I found that their approach was adequate.

The knowledge, understanding and ability of the TMI health physics staff below the level of supervisor, I don't feel that I'm in a position personally, from personal observation,

to say anything about them, because I've not observed them.

Q. Have you had discussions with other representatives of Electric Boat who have been on the site and who have observed these individuals and formed an opinion regarding their ability?

A. Yes, I have had, you know, situations reported to me from time to time. I would say that the general assessment is that the people are capable, that is, they know what to do. They do not always have the right proper respect for their equipment, nor do they have the proper respect for good contamination control technique at all times. These were individual instances of field operations that reported to me over time. I would say that they did not represent, in terms, let's say that they were grossly inadequate; but again, I'd have to use the term that there was some sloppiness in the techniques.

Q. Who is it that reported to you incidents of sloppiness to you, or discussed it with you?

A. There were on the order of five or six individuals, some from the naval reactors branch of the DOE: Mr. Irv Sparkman from the Charleston Naval Shipyard; Mr. Montgomery Williams from Norfolk Naval Shipyard; and a Mr. William Rambow, R-a-m-b-o-w, from Electric Boat; and, to a lesser degree, Mr. Zurliene and Mr. Sachetello.

I'll have to say that, again, this is a very highly

subjective situation, that I relied on Mr. Zurliene and Mr. Sachetello much more than I did any of the other people that I had in the field, because I have been with them longer, I understand their perspective much better, and I felt I could relate to it.

Their level of concern was much less than that expressed by the other three individuals I mentioned. That is to say that perhaps they observed the same things, but they felt that the significance of this so-called lack of discipline or sloppiness was not as prevalent as the other individuals did.

Q. Could you give us an example of the kind of report that you received?

A. It varied. I remember Sparkman one day said that people were eating lunch in the counting room next to -- the room next to Unit 2 control room, and the guy laid out a bunch of swipes on the table there and ran his meter off them and it went off-scale, and the guy on the other side of the table was having lunch.

This was not good practice. It had the possibility of -- the consequences would not be great, but you just don't operate that way. That was a specific, and there were those kinds of specifics mentioned.

Q. Did you personally have an opportunity to evaluate the equipment which was present at TMI for purposes of

the health physics program?

A. Again, I relied primarily on my people. We did evaluate equipment in use. We found it to be in reasonable repair, and callibration -- in most cases, the callibration dates were current. We did -- we had a concern early on to make sure that we were -- our instruments were callibrated, although we had decided that if we had a shortage of equipment and something was out of callibration, that we would have to use that equipment if nothing else was available, because callibration dates are there to run a well-structured program, but if you're one day out of callibration the meter doesn't know that and it's not just going to stop.

But we did keep our eye on that and we found that -- we thought the program was in fairly good shape as far as equipment goes.

There was a lack of certain types of equipment, which concerned us. There were no operating constant air monitors available for covering work under way. Most of the constant air monitors -- all of the constant air monitors were process devices measuring air in ducts, through discharge paths, or some other area, and there were none available to be used to put in a work area. And we found that hard to believe. We have used them a lot and we feel that they offer a good trend indication of when the air activity increases.

We did make some efforts early on to order some constant

air monitors, and in many cases there was a scramble for equipment when it came in. Many of the ones that were ordered ended up in process systems again, because we were building several new process systems that required effluent monitoring. So that as of now, I believe there are two or three constant air monitors available.

Q. Is it your testimony that the amount of equipment that was available was insufficient?

A. In the case of constant air monitors, yes.

Q. In any other cases?

Q. Let me interject with a question on that. Was this new equipment or was this old equipment? It's our understanding they were augmented with a lot of new equipment.

A. The equipment that we saw in the field, whether it was new or old, I had no large trend indications that the equipment was inadequate that they had. They were augmented with a lot of equipment. When we got there, they were short. We brought them some. NRC lent a large amount of equipment to us.

By the 2nd or 3rd of April, I feel there was an adequate amount of equipment, with the exception of the constant air monitors, which are not -- not required at all times. But they had -- there were a couple of isolated instances where the piece of equipment a guy needed wasn't present in his work area.

But there was a lot of equipment, and I think if somebody had made that known, that that piece of gear could have been found very quickly.

We arrived. We offered our instrumentation to them. They took the teletectors and a couple of other pieces, and we put the rest in a storeroom for three or four days. They didn't even need it.

Three or four days later, we started using it for some of our special surveys. During that first week after the 31st, NRC people were walking around with their equipment. They were taking readings. There were -- half the data that was generated as far as radiation levels was being reported by NRC people who went into the containment for one reason or another and, while they were there, took readings and brought them out and gave them to us.

So I think we had an adequate amount of equipment and the equipment was in reasonable condition, and it had a callibration sticker on it. Now, as to whether or not the callibration was done properly, I can't attest. And we did look at, as far as the gamma response of the field survey meters, to see whether they record the spectrum of gamma radiation that we were involved with. And we felt that the instruments were adequate for that use.

We also looked at the TLDs for measuring the personnel exposure and the self-readers, and we felt they were adequate

for use.

We did find later -- and I believe early on there was not too much of a problem with it, because our primary contamination was iodine and we were using the jellies mostly for counts --

Q. You mean ~~uranium~~ Germanium - (drifted) lithium (Inaudible) detectors?

A. That's correct.

We did find, after a month or so, when we started counting swipes and air samples using a GM pancake tube -- and I'd like to say that by that time my organization, that is Electric Boat organization, and my responsibilities did not include health physics support. As of the 6th of May, we got out of the health physics support business and became ALARA engineering only.

But in May, when they were started to counting, using the GM pancakes, it was reported to us that they were using an efficiency of on the order of 30 to 37 percent efficiency for the beta activity. And we immediately brought it to the attention of the health physics supervision that we felt that that number was high perhaps by a factor of two.

Q. Who is it that you told?

A. I told Mr. Limroth, I told Mr. Mulleavy, I told Mr. Ralph Jacobs, who is the individual that does all the callibration and runs the efficiencies for the instrumentation. And NRC people had also told them that, and later on told

them again. And this implied that perhaps some of the airborne activity was estimated by a factor of two low, lower than it should be. In other words, the activity should have been multiplied by two to get the actual activity.

Now, there were other inaccuracies thrown in there. But that particular program, as far as I'm concerned, is still not -- I have not been satisfied.

After about two weeks, three weeks, of discussion on that and some discussion by NRC, Mr. Limroth directed that we use an efficiency in the field of 15 percent for those instruments, until that problem was resolved. And that was done for a while. A source was sent off to the NBS to get an assay on it. It's my understanding it came back 35 percent. I still don't believe it. There's something fishy.

