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NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF:

NRC/TMI SPECIAL INQUIRY GROUP

MEETING WITH NRR RADIATION PROTECTION PERSONNEL ON LICENSEE RADIATION PROTECTION PROGRAMS FOR NUCLEAR POWER PLANTS

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

NRC/TMI SPECIAL INQUIRY GROUP

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ON LICENSEE RADIATION PROTECTION PROGRAMS

FOR NUCLEAR POWER PLANTS

Room 405
1935 Arlington Road
Bethesda, Maryland

Friday, October 19, 1979

The meeting was convened at 9:05 a.m.,

Mr. Frank Miraglia, Group Leader, Task Group 3, presiding.

PRESENT:

TASK GROUP REPRESENTATIVES:

MR. RONALD BELLAMY, Task Group 3
MR. OLIVER LYNCH, Task Group 3
MR. SHOLOMO YANIV, Task Group 3
MR. HARRY NORTH, Task Group 4
MR. JOHN ⌝IENELT, Consultant

NRR RADIATION PROTECTION REPRESENTATIVES:

MR. SY BLOCK
MR. CHARLES HINSON
MR. GEORGE KNIGHTON
MR. WILLIAM KREGER
MR. JOHN MINNS
MR. THOMAS MURPHY
MR. JACK NEHEMIAS

** ** **

C O N T E N T S

P R O C E E D I N G S

MR. MIRAGLIA: I guess we are ready to start.

The purpose of this meeting is outlined in that memorandum we sent on October 3, 1979.

As you are all aware, the Commission has established a Special Inquiry Group to look into the TMI incident. That inquiry group is under the direction of Mitchell Rogovin, an independent contractor to the Commission, and there are a number of NRC staff permanently assigned to the inquiry to act as technical staff to Mr. Rogovin.

The Special Inquiry Staff is divided into several task groups. One of those task groups is Task Group 3, which is essentially looking at the radiological aspects of the TMI incident.

I am the group leader of Task Group 3. To my left is Sholomo Yaniv, also Special Inquiry Group leader of Task Group 3. Sitting there is Ron Bellamy, Task Group 3; to my right is Oliver Lynch, Task Group 3.

We have previously met with senior radiological protection inspectors from each of the five I&E regional offices. The purpose of these meetings is to try and get a feel for the licensing process and the inspection process that we engage in in the area of radiation protection.

Looking into the TMI incident, a number of deficiencies were noted in the radiological protection program at TMI.

What we are trying to do is to ascertain whether the problems that we have noted at TMI are generic in nature.

Now, the inquiry group is small and we didn't have the resources nor the time to go out and look at licensing programs at other commercial reactors, and so the purpose of the meeting today is to discuss with you gentlemen what the licensing requirements are and what the review process is for examination of radiation programs and commercial nuclear reactors.

Attached to the memorandum we sent to you was an agenda, and we'd like to go through the items on the agenda and have you gentlemen discuss with us what the requirements are in the process for the various topics on the agenda.

The first item on the agenda is the management of the radiation protection program, and the first subitem under that is Procedures.

What requirements do we have with respect to procedures?

MR. KREGER: Frank, may I make just an oral statement?

MR. MIRAGLIA: Sure.

MR. KREGER: I am Bill Kreger. I think you are aware but I think for the record it might well be said that the radiation protection program of applicants for power reactor construction permits and operating licenses is submitted by their Chapter 12 of the Preliminary Safety Analysis Report and the Final Safety Analysis Report, two different stages of the

licensing, and that the Radiation Protection Section staff in the Radiological Assessment Branch is the group that reviews that Safety Analysis Report material and interacts with the applicant regarding it.

In accordance with our Standard Review Plan, Chapter 12, and the Regulatory Guides and the regulations, specifically Part 20, that have been written in the radiation protection area, once a reactor is licensed, to the best of my knowledge, the review of changes in the program or needs to reconsider radiation protection because of special activities that need to be carried on during the duration of license -- those kinds of radiation protection actions are formally the responsibility of the Environmental Evaluation Branch in the Division of Operating Reactors, if they are submitted as part of a licensing change or revision of a license condition as distinguished from the inspection and enforcement activities.

Then EEB and RAB almost invariably do interact in the activities that relate to a change in the license or something major like the steam generator removal which had a lot of radiation protection aspects.

So originally that is the way we relate to the applicant or licensee in the radiation protection area.

And one thing we have tried to do in that whole interaction process is also stay very close to the inspection and enforcement aspects of a license, so that there is feedback

continually coming from operating reactors back into the licensing process.

Those interactions are both formally maintained by trying to get together once a year with the counterpart people in the I&E group and then having special interactions at other times.

I think those are important things to have on the record regarding the way we are organized to do our business.

MR. KNIGHTON: Can I make one clarification? The point I want to bring up, Frank, is that when we talk radiation management programs, it starts back at the design stage of the plant. And everything I see down here generally is directing its attention to the final implementation, when you run the plant, by the people. And I really think you have to keep in mind that much of the program is established in the design of the plant during the CP and the OL stage and reviewed as such.

Recognition of where these radioactive sources are, recognizing when and where people will be during the operation, recognizing shielding during that time, ventilation systems from cold to hot areas, the monitoring of these things -- all of these have been designed and are fixed by the time you go into operation.

And I just want to get that clearly on the record, that what we will be discussing here, from what you have written down here, is basically the people who function after

the plant starts up and is running.

MR. MIRAGLIA: I think we appreciate that, George. I think the agenda is just one to get the meeting started and for us to focus on specific areas. I don't think we want to exclude from the discussions the radiation protection aspects that are considered during the CP phase. I don't think anyone should feel constrained necessarily to the topics on the agenda. If there are other items that you gentlemen feel are important to be discussed, I would not hesitate to raise those issues.

We are prepared to stay all day and hopefully we can get through the agenda in a day. It took us two days to go through the agenda with the regional inspectors. But by no means did we intend to restrict the discussion to just the post-operative license issues. I think we want to look at the entire aspect of radiation protection.

Before we go any further, Harry North is a member of Task Group 4 of the TMI Special Inquiry Group that is looking at the licensee's response to the emergency. And Harry in particular has reviewed and is interested in the emergency plan that was formulated by the licensee.

John Dienelt is a consultant to the TMI Group, and he has been following the activities of our group and other subgroups in the radiological release and monitoring and the interactions with the state and the vendor in this area.

When we talked with the I&E people several weeks ago

in the area of procedures, they indicated that the requirements for having procedures are kind of broadly written, in that procedures are required and then in Regulatory Guide 1.33, and there was discussion of a recent amendment for revision to that regulatory guide -- "recent" may be in the last couple of years. And I think we'd like to get some discussion as to what are the NRC requirements on applicants and licensees with respect to having procedures, maintaining the procedures, and what is the specificity of those requirements.

Can anyone of you gentlemen address that particular topic?