It's a technical problem that needs resolution. But that was one instance where it seems to me that thing could have been resolved faster than it was.

I think what I'm alluding to here gets back to what I alluded to earlier on the fact that since May the 6th there has not been one cognizant individual or one cognizant group that has looked at the characteristics of the radioactivity, what the individual nuclides are and what the percentages are, what their effects are on the instrumentation, the dosimetry, and it has represented, I feel, has represented a lack of adequacy in the program.

Q This is since May 6th or throughout?

A Well, I would say primarily since May 6th, because earlier on we did have a pretty good feel for the iodine, the xenon, and the other constituents. And they were so high, they masked all the other activity and didn't represent a problem to us, because we were controlling to the most abundant nuclides. But as those nuclides decayed, there was not a good follow-up program. There has been some, but it has not been clearly defined who has the responsibility, and it has had its shortcomings.

Q In terms of the control over issuance of equipment or instrumentation, was there a problem?

A In terms of the issuance of the TLDs, there was a significant problem in the first couple of days, and then while we were having the daily read-out of the TLDs. Once we got on the monthly TLDs sequence, I feel that it's been fairly well controlled.

The first problem occurred -- as a result of the accident, there were many TLDs left on the Island and they had to be retrieved over the next several days. The problem arose that, had anybody worn that TLD and, if so, how much exposure had they gotten before the accident, how much was a result of the accident without them wearing it. And you know, there were several hundred of those. That represented a significant investigative task.

In addition to that, the station had a policy to have two TLDs for their employees and one for visitors. And there were cases where TLDs were not picked up properly, there were double issues, triple issues, of TLDs that arose, where people were issued a TLD and they turned their old one in, it didn't get read, so they got another one. Sometimes I think it went as many as three.

That kind of situation can cause a significant problem. In most cases, the individual was questioned and he said he did not have much exposure, and he was taken at his word. But you couldn't operate a system like that very long without getting burnt.

I don't think that there were any significant exposures overlooked as a result of that, but that was a problem. That was ironed out within two weeks of the accident. They moved the TLD issuance situation from the observation area down to a time shack, a time clock building on the Island, and once they got in place there I think that situation was taken care of.

Q Were there any other problems with respect to the issuance of instruments or equipment?

A Not to my knowledge.

Q Were there problems with respect to or caused by a lack of coordination between you and other persons who were involved in the health physics program during the period

from the time you arrived up until the middle of April?

A. I think that any time you have a factor that takes your time unnecessarily or requires you to spend more effort in that area, it reduces the time available to do what you ought to be doing. And so, yes, there was a lot of -- I think it was not unique and it didn't stop then. There were new people arriving every day. These people were given responsibilities. Sometimes it took a while to shake those responsibilities down.

My people in the Island had a lot of -- I'll give you a specific situation which is a little embarrassing to me, but I'll give it to you anyway. There was a procedure that was written -- and I don't even recall the nature of it. We had to have an ALARA signature on it before it got -- before it was completely approved, and there had to be an NRC signature on it.

In this situation, Tom Murphy from the NRC came to me and he said, hey, there's a procedure that ALARA has approved and the NRC's approved, and I don't like it, and I think if you'd look at it you wouldn't like it either. So I had one of my people look at it -- or he plained it to me first, and we both agreed, we don't want to go with that procedure.

The ALARA signature was, as I recall, signed by an individual named Chaseman. I never heard of him. He was a Combustion Engineering employee that had come to the site,

had been assigned to the ALARA group when it was under Bachofer. When we took over the ALARA group we were not told about him. He was working on the second shift. He signed the procedure and I didn't even know that he worked for me.

In the case of the NRC it was a little easier situation. Bill Kruger, who was Tom Murphy's boss, had signed the procedure on the second shift, and Kruger was not aware of some of the considerations that Murphy and I had discussed earlier about that procedure. So he signed it as adequate.

Q. I think his name is Kreeger.

A. Kreeger, I'm sorry. Okay, Bill Kreeger.

He signed the procedure as adequate, which can happen when you have two different people and your shift turnover is not always complete.

But you know, that was a situation where there was a guy working for me that I didn't even know what he looked like or what his name was. This was not unique with our organization. It existed in all the organizations. There were people writing on the same procedure, two different people trying to write the same procedure at the same time. One didn't know the other was working on it.

A lot of that got shaken down after the first week to ten days. But there still -- there still was a problem where you had developed a relationship with an individual and he left and somebody else took over and it took you a while to find

out who the other person was and how he operated.

You add that to the situation where, in our case, organizationally we were spending a lot of time trying to refine the organization as it shifted, along with trying to get our work done. And it was distracting and it made us less effective.

I think this, all of this, calls out for, at least, at a minimum, having an organizational chart that defines responsibilities, and when people get assigned -- you know, before an accident, and when people get assigned to those organizations, that you promptly notify others, and you take into consideration using your own staff to the best that you can.

There's another possibility, that you might consider using something similar to the military equivalent of an M-day assignee, where, if you're in the reserve and we have to mobilize, you know where you go, and that's where you train in your summer camp and you know your responsibilities. I'm not saying that we would have summer camps at nuclear power plants every year. What I am saying is that if you were an M-day assignee for certain plants, you would know what their emergency plan was, what their responsibilities might be, and have some familiarity with their organization.

That may be more than what you need. But you need something that goes further than where we were when we started this emergency.

Q Are there any other problems with respect to coordination or problems with respect to personalities which existed at the time between March 31st and the middle of April?

A I think one of the areas I haven't talked about very much, and it's not of major significance, but it does -- it's another indicator. In the area of sample counting and in the area of whole body counting, there were -- for sample counting, the following agencies counting samples: Met Ed, Babcock & Wilcox, Scientific Applications Incorporated, Radiation Measurement Corporation, and the NRC.

So we had five different groups counting the same types of samples. It was difficult, in the early days in particular. There were stories going around that, I won't send my samples to that guy because he doesn't do as good a job as the next guy.

And I'm relatively sure that there was very little coordination or standardization among the different counting setups. That was a horrendous problem, because you were dealing with competitors. And there was a problem with getting the cooperation. You did not have one person in charge, and there was a lot of inefficiencies and difficulty in getting sample results from all the samples.

In the whole body counting, we had two contractors. We had Radiation Measurement Corporation and Helderson And they

were a little better, because they were only two companies. But there was some problem with whole body counting coordination, because we were dealing with two separate contractors.

We still have two separate contractors, but we've ironed out those differences and I think they both understand who they report to in the Met Ed organization, and we get good cooperation from them now.

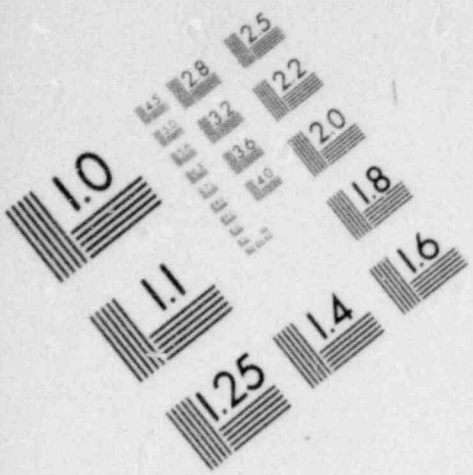
Q. Any other problems with respect to coordination or problems with respect to any other matter related to the health physics program during that period?

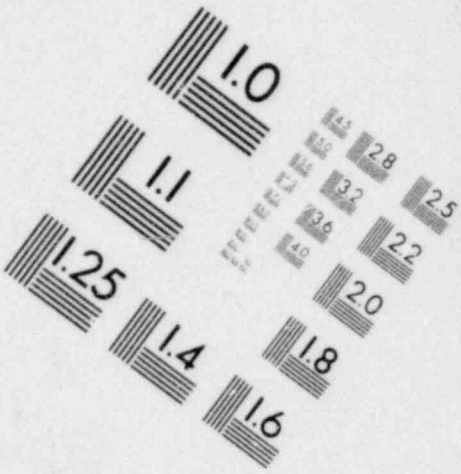
A. I can't think of any right now. I think I've pretty well covered the issues.

Q. Would you say, in the matters of coordination -- you indicated that there were a lot of different organization charts being developed. There was some time when you thought you were being placed in charge of the health physics program, and then that responsibility deteriorated down to where you were finally just responsible for ALARA engineering.

Could you say that, had GPU or Met Ed management been more forceful in defining responsibilities and in enforcing those responsibilities, things would have gone a lot smoother?

A. I think that "forcefulness" is probably not the proper word. I think if we could have been more communicative, gotten the word to -- gotten these difficulties in perspective quicker, made our decisions on how to shake that organization





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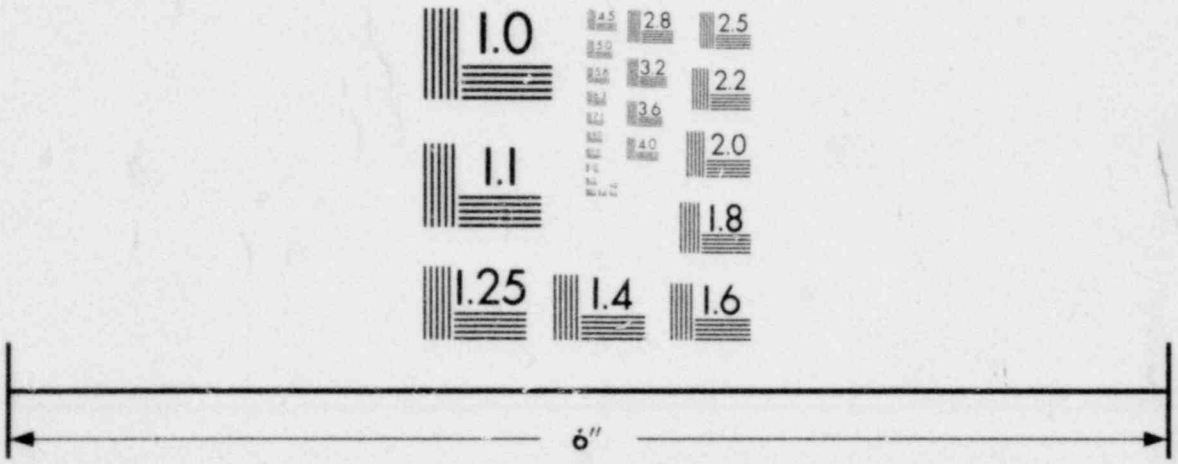

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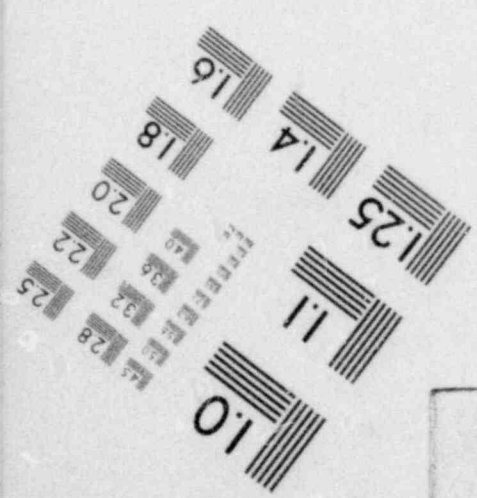

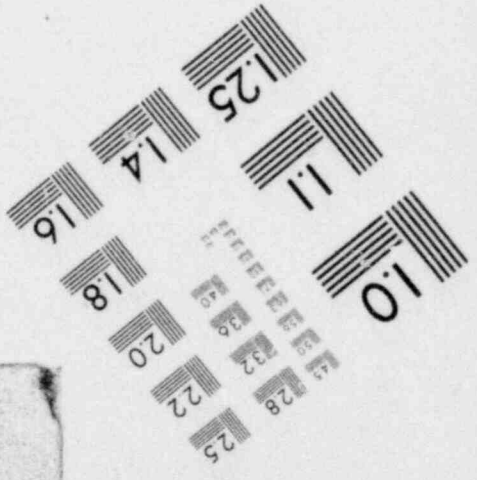

down quicker, and communicated to others. I really don't have any problem with what occurred, except that it took a long time, and in the taking of that time it was disruptive to our overall efficiency. So if it could have been done quicker, and communicated to others as soon as it was done, I think that it would have made us more efficient.

Q. Was GPU and/or Met Ed management available to you easily, or were they difficult to get a hold of?

A. They were available to me easily. I had -- I was never refused -- you know, I may have been delayed five minutes or so. But I could see that the problem was more urgent than mine. And if I had an urgent problem, I was always given an audience.

Q. To the right person?

A. To the right person. I won't say that -- you know, the fact that once I had that audience -- in the administrative areas, the actions weren't always taken. They weren't always -- my opinions weren't always agreed with. But in the operational aspects, I got good cooperation. Some difficulty occasionally on logistics, where I didn't know who did what. But once I found out who did what and I told him who I was and what I wanted, I usually got it.

Q. If you had to give the health physics program at TMI as it operated from March 28th to the middle of April a grade on a scale of A to F, what grade would you give it?