MR. MURPHY: Well, with respect to the requirements for procedures for the radiation protection program, the statement that you made is basically true. We require in a broad sense that the licensee have procedures that cover areas in their radiation protection program that we list are important.

Those areas I don't have memorized and I didn't bring a copy of 1.33, but there are some 10 or 12 areas which would require that the licensee have implementing procedures for personnel dosimetry, internal/external personnel dosimetry, for example, access to radioactive control areas, radiation monitoring, training -- I can't remember. Does somebody have a list? Does somebody have Reg Guide 1.33 with them?

(Discussion off the record.)

MR. MIRAGLIA: We couldn't get a copy of that.

MR. MURPHY: The requirements for procedures, however, are spelled out in that Reg Guide, in 1.33, the need for procedures and the need for the licensee to maintain procedures. And it has been our position that the licensee's radiation protection program falls under the sphere of Reg Guide 1.33, and it has been necessary for him to maintain procedures in accordance with that guide.

That guide gets called out in the administrative section of the Tech Specs, so it's really a requirement that he follow a guide, a Tech Spec requirement.

MR. MIRAGLIA: But in the review process, Tom, would it be fair to say that during the licensing process that NRC does not review the procedures of the applicant?

MR. MURPHY: Yes -- stop, wait.

MR. KNIGHTON: NRR does not.

MR. MURPHY: NRR does not review the procedures. Now, it is my understanding that the inspectors review the procedures prior to start-up of the licensing program.

So you can't say that the NRC does not review the procedures. One of the pre-start-up modules for the inspectors is that they review the procedures.

MR. KREGER: I think it should be pointed out, though, that in the Standard Review Plan 12.5, we have a whole section and practically a whole page of description of the procedures that they shall develop, and of how we are going to review the

fact that they are to have procedures as part of their plan when they start up. And in the revision that we have proposed to our ALARA process to go out to licensees with an ALARA program which has been issued for comment now, we have specified that the ALARA program for licensees will have in it also the submission of the identification of their procedures and the availability of their procedures of this 1.33 list of procedures for review as part of the ALARA program review by I&E of the licensee.

And that ALARA plan for licensees was developed during the past about a year-and-a-half between EEB and RAB, and was almost ready to go out to all licensees about the time of Three Mile Island, and then got interrupted by Three Mile Island to the point where the letter asking for comments on that plan went out to industry just last month or so.

MR. BLOCK: May I quote what the letter says which went out to industry with respect to this: And this is the position:

"Licensees should establish a program to insure that occupational radiation exposure of workers will be kept as low as reasonably achievable. The program should cover the guidance of their position. As appropriate, the program may include documents such as Standard Operating Procedures and the Radiation Protection Manual."

So this is part of the position of the NRR with

respect to operating license and their so-called ALARA program which they would be developing.

MR. MIRAGLIA: Let me get two points clear. This particular position is specified in the Regulatory Guide 8.8, then, rather than 1.33?

MR. BLOCK: Yes.

MR. MURPHY: This position that Sy just read?

MR. KREGER: The thing Sy read is a separate document that we prepared to reflect 8.8, but it is a separate document to go to all licensees. You see 8.8 said that licensees shall have an ALARA program but didn't formalize that ALARA program. It's been about the last two years that the staff has been developing the requirement for formalizing that ALARA program. And what we did was we took out of 8.8 and listed in this position that is going to go out to industry or that has gone out for comment right now -- we have listed each of the subparts of Regulatory Guide 8.8 which has to be considered as part of the, quote, "ALARA program," unquote, for licensees. And now we are asking when this becomes a formal way of operating for us, that instead of the relatively -- I don't know -- not very demanding statements about licensees having an ALARA program in 8.8, we are now going out and saying, "You have to have an ALARA program which has to be submitted to I&E, each regional office, which has to have the following constituents as related to paragraphs in 8.8 and has to be approved eventually by the

I&E office, including the identification of a whole bunch of procedures that have to be written in their ALARA program and have to also be available for inspection."

MR. MIRAGLIA: So the implementation of this would be the responsibility of I&E as far as review of the program?

MR. BLOCK: That's correct.

MR. MIRAGLIA: Would there be any involvement at all by NRR in this process?

MR. KREGER: We expect there to be considerable involvement. When the process was first started, the thought was we would have the programs come back into NRR for review. Harold Denton -- this was six months before Three Mile Island, no more -- felt that the staff in NRR didn't have the manpower to appropriately -- as I recall, the argument was the manpower was too tight to review all licensees' ALARA programs as well as do all our licensing work for applicants, so he had negotiated an agreement with, I believe, John Davis at the time that instead we would ask that the regional offices review those ALARA programs.

MR. MIRAGLIA: Has this position gone out to the operating licensees?

MR. BLOCK: To AIF for comments.

MR. MIRAGLIA: So it is still in the formative stages.

MR. BLOCK: Yes.

MR. MIRAGLIA: What type of period is contemplated for the review of at least all operating plants with respect to these requirements?

MR. BLOCK: Well, my document is dated August 1, 1979, and we say, "I would appreciate receiving your comments within the next month."

MR. KREGER: But then the plan itself had a number of days which the licensee is supposed to get his program back in.

MR. BLOCK: Oh, let's see.

MR. KNIGHTON: Six months?

MR. BLOCK: Yes, six months.

MR. MIRAGLIA: Six months for the licensee to get his plan into I&E. So it will be at least in the order of a year after the letter is issued before the operating plants are reviewed with respect to the ALARA program.

MR. BLOCK: That is true.

MR. KNIGHTON: Let me caution you here. We are spending a lot of time on ALARA which is an extension of an existing program. It has nothing to do with the plant presently or not.

MR. MIRAGLIA: Understood.

MR. KNIGHTON: Because the way the discussion is going, it sounds like we are waiting for something that is really needed from a safety point of view, and that is not true.

MR. MIRAGLIA: I wanted to ask about the other ALARA

aspects of this that is in this letter. It is being considered now in the review process for operating licensees and construction permits?

MR. MURPHY: Yes. Well, the basis for the letter to go out to licensees was extracted from the program that already exists for construction permits and operating licenses.

MR. KREGER: But it was to make it more formal in a sense. We have written up in the CP PSAR the entire plant the applicant has at the construction permit phase for his, so to speak, ALARA Radiation protection program. We have the same thing at the operating license stage except that at the construction permit phase we emphasize those parts of Chapter 12 that relate more to the design of the facility, the shielding, the layout, the way things are going to happen, the way components are organized, so that the jobs can be done without a person having to be exposed to 16 difference sources at once, and all that stuff.

At the operating license stage, which is the FSAR being submitted when it's already under construction, and in fact some considerable percentage constructed, the main thrust of the license review is plans and procedures and health physics equipment and instrumentation as distinguished from the design of the facility.

And at both of those stages, the staff's review includes all aspects of the management of the ALARA program and

the management of that program.

But the formalization of this other thing was a recognition that once the operating license comes into effect, we only had some fairly general words in 8.8, which I'm not sure that I can find quickly, but that state that licensees shall have an ALARA program.

And I guess that's in this section.

MR. BLOCK: Won't that be in a regulation, Bill?

MR. KREGER: What?

MR. BLOCK: Isn't OSD working on a regulation which will require licensees to have an ALARA program?

MR. KREGER: That is true. Bob Alexander was going to put in Part 20 as an additional regulatory statement of some kind, to the effect that it changed the "should" to "shall" in essentially the statement in Part 20 that relates to an ALARA program.

MR. MIRAGLIA: How would the review of the procedures in the licensing process be different with the advent of the ALARA program over what was done prior to having that program? As George indicates, there is an existing program out there. Are we just getting to another level of detail, or are the requirements becoming more specific? What is the difference between the requirements that were on the books for these operating plants at the time that they are licensed and now that we are asking them to develop an ALARA program?

MR. KREGER: Well, the difference, I think, is that whereas before they had a very detailed write-up or relatively detailed write-up in the FSAR of their ALARA program and radiation protection program as a whole, and then a bunch of in-plant procedures that implemented various aspects of that program, and were in a position by which they could change the FSAR without submitting it for review by NRC as long as it met the 50.59 requirements of not being an unreviewed safety issue, that could gradually change and the changes only be identified by maybe a little notation in the annual report.

Now we are saying that this documentation says you have to have a written ALARA plan that is separate from being able to just pull out Chapter 12 of the old FSAR which grows older and older as the operational phase goes on. But it says that now you are going to have to have a written ALARA plan which describes at any time the constituents of your current ALARA program and has as appendices or whatever these some 11 or 12 procedures as well that the inspector can ask to see and can review.

MR. MURPHY: May I clarify some of that.

There is a difference, at least in our minds there has always been a difference, between ALARA and the connotation that ALARA would require some impact assessment and a radiation protection program which is designed to assure that the criteria of our regulations, specifically the dose limits and things

like that, are met.

The requirements for procedures in Reg Guide 1.33 are requirements in terms of what is necessary for a radiation protection program to meet our regulations.

As a matter of fact, I think even one of the requirements in Reg Guide 1.33 now says that you have to have implementing procedures for ALARA.

Now, as far as ALARA is concerned, I see that as being over and above just having a radiation protection program. It involves making decisions on the benefit of reducing radiation exposure, not just maintaining exposures within the individual dose limits of Part 20, but also taking what action that is as low as is reasonably achievable to assure that doses have been reduced.

And I don't think we can talk about procedures for ALARA without saying that what we are asking for here is really in addition to what exists at the licensee and what exists for CPs and OLs in terms of requirements for procedures for a radiation protection program.

The purpose of the proposed rule change that Alexander has been working on, which by the way we have paid a lot of attention to and put a lot of input into, is to beef up those radiation protection programs, and not just for reactor licensees but for all NRC licensees. But it is to beef up those programs to assure that the licensee not only has a radiation

protection program that meets the requirements of the regs, but also we will have procedures that require him to review jobs, potential jobs, to look at the exposure of those jobs, and to look at ways to reduce the exposure of those jobs.

You know that is really what the ALARA thing is after.

MR. MIRAGLIA: Would it be fair to say that Reg Guide 1.33 and the procedures required basically were the criteria used that met the requirements basically of Part 20, not exceeding the limits specified therein, and that the ALARA program is superimposed upon that to make sure that you conform with the general requirement that doses should be as low as reasonably achievable?

MR. MURPHY: That is my view of it.

MR. MIRAGLIA: With respect to procedures in general. is there any distinguishing between normal operations versus emergency operations? Are there specific requirements for emergency-type procedures? Or is it directed basically at normal operations at a facility?

MR. MURPHY: Up to now our review and our mentality has been all normal operations.

MR. KREGER: I think it's clearly specified in the Standard Review Plan, in fact, or in the standard format and content, that the program we are asking them to describe is primarily a program for normal operation and anticipated operation occurrences.

I believe there is a sentence in Chapter 12 of the Standard Review Plan that says something about accident, but it's one sentence, I think, devoted to accident.

MR. MURPHY: The reality of it is that the review process has been geared to normal operations. It has not been geared to emergency procedures.

MR. MIRAGLIA: The question basically stems from the point that in looking at what happened at Three Mile Island they did have procedures prior to the incident. Inspection history did not indicate too many deficiencies with respect to procedures. There was perhaps some indication that there were some problems with respect to the implementation of those procedures by the licensee.

However, during the first two or three days of the incident, it appears that many of these procedures were not followed during the initial days of the incident.

MR. KREGER: Yes.

MR. MIRAGLIA: And that is why I raised the question: Has the focus been predominantly on normal operations versus emergency kinds of operations? And in view of what we have seen at Three Mile Island, are there any changes being contemplated in this area with respect to that particular point?

MR. KREGER: I think both Tom and I, at least, would probably have comments on that, because we were both up there from the second day on for a fairly extended period of time.

And I have made comments to ACRS and other groups before on the subject of things other than normal operation.

The things you look at in a health physics program are radiation protection programs and things that we implement and insist that an applicant have put in his program -- and I believe that I&E insists that a licensee have in their program -- many of those things. I say "things" -- program aspects, procedures, equipments, plans for analyzing, measuring, collecting samples, protecting the people, all those things, are just as applicable to an accident situation, a decommissioning situation, a shutdown situation versus operating situation, a maintenance mode, a special maintenance mode like even taking out the whole steam generator, as they are to just plain, ordinary running for power.

And one of the things that we thought and even said to groups that asked that kind of a question before Three Mile Island was, "Well, the health physics program that we have approved, we have approved and approved -- or radiation protection program, as it were -- can handle, has built into it, all of the things you need for running for power, for refueling, for special maintenance, for decommissioning, for whatever."

Because there is relatively little difference except where the radioactivity is and except how much of it is someplace rather than some other.

The thing that most strongly impresses me both at Three Mile and post-Three Mile is that we were probably wrong in feeling that the kind of thing we looked at, the kinds of things we insisted upon, the kinds of things we expected people to do, would just automatically happen almost no matter what the circumstance. Because all the features were there. All the right features were there. You know how to go decontaminate little areas; you know how to go decontaminate big areas. You know how to live in little contaminated areas and presumably how to live in big contaminated areas.

All the things seem to be easily extrapolatable to the accident situation.

I think what we saw at Three Mile Island was the people weren't ready to do that. The people weren't prepared. They hadn't exercised the extrapolation to something big. They hadn't thought about it and talked about it and practiced it and trained for it, you know.

My reaction is the biggest deficiency is that if you are running in that other mode week after month after year, with the radioactivity right where it ought to be and right where you hoped it would be and all that, that you really sort of lose track of the fact that, "My God, it may be a whole slew of places where we never expected it."