Q. Could you repeat that question, please? I don't think it came in on the tape.

Q. Could you give me an indication of what grade on a scale from A to F you would give the TMI health physics program as it operated from March 28th to the middle of April? And if the grade would change, in the sense that you would give it one grade as you found it when you arrived, and then a different grade or different grades later on, feel free to tell me what the different grades would be.

A. Well, obviously that's subjective, so I won't preamble it with very much. But I guess the grade would have been a D.

Q. Meaning poor?

A. Meaning poor, meaning probationary.

Q. Below average?

A. Below average.

And I don't know too many other organizations that would have gotten much higher, considering the circumstances. But I'm saying that if I had felt at any time that that situation was out of control and that we were going to overexpose people, then I would have taken action or, you know, I would have either said, you've got to do these things or I would have quit, because I would not have associated myself with a program that was subjecting people to the possibility of exceeding statutory limits, you know, on even -- not a

routine basis, but on an occasional basis.

So that was the way I came into it. And if we're talking about that first two weeks, first three weeks, there was not significant improvement. First four weeks, the thing was probably up to maybe a D-plus or a C-minus. Today it's a C level, and C, using the American grading system, which kind of is overstated, C is slightly below average.

Q. What, as you perceive them, have been the consequences of the inadequate or below average health physics program which existed from March 28th until the early or middle part of April?

A. The consequences, in my mind's eye, from a biological or environmental impact, either environmental impact in one case and biological effects to employees in the other, have been very minor. From the -- to operate the ALARA program, it has been ineffective on the broad base. It's been relatively effective in certain specific high-priority jobs. There has been considerable amount of exposure relatively speaking, but you know, I'm talking about in terms of rem rather than -- maybe tens of rem rather than maybe hundreds of rem, certainly.

I could say, with not -- I couldn't prove it very well, but you know, we might have wasted ten rem of exposure due to having to go back in and decontaminate areas that were previously decontaminated to a level and were allowed to get

cross-contaminated.

Q Do you mean rem or man-rem?

A Man-rem. Man-rem.

I think that one inadequacy that I haven't discussed before is the technical review, the engineering review of where the sources of airborne activity were and a better program to identify the leaks, to fix the leaks, to reduce that airborne activity, could have helped in letting us get into at least respirators as compared with retained air systems. That has cost us a little bit.

In the program that I come from, we put a lot of emphasis on the discipline and the maintaining of controls during normal operations and even abnormal operations, in order to be able to operate effectively when we do have an abnormal situation. And I think that therein lies the danger, that the practices that we have used, that have been allowed to be used, will cause a lot of difficulty to Metropolitan Edison at TMI as they move further into this recovery effort, where they get closer to the sources of activity and start doing some large-scale operations which are going to require discipline much greater than that that I've seen thus far.

So that the consequences have been relatively slight, and when I say that we used a lot of exposure, that's relative. I mean, ten rem is not -- ten man-rem in the terms of the NRC's economic thousand dollars per man-rem, represents

$10,000 of money. Ten man-rem to the large population we have there does not represent approaching an overexposure.

So that I view it as a problem and I view it more in its potential than what it's actually cost today.

Q. Is this a good point to turn the tape over?

Q. No.

Q. Do you want to comment briefly on what the potential is?

A. Well, I think that the potential, once containment entry commences, you'll be dealing with much higher orders of contamination levels, and the potential for internal uptake, the potential for overexposure to beta radiation similar to what was experienced there ten days ago, the potential for gamma exposure once we get more workers going into more areas, someone going into an area without the proper briefing and overexposing himself. All of those things are possible when you don't have the level of discipline and control in the system that is needed.

Q. You made reference to an overexposure ten days ago. That would be during the month of September or late in August of 1979?

A. Yeah. I don't have the exact recall date on that, but there was a situation where some individuals went into a valve room --

Q. Excuse me. Can I interrupt? We're going to have

to cut the tape.

A. All right.

MR. LYNCH: The tape reading is 383. This is Side 1 of Tape 1.

This is Tape 2 of the deposition of William E. Graber, September 6th, 1979.

e-1

BY MR. DIENELT:

Q. Mr. Graber, you were about to describe an over-exposure which occurred within the last two weeks of this date at TMI. Would you continue and briefly describe that incident?

A. The situation was that we had experienced some very high airborne activity, which was indicative that we had a leak of the primary coolant somewhere in the auxiliary building. Now, the leak was suspected to be in a certain valve room. A health physics foreman went into the room and located the leak, took gamma measurements and air samples to determine the airborne activity in the room and the gamma levels.

Workers were sent in to repair the leak by tightening the packing of several valves. They were given very explicit instructions, briefings, stay times, and provided with extremity dosimetry.

What was overlooked was the potential for high beta exposure and, although the performance was very good in controlling exposure to gamma radiation levels, it was

discovered the next day when the thermoluminescent dosimeters, TLDs, were developed that the individuals had received very high beta doses to their extremities, and in two cases fairly significant beta doses to the skin of their whole bodies.

I use the word "beta." It could have been high-energy gamma -- that is, low-energy gamma, that caused the exposures, rather than beta.

There is follow-up being done on that. But that particular event could have been prevented by a beta survey prior to entering that room or a more detailed assessment of the exposure potential prior to entry of that room to perform that repair.

Q. How would a beta survey have been conducted?

A. There is a survey instrument which is used. If it had been -- it's an open-window, closed-window instrument. If you put the window open, you would get the beta and the gamma exposure; if you had the window closed, you only get the gamma exposure.

That particular instrument was not used. Another instrument, which is a high-range gamma instrument, was used, because it has a long telescopic probe on it which can be held out in front of an individual without getting close to the source. Had the first instrument I mentioned been used, that had both the beta and the gamma capabilities, it would have been off-scale in the work area, that is, reading very high. Had

it been used part-way into that room, it's my opinion that it would have indicated very high beta radiation levels, and that would have indicated to us that we had this beta exposure problem and we could have addressed it. Since that wasn't done, we did have these exposures.

Q. And it's your opinion, then, with a more detailed or a more careful set of procedures, this kind of an incident could have been avoided or would have been avoided?

A. That's correct. A better set of procedures, a better discipline program, and the third area which I alluded to earlier, a better review of the characteristics of the radioactivity and the nuclides that made it up, would have also indicated that this potential existed.

Q. What would be the major changes that you would make in the health physics program at TMI in order to avoid or minimize the potential risks to which you have just referred?

A. Well, that would require a considerable amount of time to develop a total upgrade program. I think many of the areas where I have had these concerns and made them known to management, there is work under way to do that upgrading. We still have a problem with what I call health physics support. There is needed a group, not a large number of people, but several people who have as their responsibility to look at the samples in various forms, either liquid, surface contamination, core borings, airborne activity

What was the content of the pills?