And so my reaction is we thought the whole program -- I thought the whole program would easily extrapolate to an

accident condition and the people would almost automatically, with the training they had had, be able to move into that mode -- and they didn't.

Now, Tom may have some good comments.

MR. BLOCK: As a matter of fact, I may mention something. In the DOE facilities which I am familiar with, we have emergency exercises where we have scenarios of releases of large quantities of plutonium or tritium as the case may be. And we found that even though we had procedures for these emergencies and people who had in the past gone through these exercises, at the critique there had always been failings in what happened. People would do the wrong thing or they weren't at the right place at the right time or they didn't know how to handle specific situations.

I think in every scenario, Three Mile Island being an extreme one, unless you do rehearsals and exercises, there will always be a screw-up.

MR. KNIGHTON: You can still have the exercise and you will still have it. The exercise does tune everybody up at that point in time to the particular problem, and generally speaking you have changed the people. So if you have another exercise, they will probably do the same mistakes they did the first time, but you will tune them up.

Adding one point to yours, Bill, it would seem to me, looking back at Three Mile, what Bill has said is true. If

we get rid of the emergency situation and the excitement of it and the confusion that comes out of such a thing, what happened, probably our weakest situation in terms of program was having monitors off scale. But we still have the manual. Surveys could be run, protection could be provided. That is basically what Bill is saying.

I think the biggest weakness was that we had monitors off scale, and it would have been better had we had them in there to take care of that situation.

MR. KREGER: But for a couple of days they had dropped even radiational work permits.

MR. KNIGHTON: But it was still there.

MR. MURPHY: It relates not to the procedures, I think; it relates to the people, a subject that you didn't even have on your outline. I don't know whether you want to get into it or not, but I think it's the most significant area in my recollection of the early days -- the most significant area of problems. And it comes from, at least in my feeling, a lack of depth of both professional and technical competence in the licensee organizations, at least in the Three Mile Island organization. I am not quite sure I would characterize that as being true for all licensee organizations, but in the Three Mile Island organization they had trouble gathering together enough people to do all of the things that needed to be done.

Now, there were procedures available for them to do

all of those things. They just didn't have the wherewithal or the resources to get them all done and get them done right. You know, you have to have people who are both qualified and trained to just jump in and take over and run the situation. And don't think that that characterization of the radiation protection program is any different from what some of the problems were that they had with just getting the plant in a safe condition.

They needed to get more people in in the early days to help bail themselves out of some of their problems. When they brought these people in, the people weren't familiar with the station procedures. They were familiar with relatively good, realizable control procedures from their own facilities, but they weren't necessarily familiar with the specific procedures that were to be used at Three Mile Island or the specific layout or how things should operate.

You know, you didn't have compliance with procedures in the early days. You didn't have the licensee using a radiation work permit program, for example, which would have made him think about activities that he was going to get into beforehand, and putting the proper radiological controls on the people that were going in there.

You had some plant people providing their own radiological control.

MR. KREGER: It took them about four days to get

back into a really effective radiation work permit program.

MR. MURPHY: Yes. The early overexposures in the first few days were all before they had an opportunity to sit down and regroup and say, "Hey, what the hell are we doing? We ought to be following procedures. We've got procedures to follow. We are just not doing it."

MR. KREGER: One of the things that came out most strongly in my thinking -- and Tom and I have talked about this a good bit since Three Mile Island -- most of our review in the licensing stage is a paper review. In fact, when we even insist we want to know who is the radiation protection manager going to be and what are his qualifications, a lot of the time we'd get the thing, "We really haven't assigned the guy to that plant yet." And even though our last stage of licensing, the OL stage, and our issuance of an FSAR, and we do have our reviewer in the licensing review go up to the plant if at all possible, but he spends a couple of days with the plant and maybe not even with the guy that is going to be the radiation protection manager.

My reaction after Three Mile and in discussing it with Tom many times since then is that a review might be much more meaningful, a license review of a radiation protection program might be more meaningful if somehow at the very tail end of the process, when you have the staff assembled and assigned possibilities, that you could go and live with that

group for two months or something and say, "Well, what is their capability? What are they like? What can they do? How do they think? How do they approach the things that they are having to do to get ready to run that plant?"

And then you might have a better feel for what might happen if they get into an unusual situation.

We certainly can't get that out of the paper we look at for most of the licensing review. We just can't have any real idea of how those people are going to react. And it was the people that was the problem.

The program, as I say, still has all the elements it needs, and the equipment was there, although admittedly some of the in-place equipment was off scale, but other equipment was there to replace it. They had everything they needed, but it comes down to people.

MR. MURPHY: I just want to make sure that you understand that what we are talking about is the immediate term right after the accident happened. I don't think there is a facility out there -- and it certainly doesn't exist now -- to cope with the magnitude of the clean-up operation that exists at Three Mile Island. I don't think you are getting into that part of it, I hope.

MR. MIRAGLIA: No.

MR. MURPHY: Because we are not talking about that.

MR. YANIV: Bill, you said the equipment was there.

That is not entirely correct as far as I know because over 50 percent of the portable equipment was not operable, or more than that. And then there were other problems, like the immediate loss of the counting capability, the loss of access to the health physics area.

MR. KREGER: Yes.

MR. YANIV: And other factual or design deficiencies that came to light, like lack of shielding.

MR. KREGER: Yes, I agree there are some design things.

MR. YANIV: All these things contributed to the inefficiency of the health physics program immediately following the accident.

MR. KREGER: But I have to contradict in a sense. I was surprised, getting there two days later, and finding out that, my God, they were bringing people in from several other plants and from Electric Boat Company and from NUS Corporation, and we were coming in and everything. I was really surprised two days after the accident, and in talking to them for the next eight days, that they had stuff moved -- clothing, masks, more portable monitors, everything, moving in that place quite fast, really. I was amazed at how fast they were able to get back-up equipment, back-up clothing, back-up masks, respirators -- all that kind of stuff.

Now, I am not saying that it was fast enough.

MR. YANIV: They did not have it in the first two days.

MR. MURPHY: They had it by the time we got there.

MR. KREGER: They had it by the time we got there. And to my knowledge, that didn't contribute significantly to a radiation problem.

Not being in their health physics areas did. That gave them a lot of problem.

MR. MURPHY: The fact the equipment wasn't working, I think, is not indicative that the requirement was not there.

MR. KREGER: They could still go survey.

MR. MURPHY: No, but that they had a management problem with maintaining active --

MR. YANIV: The fact they couldn't analyze their activity contributed significantly to the problem.

MR. KNIGHTON: Not to the hazard necessarily because they didn't take actions. They had procedures. Had they had better instrumentation, they might not have had to go through some routines that they did.

MR. KREGER: We wouldn't have had to wear masks if they knew --

MR. MURPHY: They were never in a situation where they couldn't do an airborne sample with the exception of the iodine. That was one that they had a problem with. And, of course, basically because they couldn't do monitoring for

iodine in a short period of time. They did not have a multichannel analyzer available to them, that's true.

The fact that the counting room very rapidly -- both counting rooms, both counting areas -- became inactivated I think is a significant problem.

MR. MIRAGLIA: I think with respect to counting areas, one area, the equipment was never installed.

MR. MURPHY: Say that again.

MR. MIRAGLIA: The counting room had a multichannel analyzer but it was never installed.

MR. MURPHY: It wouldn't have done them any good.

MR. KNIGHTON: The activity level in the background.

MR. MIRAGLIA: I think the point I'd like to get to is the point Bill sort of alluded to. It appears implicit in the review process there was always the feeling that these procedures would be applicable in the emergency situations. When the review is conducted and we look at the number of personnel required to implement the radiation protection program, when the qualifications of these personnel are examined -- was there again the focus on the normal kind of operations? And if that is the case, if the answer to that question is yes, doesn't that suggest that the review process should be changed in some manner?

MR. KREGER: Yes.

MR. MIRAGLIA: And I'd like to get your thoughts on

those particular aspects of it.

MR. KREGER: What I said about talking about the situation and going and living with those guys has the same implications about extending the process, I think. And I have been involved a lot in this whole hassle about emergency planning off site since Three Mile Island, which is partly just because in my current job I have that responsibility. I mean I have the Accident Analysis Branch which I didn't have before.

But the thing that in my mind very clearly becomes a most significant change in Chapter 12, Standard Review Plan, standard format and content, what we ask them for, regulatory guidance, and even regulation, because we now have this committee I think you are aware of on Part 20 changes.

The things we have identified that are going to be very strongly needed to be added to even the regulation, Part 20, is a whole range of things for emergencies. And I think we are going to have to put it in our review. I think we are going to have to put it in Part 20. We are proposing for the new outline for Part 20 the standard for radiation protection, our major regulation on radiation protection. We are proposing in the outline at least a whole new section related to -- I don't know whether you want to call them accidents or emergencies. I forget how it is identified in that outline, but it's a whole new attention to accidents.

MR. BLOCK: But I can't see how you can identify

qualifications of people under normal operating conditions as compared to their qualifications under stress. I think it would be very difficult for the staff to interview people or look at the qualifications of people and how they would behave under stress.

MR. KREGER: But you can find out whether they are having in their training program just what you said you had at the DOE laboratories.

MR. BLOCK. Yes.

MR. KREGER: To my knowledge, we never paid very much attention to that before. Do you have every six months an exercise on "what if"?

MR. BLOCK: Yes.

MR. KREGER: That is the kind of thing we can build in. Admittedly, you can't do a psychological test. And even if we lived with them for two months before we wrote our OL SER, we are not going to see a lot of that, but we will see a lot more than we are seeing now.

MR. MIRAGLIA: Do you realize at TMI they had seven drills with different scenarios in which the program was supposedly exercised in the manner we are discussing?

MR. NORTH: They occurred in about a six-week period at the end of 1978. Six of them they referred to as rehearsals. One was observed by inspectors from Region 1.

MR. KREGER: That is part of the I&E process that

I am not totally familiar with.

MR. NORTH: I have a question here. You have been talking about drills. Essentially all plants have emergency plan drills.

Now, are you speaking of a drill in the in-plant staff with emphasis on response to in-plant problems? Because most of the emergency plan drills that have been conducted in the past relate to off-site or out-of-plant problems, the emergency monitoring teams and this type of thing, with very little emphasis on what goes on in the plant.

MR. KREGER: I am strictly talking about the former, Harry, in-plant.

MR. MURPHY: Were those drills?

MR. NORTH: They were emergency drills which talk about on-site, off-site emergency situations.

MR. KREGER: That was not in my thinking at all. That is a whole separate issue.

MR. MURPHY: That is indicative of where we have been and where we are at. The whole emergency planning process that existed up to the time of Three Mile Island was basically to protect the public, and it did not get into how you react in-plant.

And I'd be the first to admit that that was one of the criteria that we never looked at in our review process. And we haven't yet started to look at it in our review process

for in-plant radiation protection.

And as far as the Radiological Assessment Branch is concerned, it is not something we have looked at often either, except we have just started to augment that part of it and we can get into it a little later.

MR. KREGER: But let's face the reason. I have said many times, you know -- I mentioned a list of things we said you are going to have to face.

You are going to face operating for power, you are going to have to face refueling, you are going to have to face regular maintenance, regular repeated maintenance. You are going to have to face special maintenace, and 75 percent of the exposures in an operating plant is from special maintenance. You have to consider rad waste handling and servicing inspection.

Those were the six things we emphasized during our review process, and we emphasized what the differences in those six kinds of operations are, what the special features of those are. We said, "Your program has to accommodate those."

And then a seventh we had talked about is decommissioning but isn't really written into it very heavily. That is new and different. But we emphasized, "Your program and design have to accommodate those six features." And we essentially said, "And accidents aren't going to happen."

I think much of our NRC philosophy before Three Mile -- not in system safety where they are designing for the

redundancies and the back-ups and protection against accidents, but I think in our part of the thing I personally -- you know, accidents aren't going to happen. We have so many protections, accidents aren't going to happen.

And now I would say, "Of course, we have to have that seventh or eighth thing, the six I mentioned, and decommissioning the seventh, and eighth, accidents. So now our whole review has to say, "Oh, they can happen and did happen and it may happen again."

So we are going to have to add that seventh thing and ask: What is different about it? What does the program that we have developed so far not cover? Where is it likely to fall down, have deficiencies, be unprepared? What has to be built in this program for accidents?

MR. YANIV: Does that extend to the actual design and layout?

MR. KREGER: I am sure it does. You see in Lessons Learned we have a whole new Item 2.1.8(b) that says you have to consider now looking at least at the shielding design because you are going to have a whole bunch of components that are potentially a heck of a lot hotter than you had designed for. And so we have one item in the Lessons Learned that is already saying you've got to go back and take a look.

MR. MURPHY: I don't think we would allow a design that would decommission your counting facilities in the event

of an accident. It doesn't make any sense. I don't think we'd allow a design in the future that would decommission the effluent monitoring facilities.

MR. KREGER: Of course, that is the other Lessons Learned, and that is having these things go up for higher measures.

MR. MURPHY: But the fact is that it did exist and does exist out there right now.

MR. KNIGHTON: I think I should clarify, though, because the staff has been looking at 1.97 and trying to get that out for a year or more. And so it has been on their minds. They just hadn't succeeded.

MR. MIRAGLIA: What is the status, George, to the best of your understanding, with respect to Regulatory Guide 1.97 in operating plants?

MR. KREGER: We got Draft 2 about two weeks ago from Wensinger's group asking 20-some people to review Draft 2 and get comments back by something like the 15th of October in preparation for their finalizing the revision to 1.97.