A. I don't have that information in front of me. It was either 100 or 250 milligrams of potassium iodate. There were ten pills in a foil wrapper, with some simple instructions on them that an individual that's exposed to high radioiodine concentrations should take one a day, and that they would significantly reduce exposure, internal exposure to the thyroid.

Q. How many packages did you bring down?

A. Say approximately a thousand.

Q. So you had about 10,000 pills, then?

A. That's correct.

Q. A thousand individual doses, or individual doses for a thousand people for a ten-day regimen.

A. Correct.

Q. Okay.

A. We had them in our van, and after a day or two -- the van was always at the site, and we had considered taking them over to the control room. I went to a staff meeting and brought up the subject, stated that we had these pills, that they were not currently approved for use in this country, to my knowledge, that I felt that they could provide a significant assistance to people that might get exposed in the case of an emergency; that I certainly did not recommend them for prophylaxis.

I asked if I should go and discuss it with the NRC or other state or federal authorities to determine what could be done to make these things available for use. And Mr. Arnold, the vice president of GPU, told me to proceed with that.

I went to the NRC trailer and I talked to --

Q. There were no NRC people at this meeting, then?

A. That's correct.

Q. Okay.

A. It was an internal staff meeting.

I went to the NRC trailer and talked to Mr. George Smith, from Region I, and Mr. Boyce Grier was also present, and explained to them my situation. And they in essence said that they were not in a position to give me authority to use these pills. However, they were not going to tell me not to use them, and that they would tell me of anybody in the state of Pennsylvania that I might discuss that situation with.

Q. What day was this, do you know?

A. No, I don't. I was about to look in and see. But it was certainly in the first week, and I'm not -- I'm not sure.

"KIs have been sent under lock and key to Unit 2 control room on 4/4."

Q. Okay, so by 4/4 you already had had this conversation with the NRC?

A. That's correct.

Q. Okay.

A. The NRC later called me and told me that I could talk to an individual in the Pennsylvania Department of Health. I don't recall the gentleman's name. He was a pharmacist. I called him and explained to him the situation, and he said, well, that in an emergency situation, that he felt that we should do what we considered to be necessary. He did look up his -- look up in one of his books of pharmacology the particular compound that I had.

Q. Did you have a manufacturer's name on it?

A. I didn't. It was either Bell and Cordell -- I have those back at home. We purchased these -- part of them we purchased in Canada and part of them we purchased in England.

Nonetheless, he reported back to me that they were approved for administration to horses and goats and other animals, but he had nothing on human consumption; but he didn't see any real problem. However, they did not appear in his reference.

So I went back to Mr. Arnold and gave him that information, and he said, what do you recommend. And I said, I recommend we put them in the control room, we tell only Mr. Miller, Mr. Dubiel, Mr. Mulleavy, and the other shift supervisors that their present, that they be kept under lock and key in a file cabinet; and that if we have a situation where we have a major release of iodine, that they be given to the employees

in the plant.

And so that was done. We put them over there and we briefed Mr. Miller, Mr. Dubiel, Mr. Mulleavy, and Mr. Miller briefed the other shift supervisors.

Were any of the Met Ed medical personnel made aware of this?

A. Yes.

Q. Specifically?

A. We had a conversation -- first of all, we had a conversation with the Met Ed medical consultant, Dr. Lindenman, and Dr. Brennan.

Q. M.D.'s?

A. M.D.'s.

Q. Okay.

A. They felt that the Lugal was good enough. They had no particular medical concern. They had some administrative legal concern about the pills. And I told them that Mr. Arnold had -- rather, Tom Peterson did the discussions with them; I didn't. But they were told Mr. Arnold had approved us putting them in place.

There were further discussions about the possible prophylaxis of KI. Nothing ever came of that.

Q. Were they referring to the solutions of Radiation Measurement Corporation?

A. Yes.

Q. Rad Management Corporation?

A. Yes.

Q. Rather than your --

A. That's correct, because they had supplied those solutions, as they do to a lot of power companies.

So you know, we put the pills over there and we did not have to use them because we did not have a release.

Q. Okay. Was anybody in the NRC made aware of the location of these pills?

A. Not directly. I told both Mr. Smith and Mr. Grier and other NRC people who were in the room when I had my first conversation with them that we planned to put them in the control room under the direct control of the health physics supervisor and the superintendent. But I didn't specifically tell them -- and later I told them we had done that. I didn't tell them which cabinet and who had the key to the lock.

Q. Okay. How old were the pills that you had?

A. Approximately two to three years old. Shelf life has been quoted as being on the order of 10 to 15 years for these pills.

Q. They're hermetically sealed?

A. Hermetically sealed in aluminum foil.

Q. Were they in a bigger container?

A. In a cardboard box.

Q. In a cardboard box. About how big was that cardboard

box?

A. It was slightly smaller than half a file drawer, 12 inches by 8 inches by 12 inches.

Q. Do you have any idea how much that cost?

A. Roughly, I would say a couple hundred dollars.

Q. Okay. All right.

A. May have been less.

Q. May have been less.

Where are the pills now?

A. Still there.

Q. What is planned for the disposition of those pills? Do you plan to retrieve them?

A. We plan to retrieve them and take them back home.

Q. Okay. Did a plan exist for the issue and use of those pills?

A. Yes. The plan which, as I previously mentioned, was that, at the decision of Mr. Mulleavy and Mr. Dubiel in conjunction with the plant superintendent or the shift supervisor, that the shift supervisor, upon consultation with one of those other two gentlemen, would direct that they be issued to employees who had to stay on the Island if we had a major iodine release.

Q. Would a medical officer be contacted for that decision, or was that out of the process?

A. That was out of the process.

Q. Okay. Would they just be issued to people on the Island?

A. That's correct.

Q. Under what method, or was that decided?

A. It wasn't decided. It was decided they would be given to people in the control room, and then an announcement would be made that for all other person to report to the control room, if we had this major -- if we had an iodine release, and it would be issued to them.

Q. Okay. Were you aware of the adverse side effects of the use of potassium iodide?

A. I am aware, within my limited lay knowledge, that there is a potential for allergic reaction for less than on percent of tne population. That allergic reaction even to the allergic people may be minor, and in very, very rare cases can be major.

Q. Could you provide some detailed information on what that allergic reaction may be?

A. Not personally. I've read the literature. It's not hanging around in my head right now.

Q. Okay. Was that discussed at all?

A. That was discussed.

Q. With Met Ed people?

A. Yes, it was.

Q. Okay.

A. And with the doctors.

Q. And with the doctors.

A. Lindenman and Brannan.

Q. Okay. With the other forms of potassium iodate or iodide, Lugal solution or any other solution of potassium iodide -- Legal's a reagent, et cetera -- you indicated that there were some large bottles provided by Radiation Management Corporation.