And the new draft just orders -- not orders of magnitude but significant fa ors over what the old 97 is, and particularly in the business of what instrumentation has to be available, the range of that instrumentation going into the accident region --

MR. MIRAGLIA: This is to get a revised reg guide out

on the street?

MR. KREGER: Yes.

MR. MIRAGLIA: What is the implementation schedule for that reg guide with respect to operating?

MR. BLOCK: I don't remember.

MR. KREGER: I don't remember. That is way at the end after about 100 pages.

MR. BLOCK: As a matter of fact, to answer that question, I got a call from Millstone yesterday wanting to know what the range of the 171 was for iodine particulates so they can immediately install it.

MR. BELLAMY: What did you tell them?

MR. BLOCK: I gave them the numbers from 1.97.

MR. BELLAMY: And those numbers are in Revision 2.

MR. BLOCK: And he was happy we didn't ask for tenths or fifths of microcuries for particulates because the people who are making those instruments say they can't make them at that range for particulates.

MR. NORTH: I had a question. You mentioned the up-grading of the procedures. Are you also thinking in terms of increased requirements for the individuals who will act as the rad protection manager or supervisor, more experienced or, let's say, with background in high-contamination work, fuel-processing-type activities? Because I think that most of these people, except for a few who had plants with bad fuel experience, just

don't have that kind of background.

MR. KREGER: Harry, I wonder if you wouldn't run into the unavailability. You know, there have been worries when we came out with our slightly tougher requirements about three years ago, was it, when we came out with a revision to 1.8 and the requirements were slightly tougher and industry said, "Hey, wait a minute. You are potentially putting us out of business because there aren't enough people with these qualifications of having so many years of experience in radiation protection activities at a prior reactor or in a situation that was similar." And they did a survey and found out, yes, there probably were enough people available.

But I haven't thought about putting those kinds of requirements, but I just wondered if you wouldn't run into the same problem that in that case you really wouldn't find enough people who were dirty-hands people at high curie levels.

MR. NORTH: Isn't there the possibility that the utility industry as a whole has this problem now? And if the Commission imposed a requirement, couldn't the utility industry respond by setting up training programs?

MR. KREGER: Yes. Well, they gathered the dirty-hands people.

MR. MIRAGLIA: We are drifting into the next item on the agenda.

MR. NORTH: I'm sorry.

MR. MIRAGLIA: Before we leave the management, one aspect that has come to light in view of Three Mile Island is where radiation programs is a management organization. At Three Mile the radiation protection function reported to the station superintendent. Do we have any requirements as to where radiation protection should fit organizationally?

MR. MURPHY: Well, I can answer that.

MR. BLOCK: Are you going to answer that?

MR. MURPHY: There are criteria in Reg Guide 8.8 as to where the radiation protection manager should answer. And they are negative kinds of criteria in the sense that they say you should not answer through an operations-oriented individual, a technical-support individual, or maintenance-oriented individual. The criteria are spelled out in terms of independence from those functions rather than specifically where in the organization the radiation protection manager should answer.

The radiation protection manager, by the way, did not answer to the plant superintendent at Three Mile. I don't know where you got that from. But that wasn't true.

MR. MIRAGLIA: He reported to Administrative and Technical Support, and that Administrative and Technical Support reported to the station superintendent.

MR. MURPHY: Yes, but that is a hell of a lot different from saying that he reported to the station

superintendent. You could have said he reported to six layers of management, too, and eventually would report to the station superintendent.

MR. MIRAGLIA: Would that kind of reporting change have been in conformance with the criteria that you just specified in Reg Guide 8.8?

MR. MURPHY: Yes, it would have been.

Now, I will be perfectly frank with you. There is a lot of discussion among staff people as to whether or not that is adequate or is a position that we should maintain. And I would say, in my survey of the staff, it's about equally divided as to what we should do about that. Should we require that the radiation protection manager answer directly without a layer of management between him and the station superintendent or directly to the station superintendent? Or is there some advantage to having a second layer of management between him and the station superintendent?

There are arguments on both sides that probably are valid, and depending on what utility you are in and what the overall utility management posture is, it probably would work equally well in either one.

The only place that we have unanimous agreement on in the staff is that it should be a function independent of the megawatt generators.

MR. MIRAGLIA: Isn't that a primary function of the

station superintendent?

MR. KREGER: Usually under the station superintendent there is the operations manager, and we said that the radiation protection guy definitely should not be under the operations management. Under the station superintendent there is usually engineering and a couple of other functions, including potentially health and safety.

One thing that we have had for a long time in the Reg Guide 8.10, I guess it is -- maybe it's 8.8. I find my copy of 8.8 has about 10 pages missing, the copy I brought over.

But we did have a dotted line. We have always said that the radiation protection manager has to have, so to speak, a dotted line of authority up to a corporate guy who is the person identified as having the final highest-level authority over radiation protection, over, to so speak, ALARA. And that works different ways. And we have talked to a lot of people about that over the years as we were developing that process. And you know people would say, "Well, that works fine." There were people that would say, "It doesn't work." There were people that said, "You ought to have the radiation protection guy completely outside of station management."

When I said there are people who said it doesn't work, health physics, radiation protection people who said it doesn't work, and the bottom line on all those conversations that I can remember is it is very much people-dependent. It

ain't where the blocks are.

It is so people-dependent that you can put these blocks in this place and it will work great. The same blocks with the same labels on the blocks may not work in some other place because it really depends on the station superintendent, the corporate management, what their philosophy is about either getting out power or protecting people or whatever.

MR. MIRAGLIA: I've got some questions.

Tom, you said that that specific requirement regarding independence, the negative criteria that you stated, are in Reg Guide 8.8. My understanding is that that Reg Guide 8.8 has not been fully implemented on all the operating points. So prior to that requirement, what was the position with respect to the organizational set-up for radiation protection in the majority of the operating plants that are out there now?

MR. BLOCK: Maybe I can answer that question. We have in the tech specs that the qualifications of radiation protection managers shall be in accordance with Reg Guide 1.8. And Reg Guide 1.8 specifically references Reg Guide 8.8 in regard to the fact that the RPM who is qualified in accordance with 1.8 shall be on site, and with respect to 8.8 also they should not report to the operation or the maintenance superintendent or technical support, as the case may be.

So we do have tech specs that specify those particular reg guides even though they are for OL and CP type of applicants.

MR. MIRAGLIA: Is that true of all the operating ones?

MR. BLOCK: Yes.

MR. KNIGHTON: We had a generic activity that he was in charge of.

(Discussion off the record.)

MR. MIRAGLIA: Bill, the point that you raised, the philosophical question is that regardless of where the blocks are drawn, people tend to function perhaps differently. I think if you look at what happened at Three Mile Island, it appears that the radiation protection function, even though there was an administrator for technical support which normally the radiation protection function reported to, in practice the radiation protection personnel did report through the operating superintendent of each unit.

MR. KREGER: The operations manager or unit superintendent?

MR. MIRAGLIA: Each unit superintendent.

MR. KREGER: Yes. Well, I don't have any problem with that if, in fact, they are all the right kinds of guys. He still has to have -- in our plan he still has to have a route to go to corporate management and say, "Hey, Operations," or "Plant Superintendent," or whoever the guy is, "is not paying enough attention to health and safety."

That is the reason why we said there's got to be a dotted line from the radiation protection manager to corporate

management. He's got to be able to go around plant management if he believes that health and safety of the work force is not being adequately taken care of.

MR. MIRAGLIA: How does the review process consider that particular element?

MR. KREGER: Would you say you don't? I'm sorry. I thought 8.8 said he's got to have a reporting line -- my pages are missing.

(Laughter.)

MR. MURPHY: I don't believe so. I don't believe we have ever required that we have a set-up that says that the radiation protection manager must have direct access to the corporate HP. In fact, we don't have a requirement for a corporate HP.

MR. KREGER: No, I didn't say a corporate HP. I said the guy at the management level who has been labeled the radiation protection responsible official in that organization.

MR. MIRAGLIA: Oh, yes, that is something different.

MR. KREGER: There has to be a guy at the management level who is labeled to be responsible for radiation protection. And we say that the radiation protection manager on site has to have access to that guy.

MR. MURPHY: I will just read it to you if you are interested. It says:

"The radiation manager has a safety function

responsibility to both employees and management that can be fulfilled if independent of station divisions such as Operations, Maintenance, or Technical Support. His primarily responsibility is continuity. The RPM should have direct recourse to responsible management personnel in order to resolve all the questions related to radiation protection."

MR. KREGER: That's what I meant. He has to have direct recourse so he can go around and say, "Those guys aren't paying enough attention to health and safety,"

MR. MIRAGLIA: So basically the way one way looks at that requirement in the review process -- maybe I'm paraphrasing you incorrectly -- is to see that the organization blocks go to the right kinds of functions.

MR. KREGER: Yes.

MR. MIRAGLIA: You alluded to the fact that a lot of that depends on the individuals that occupy those particular blocks.

MR. KREGER: Yes.

MR. MIRAGLIA: What we found during the course of our inquiry was that a number of radiation protection personnel at Three Mile Island felt -- and these are quotes from various idividuals at various levels within the organization -- that health physics was viewed by management, station management, as a necessary evil.

MR. MURPHY: Uh-huh.

MR. MIRAGLIA: That radiation protection was viewed by station management as being a hindrance to operation, and that the view of a number of radiation protection people was that management is essentially operations-oriented.

MR. KREGER: When you say "management" now, are you talking about management from the station supervisor on down, or are you talking about management all the way up to the top of the company?

MR. MIRAGLIA: It could be both, because depending on what level the individual was in the organization --

MR. KREGER: Most of the individuals don't know much about corporate management.

MR. MIRAGLIA: My question to you is: What can be done to foster the right kind of philosophy and attitude towards radiation protection with respect to the utilities?

MR. KREGER: We worried about that in writing 8.8 and revising 8.8 and rerevising 8.8 many, many times. Because you go out and talk to people and hear all the things you are saying. You hear them say, "That guy above me" -- whoever he is, whether the station superintendent or operations superintendent or whether he is not above him but in some other group -- "doesn't worry about health physics."

And I have heard managers, on the other hand, say, "If the health physics guy was the right kind of guy, we could have a beautiful relationship supporting each other as to taking

adequate care of health and safety and still getting the operations done."

So I have heard both criticisms with the wrong guy in radiation protection. He can just be a hindrance. And no matter how you write this book, he can be a hindrance. But with the right guy in health physics, they can have a beautiful working relationship regardless of the blocks.

The same thing is true of other guys in management who have to get out power, have to keep the facility running, have to get it ready for the next shutdown or get it back on the line after the next shutdown, and so forth.

The one thing I feel we have found out over the years in that regard is it is terribly people-dependent.

And I despair of being able to write words -- and that is why I come back again to the fact that I don't see -- I mean I see an evolving process of review in which we live with them for a while.

MR. BLOCK: May I respond to your comment about health physics people being necessary evils. I think this is not site-specific but generic. I think within the whole nuclear industry, including DOE, this is the characteristic phrase of people with respect to the health physics people. They get in their way of accomplishing research, production of any sort. So I wouldn't take that as being a literal site-specific phrase.

MR. MIRAGLIA: Yes, I appreciate that side of it, but

the point I was asking was indeed if you take that as a given, what can the NRC do to foster the right kind of management, utility management, attitudes towards radiation protection that we haven't done or are trying to do but haven't been successful in ?

MR. MURPHY: I would make a suggestion.

MR. MIRAGLIA: Sure.

MR. MURPHY: I don't see it as generic to health physics. It is a management problem. It is one where you've got to get top management accepting their full responsibilities for the total operation of the facility -- the total safety operation of the facility. And that includes not just generating megawatts and repairing the facility, but it includes the quality assurance program that goes along with it, the security aspects, the radiation protection program, the whole thing.

It seems to me that one thing that might be done is to require that plant management, top management, go through some kind of an orientation and training program conducted by the NRC that would specifically call out the seriousness with which we view these various aspects of his acceptance of a responsibility for the safe operation of the plant.

And I would think that perhaps one of the things that could be done is, for example, to have each station manager come in and spend a month, four months -- pick a time -- some

amount of time with the Nuclear Regulatory Commission and with various technical organizations with the Nuclear Regulatory Commission in which he would, one, get educated as to what is the role of the NRC, but also get educated as to what we consider is expected of him.

And I think that that might work in all areas, not just in the health physics area. But I think it would help in the health physics area.

And you know it is a kind of program that I would consider could be fostered not only for station superintendents and perhaps assistant superintendents but also those who the utilities are aspiring to appoint to those positions.

Now, that is one thing that I think could happen, because I think it's a basic management problem and a basic problem with assuring that the people that you put in responsible positions are willing and are ready to accept their total responsibilities and know what they are.

And it is not necessarily clear to me that they are really, in a radiation protection sense, familiar with what all it is that we have collectively been trying to impart in the last four or five years.

MR. KREGER: I don't think that applies just to the industry either, though. We have had numerous occasions in the past where in interacting with the Commission, interacting with ACRS, with OPE or even management levels within NRC, when you

say, "I see something that is saying the same thing. Oh, you health physics guys are just a fly in the ointment," Frank, and I am surprised from time to time at how little some people know Part 20, including the Commissioners. They have no idea of what Part 20 is trying to get at, what it specifies, what it doesn't specify. And I agree with Tom.

Oh, I want to extend that to one more point. We have said many times in our review process, "What if we said you shouldn't license that plant because they don't have an adequate radiation protection program?" And I have said I don't believe we'd be able to stop it because people don't think of health protection -- this is all past -- maybe not now after Three Mile. But we have faced that: Would my saying you shouldn't issue an operating license because that plant has a lousy radiation protection operation in the plant?