Which of the M.D.'s was associated with that?

A. Lindenman and Brennan, Lindenman and Brenneman. I believe that's the way you say it. Maybe Brennan, maybe B-r-e-n-n-a-n.

Q. Okay. You said these were large bottles. Do you have any idea what the -- how many doses were in each bottle? Did you ever see the product?

A. I never saw it. I surmised that they were talking about quart-size bottles, maybe two quart-sized bottles in each one of their emergency kits or something on that order.

Q. Okay. You indicated that these are provided to a lot of power companies.

A. That's my understanding.

Q. Who gave you that understanding?

A. RMC, who does -- who has a lot of contracts with power companies to provide emergency planning services in the treatment of contaminated or injured persons, has a

pretty standard program where they provide similar services and products to many of these utilities -- Northeast Utilities, Commonwealth Edison, GPU. I don't know what other utilities they provide that service to.

Q. Okay. Do you know who manufactured the product?

A. No.

Q. Okay. As far as the potassium iodide solution that was in the possession of the NRC inspectors, who had the solution?

A. I understood Tom Murphy had a vial.

Q. Okay.

A. I don't know of anybody else. I didn't see any.

Q. Okay. It was in the liquid form?

A. That was my understanding.

Q. Do you have any idea what the container looked like?

A. No.

Q. Any idea about the size?

A. No. I didn't see it. And I didn't discuss it in any detail.

Q. How about the monitor that saw somebody drop one out of their raincoat?

A. Well, I don't think it was a monitor; I think it was one of my engineering people.

Q. Okay, engineering people. Did he indicate a description of the container?

A. Nope. He just said it was a vial.

Q. A vial rather than a bottle?

A. That's what he said. But --

Q. What was his name?

A. I think it was Tom Peterson. I'm not sure.

Q. Okay. Was any of this potassium iodide offered to EB employees?

A. No, nor was it offered to Met Ed employees.

Q. Just the NRC inspectors?

A. That's correct.

Q. Okay.

A. I asked Bob Arnold last week if he knew that the NRC had any and if it had been offered to Met Ed, and he said no to both questions.

Q. Okay. And you are aware, through the media, of the Federal Government's efforts to supply potassium iodide solution to the TMI area?

A. Yes.

Q. Specifically to the state. Were you aware of that?

A. Again, I believe -- and I don't know my source; I think it was the media -- that there was some sent to the Middletown Armory for possible issuance to the general public if the need arose. I don't know what form it was in.

My concern -- and I have no objection to Lugal -- my

concern was that an operator running to turn a valve in the middle of an iodine cloud is not going to be very well disposed to open a vial or pour some stuff out of a bottle into a small cup and drink it, he may drink more than he should and it would be a problem.

On the other hand, I feel that the pill would have been more convenient and we would have had a better reliability of administration of it to the individual. There is the potential he'll take more than one. But the pills were sized, the instructions on them were explicit. They still had my company's name on it. I considered marking my company's name off on it, but I didn't feel that I wanted to sit down --

Q. Was this on the box or on each container?

A. Oh, on eac container, with some simple instructions.

Q. A thousand containers?

A. Yes. And I just -- we decided that it wasn't practical to mark off our doctor's name and our company's name off of those.

Q. Your doctor's name and your company's name on those containers was what?

A. Dr. A.D. McDougal, General Dynamics Corporation, and a phone number if there were any questions that arose.

Q. Were these -- would these be issued under his cognizance, so to speak?

A. That's correct. In our situation, in our emergency

plan procedures, we do contact our medical director if time permits and discuss with him the projected dose, and we've done that in our drills, discussed with him the projected dose the individual would receive and request his concurrence to issue them.

We felt that the situation at TMI was such that the potential dose could be quite large, and that time is so much of the essence with the administration of the pills that we did not have that kind of latitude. We already had iodine in the minus-six range, and the potential exists for it to go up by a factor of 100 or so, where you could have significant exposure to individuals.

Q. Was Dr. McDougal aware of the relocation of the potassium iodide or iodate?

A. He was aware of that. We did not have their doctors confer with him, to my knowledge. But he was aware that we had done that.

Q. Did you ask his permission ahead of time?

A. No.

Q. Did you contact him as soon as you --

A. He was -- after we got to Three Mile Island on that Saturday, by Monday he was told about it.

Q. And what were his remarks?

A. He had no objection to us having the pills down there. He did say that we should talk to other doctors, since

they were out of his direct control. He said if we had to use them, that if the EB employees present had to use them, that we had his authority.

Q. Was the form of the packaging in which the pills were supplied, with the company and doctor's name on them, the original form in which they were purchased?

A. That's correct.

Q. So they were manufactured in that manner?

A. That's correct.

Q. Okay. I don't have any more questions on the potassium iodide.

BY MR. DIENELT:

Q. Let me ask you a few questions about a couple of other matters that we want to cover, Mr. Graber.

Did you have any dealings with NRC employees while you were at Three Mile Island?

A. Yes, sir. I was introduced to NRC employees, Dr. Denton, Mr. Stello, Mr. Volmer, Mr. Mattson, two Gibsons, two Collinses, and most of the health physics -- I think they're referred to as radiation specialists from I&E, and a number of people from NRR.

We had, earlier on, daily meetings with them, in which they expressed their concerns and we responded, attempted to respond to those concerns, in some cases made up tasks associated with those concerns, and reported back our actions,

and in some cases they reported back their findings associated with our corrective actions associated with those concerns. The meetings were relatively informal. At first they were held with me. Later, Mr. Lawyer attended several, then Mr. Limroth, then Mr. Thorpe when he assumed the responsibility of the health physics program, and later Mr. Hetrick. Those meetings continue to go on and, depending on the level of concern, the upper management individual such as Mr. Arnold or Mr. Herbein occasionally attend the meetings also.

During the first week or so, most of the inspectors on the current shift came to the meeting and reported their observations, made recommendations as to what they felt should be done to improve the health physics program. We generally tried to respond to most of these recommendations. On some occasions we took exception with them as to the degree of the problem. In some cases they were technical discussions concerning whether or not their recommendations were appropriate.

Q. How often did the meetings take place?

A. Almost on a daily basis for the first two weeks, then perhaps reverting to a once weekly, then to a once every two weeks. They're kind of a random thing now. I believe that they occur approximately once a week, that is the formal meetings.

There were also conversations, many conversations with

individuals concerning what they had seen or their recommendations, their findings.

Q. Were minutes kept of the meetings?

A. There were agendas made of the meetings, not formal minutes. I have -- in one of my folders, I have all of the agendas that I know about, with appropriate comments. In some cases NRC kept minutes and got them typed up; in other cases we kept the agendas and tried to work off those as operating agendas.

Q. Do you have in your file the minutes which NRC had typed up?

A. In some cases I do, the ones that were given to me.

Q. Can you in general terms characterize the role that the NRC inspectors played in the area of health physics?

A. Well, I t. .k it varied. The role in general was one of observing the situation, reporting back to us or to Met Ed or part of the Met Ed organization what their findings were, what their recommendations were.

Q. These reports were made at the daily meetings?

A. That's correct.

Q. Were they made in any other way, to your knowledge; any other channel?

A. I know of some occasions where maybe the finding was considered more significant and the Met Ed management at a higher level than I was mentioned to me the comment. So

that apparently it had gone up to the NRC chain if they felt it needed to go up higher and come back that direction. So I'm sure that they were made. Whether they were made formally or whether they were made in conversations, I didn't ascertain. But there were occasions where a certain item was discussed and then it would show up on the staff meeting agenda, or it would be mentioned to me by Mr. Herbein or Mr. Lawyer, Mr. Arnold, or maybe Mr. Dieckamp.

So that, you know, there was -- that pathway was open and it was used on occasion.

The comments in general were similar to items of non-compliance, although they weren't expressed in that fashion always. They generally said that they were concerned about this and they had certain findings they would report, which could be recognized as items which -- or might be recognized as items of noncompliance if you weren't in an emergency situation.

And the level of comment or the significance of comments varied from trivial up to major concerns. There were occasions where I personally felt that there was a problem with the relative priority of the findings, that is to say that sometimes a lot of time was spent on minor items which were not necessarily indicative of a generic problem, whereas there were some major items which were cause for concern that received just passing comment.

I had a concern over the first week or so that all we were doing was listening to NRC comments and trying to respond to those, rather than us ourselves looking at our problems and trying to solve them, and in addition paying attention to what NRC was saying. But there just seemed to be a large number, and in some cases a continuous comment on something that obviously could not be corrected over a short term, that received a lot of attention.

But there were two groups, and it appeared that the NRR people perceived their role to be almost totally one of helping, assisting, and providing some almost consultant management help; that they would talk about -- they talked more about generics and they talked more about how to improve the program, to get the program in better condition; whereas the I&E people had a tendency to report individual situations, talk more about specifics rather than generic problems.

Q. Could you comment on your perception of the competence of the I&E inspectors on the health physics side?

A. Well, that --

Q. That's a loaded question.

A. That's a very -- the individuals all seemed to have a very good knowledge of 10 CFR 20 and tech specs. Once you got outside of that realm, there were people that obviously were more specially oriented in respiratory protection in some cases, and counting equipment in others, operational

aspects in some cases, dosimetry in others.

We had about -- somewhere between 10 and 20 inspectors there for the first couple of weeks. They changed out every three or four days

Q Did they act as a team or did they act as individuals?

A They more or less acted as individuals. When they came together, they worked their way around the board. There was usually one senior individual that tended to try to summarize or put things in a little more perspective than the individuals did.

I think -- as I said, the competence was quite varied. There were people who were very technically knowledgeable in some cases and had very little operational experience. I think that they were taxed with the complexity of the situation, just as we were. And in some cases they were also taxed with their change in role, where they had to get out of the inspection mode and come up with some -- first of all, try to assess the program rather than just look at individual findings; and secondly, look at a reasonable approach to resolve the problem, rather than continue to repeat the problem.

Q Apart from the meetings that occurred with the radiological inspectors from the NRC, did you have other dealings with any of the NRC inspectors on a working basis?

A. Yes. I had some dealings, several dealings in the public relations area, where I had inquiries from members of the general public or people who were subcontractors from Met Ed who had questions, and these questions were fielded pretty well by the NRC. They either told me what they had in mind, told me that they would assist by talking to the Governor's information committee, something like that.

In the area -- quite often when my people in the field had dealings with them -- on one occasion, it was alleged that we had had high alpha activity in a work space and a swipe was taken. There was a lot of concern about it. One of my people tried to point out to the NRC inspector that that was not alpha he was seeing, that it was beta. We had about 60,000 dpm or more on a swipe. They used an alpha counter.

They got 60,000 dpm on an alpha counter. We put two sheets of plastic, two tube covers on top of it, and still 60,000; and told them that we were fairly sure that it was not alpha. And they said, go prove it. It caused us a little concern.

The NRC inspectors, if I would say they were lacking in anything, it was probably in practical operating experience, and there were -- this was not a generic problem across the board. There were individuals who had not had experience in the field using the survey equipment and dealing with the situation we were faced with.

There were some very good people that came in on occasion that had an expertise in certain areas and provided us a lot of advice and a lot of help, and I mean true help, reasonable recommendations, offers of assistance to, say, count something that we had counted in order to give us a good basis for comparison.

Looking at the dosimetry program, there was a lot of concern there and some in-depth looks there that were done and done very reasonably by the NRC inspectors.

I think that particularly in the early days, most of their approach was that of performing on-site inspection and providing findings. As time went on, they got a little further away from that and started trying to point out major areas of concern that required improvement.

Q. Do you regard the NRC inspectors as having made a contribution to the effort with respect to health physics and dealing with the abnormal situation that presented itself at TMI?

A. They certainly made a contribution, but they also were a disruptive force.

Q. Did their contribution outweigh their disruption?

A. I'm not sure I can -- I'm not sure that I can truly assess that.

Q. Are you saying that the pluses and the minuses were about in balance, or that you're just not in a position to

be able to assess whether the pluses outweighed the minuses?

A. Well, my struggle here is that the way they perceived themselves and the way we perceived them by their actions was not conducive to getting on with improving the program. In other words, there was a meeting called with the NRC and we went to the meeting and we listened and we responded. And in that kind of forum it's very difficult to get the most out of the discussion.

If they were truly there to help and we were to utilize their expertise, we should be able to give them a task or they should be able to work alongside us and get a task done. That didn't happen at all. The only time that happened was when they went into the compartment, many of them would take readings and come back with those readings, and my people considered them to be very reliable readings. And the guys were very helpful in giving us that data.

I think they enjoyed that aspect of what they were doing, and I think that most of them did it very competently.

But what you had was you had -- no matter how you look at it, they were perceived by themselves and us as being big brother overlooking us and telling us what we were doing wrong and telling us we better hurry up and get it straightened out. And that was a detracting situation.

Now, I don't know what their role was supposed to be. I will say that they didn't hold up many jobs as far as saying,

hey, you can't do this; that they allowed the licensee, as much as I could see, they allowed him to do what he thought ought to be done. But then they went around, and in some cases inspectors did interject themselves into situations, perhaps, and make it better. In many cases they observed a situation in which they could have interjected themselves and did not, allowed the situation to continue, then went and reported it to their people, and then at the meeting that night reported to us. That's not a lot of help, from the perspective that a heck of a lot of good talent was available that could have been used to do the work and to do it right, rather than to report on the fact that it was being done wrong.

And I don't think that they -- they were not systematic in their approach. Their approach was a random approach and it tended to be, as far as I could see -- now, they may have had assignments that I wasn't aware of, but we were not -- as far as procedure review, they were a help. As far as assisting in counting, on most occasions they were a help. But as far as reporting of findings and seeing situations in the field that were not -- that could have been handled better, I don't feel that they were -- they did tell us what we were doing wrong, and insomuch as that helps you, that helped.

Q Anything else with respect to NRC?

Q Yeah, we're kind of getting close on the end of the

Q. Overall, would you say that, in their transition from being inspectors to being observers and advisers, did you perceive any change in the analytical aspects of their performance? In other words, did they analyze and provide solutions for problems, or was it more like meter-reading and providing numbers for somebody else to analyze?

A. It varied. You know, the operational people, the people who had had operational experience elsewhere, sometimes provided solutions. However, many of their solutions were outdated or not applicable to that situation. People who had come from the naval reactors program, for instance, would remind us of how the naval reactors program solved this problem or that problem. In some instances that was applicable and in some it was totally not applicable.

There were some -- Bill Kreeger and Tom Murphy never got into that mode at all. Their mode was entirely overview, generic problems, and suggestions for program improvement. They were two individuals who consistently did not get into the details. They called a spade a spade, and they tried to get on with the program and get us into the mode of solving those problems.

But I would say that they were exceptions to the normal fare that was served up each evening.

Q. Okay. I have no further questions. Do you have?

Q. Yeah.

A. I would like to say that, as time has gone on, that the adaptation of the NRC inspectors has as a rule improved. They have gotten a better understanding of the problem and they have tried very hard to point out to us our problems. I will also say that on certain occasions I have used the NRC to my advantage, to help get across to Metropolitan Edison an idea, a concern that I had, which, when they weren't listening to me, I talked to an NRC inspector and he and I together were able to, as a team, use enough clout to make them do something.

And conversely, the NRC inspector has used me to tell me of his major concerns, and I've run to Met Ed upper management and said, the NRC is really concerned about this thing. I am, too, of course. But if you don't do something, they're going to do something. And that has worked out pretty well. That's perhaps a political approach to the problem-solving and not necessarily a standard that either one of us uses, but we both have used that to some degree.

Q. Returning back to your relationships with people at Met Ed for a moment, you've discussed a number of different individuals. One that you haven't discussed is a Mr. Logan. Did you have any dealings with him?

A. Yes. The first time I had a dealing with Mr. Logan was during the primary sampling situation, when the situation wasn't moving and I went into the control room and asked who

was in charge, and somebody told me he was, and it was Mr. Logan. And I told him my problem and he listened to me and he said, well, the man to make that decision is Mr. Miller. He went over and told Mr. Miller who I was and what the problem was, and it got solved.

I didn't see Mr. Logan for some time thereafter, until I got involved in the waste management organization and he was assigned to that. My relationship with him since then has been that he has kind of been the one individual that I feel I can talk to about our true concerns in the program, and he's always been responsive to taking that concern and trying to do something about it.

Right now, any time we have a problem in our organization and we don't feel Mr. Limroth or Mr. Dubiel or somebody else is sympathetic or empathetic with it, we take it to Mr. Logan, and Mr. Logan makes sure that that thing gets turned in the right direction and starts to happening in the way it should. And he has had a lot of long sessions with me about his concerns.

But that started around -- I would have to say I think, if you find the organizational chart where we went into the waste management organization was when we started having that interface with him.

The ALARA people had an interface, the operating ALARA people had an interface with him earlier. But my interface

started a little later.

Q. Are we about to run out of tape?

Q. Yes.

Q. All right.

Q. Let's briefly go over the series of documents you've furnished today. As I understand it, you have given me a log entitled "Three Mile Island Record," which was maintained by --

A. Tom Peterson for the first several days.

Q. Two stenographic notebooks, one tan-colored with "T. Peterson" on the front. That is also a log maintained by him?

A. That's correct.

Q. One that is green on the front.

A. And that is also a log or technical data, notes, associated with Three Mile Island.

Q. Who maintained that?

A. All of those were maintained by Peterson.

Q. All right. He was your notemaker --

A. In the first week or so, he was my notetaker.

I have included a series of folders which contain informal data. In one folder there's a series of agendas used at the NRC-Met Ed meetings with notes. Another folder is the health physics daily meetings, with agenda and notes; and another folder is a daily planning meeting run by Metropolitan

Edison staff, with agendas and notes. There are also some historical documents that are informal, which may be of some use to you in your inquiry.

Q. All right. What we will do is review these documents and if there are any which we wish to add to your deposition, we will indicate that to you and provide you with copies of it, and if there are any questions which we want to ask you about the documents, we will attempt to work out some arrangement to ask them of you in a situation in which you're under oath, but in which perhaps you don't have to come back or we don't have to go up to --

A. Perhaps they could be notarized or something. We do have a notary.

Q. We'll work something out.

Let me just ask you, since we are running out of tape, if there is any other area of comment or any other statement that you would like to make?

A. I would like to make one statement in summary: that overall, in spite of many of the subjective statements I've made, the people at Metropolitan Edison that I have met in general are trying to do what they think is best. They are dealing with a difficult situation. They have devoted themselves, their minds and bodies, to the situations there, trying to do the best they can.

I don't think that there has been any case of shirking

their responsibilities. There has only been disagreement maybe in what is the primary situation, the priority situation. And I considered it a pleasure and an honor to work with those people, even though we do have our differences and we were operating in a very difficult situation.

Q. This is an ongoing investigation. We are finished for the day. I hope we will not need to bring you back for any further depositions, as I indicated. But we will recess this deposition now, rather than terminating it.

We thank you for your time today.

A. Thank you.

Q. Thank you very much.

Q. Did we make it?

Q. Yes.

This is the close of Tape 2, Side 1, of the deposition of William E. Graber, September 6th, 1979. Tape reading is 394, e-2 Oliver Lynch reporting.

(Whereupon, the taking of the deposition was recessed.)