And if we came down to that, we'd have to go through the same education program of some of the management levels. Obviously Harold is fairly familiar with it being the guy who had that under him.

But if a systems safety guy was up there now, you know, we might find the same thing.

MR. KNIGHTON: I have to say I don't agree with that. I think you are speculating. I think what actually you have done is you have had the guts enough to stand up and say they shouldn't get their license. What would happen would be there

would be negotiations where the licensee in fact would take action which would be acceptable, and then they'd get their license. That is the approach they normally take anyway.

MR. KREGER: Sure. I am just saying you might have to go through a fair education process at several levels on up in the NRC before you could get the kind of a delay which might result in the negotiation process with the applicant.

MR. KNIGHTON: I have a problem with it.

MR. KREGER: Why?

MR. KNIGHTON: On the environment side they held things up in a lot of cases.

MR: KREGER: I said it was purely speculation that we have talked about on occasion in the past.

MR. MIRAGLIA: Does anybody else have any questions relating to the management aspect?

(No response.)

I think it might be appropriate before we get into the next item to take about a 10-minute recess.

(Whereupon, a short recess was taken.)

MR. MIRAGLIA: Why don't we continue.

The next item on the agenda deals with training.

MR. MURPHY: Could I say before we get into that that there is one aspect of this management that you didn't touch on which I think is controversial and one you probably ought to be aware of and one which concerns me -- and I am not quite

sure I know what I want to do about it but I will make you aware of it.

And that is the aspect of radiation protection management function being diluted with a radiochemistry or station chemistry function.

I think that it is an area that I think may even be, in terms of removing technical capabilities from the RPM, probably more important than the area we were talking about earlier.

You know, in a lot of plants the radiation protection manager is vested with two responsibilities. He is vested with the responsibility for the radiation protection program and he is also the station chemist, the radiochemist, primary system chemistry, secondary system chemistry, water quality, EPA water quality, that kind of thing.

My personal position on that and my personal feeling on that is that those two responsibilities are too much basically to be vested in one individual, and particularly in the individual who is also the radiation protection manager. And I have been trying to get my thoughts together and put together my position that we probably ought to be moving towards separating those functions.

In some cases the chemistry function is more an operations support function that might be not necessarily always compatible with the radiation protection function. In

other areas, obviously, it very much is compatible where the radiation protection manager is responsible for counting room facilities and things like that where he can make sure that the proper priorities for counting samples for radiation protection purposes are interspersed with the priorities for station chemistry.

But I think that that being the major drawback, the advantages of splitting that function are that it gives us an individual, one individual, who has complete responsibility for the radiation protection program without it being diluted with another equally important function.

The staff is divided on that one also, and industry is divided.

MR. KNIGHTON: We are divided.

MR. MURPHY: And I may be one of the few people, as a matter of fact, who feels strongly that the function should be a separate function.

There are people, though, in the industry that agree with me and there are others who don't.

So I don't know where we are going to go with that one.

But my personal feeling is it is an important problem and one we are eventually going to have to address.

MR. NORTH: I think there is another problem in the same area that should be addressed which is cross-training of

technicians where they are continually being rotated.

MR. MURPHY: I think that is equally important, Mr. North, and maybe even more so. But I think the fact that you have the management together fosters the technicians being a dual function role. And that is an important problem that we have gotten in on the periphery of, mostly because of our involvement in Three Mile, more than because we have been into that in our review function. It is not the kind of thing that we would even look at in a review function.

MR. MIRAGLIA: Would you have a similar view, Tom, with respect to the responsibility for the rad waste station, radioactive waste?

MR. MURPHY: Absolutely; absolutely. I think that the operations of the rad waste function should be an operations function and should be separated from the radiation protection manager. The radiation protection manager ought to have an overview of that. He ought to be provided radiation protection for it and he also ought to be approving station discharges and station waste shipments to assure that they are complying with our regulations. But I don't think that he should have the responsibility for getting that work done.

I also feel the same way about decontamination.

MR. YANIV: You mentioned the staff is divided on that. What are the arguments against separating those functions?

MR. MURPHY: One of them I mentioned to you that I

I have heard is that by having the radiation protection manager responsible for both functions, he can control the access to the counting facilities and things like that. Otherwise there would be a need for two separate counting facilities so that the health physicist can get his priorities recognized when needed.

That is one of the things.

The other thing is economic.

In the early start-up phases of a reactor operation, in the first year or two, the health physics problems really are not very great. And the chemistry problems are pervasive. So that the utilities have found that it's an economically justifiable position to have this person handle both functions. And in the early start-up phases of a reactor, he can in fact handle both functions. A good individual can divide his time between both functions adequately.

The problem is that as the plant gets older and as the radiation levels build up and more maintenance activity is required, the health physics problems start becoming more important and the radiochemistry and the plant chemistry problems don't become necessarily significant, let's put it that way, and he starts in my view not paying attention to both things adequately.

So to answer your question, the other side of the coin, the advantages for keeping him are, number one, economic,

both for the individual and also for the group. In terms of technicians, for example, when a plant is operating, the health physics activities are usually not as demanding as when the plant is shut down. But the radiochemistry and the chemistry activities are more demanding when the plant is operating than when it is shut down.

So one of the reasons that the utilities use for having so-called cross-trained functions is that.

The problem with that, though, at least at the technical level, is that none of the technicians really get completely competent in either area, because in order to maintain their union seniority and to get their union raises and things like that, they've got to move around. And by moving around they stay in one place for three to six months and just start learning that one function when they are off doing something else. And it may be a year or two before they get back to that function again, and by then they have forgotten what they have learned.

So I think that is a disadvantage, personally.

MR. MIRAGLIA: With respect to this problem, Tom, have you or has anyone looked at whether that situation is predominant in the utilities? Are all utilities generally organized more or less along those lines?

MR. MURPHY: I don't say it's predominant, but at least a third of the utilities are organized that way, and maybe

close to a half. I have never done a survey on that. That is more from just being aware that the radiation protection managers for the most part are also the chemistry supervisors.

MR. NORTH: Have you noticed a change in the utilities to change recently, relatively recently?

MR. MURPHY: There has always been a tendency in the utilities to change as they grew older in the business. Generally what we see is that a utility just starting out would tend to be more organized with the radiation protection and chemistry function combined, and then as the plants grow older and it gets more health physics problems and more chemistry problems, then they tend to start to separate them.

But the answer to your question is no, we don't see a change necessarily for those new plants that are coming on line. There is still the same percentage of new plants coming on line that want to have radiation protection and chemistry functions combined as they were five years ago.

MR. NEHEMIAS: For me the problem is one step worse than Tom describes. If you have a box that says "Rad-Chem Manager," you have two sections under two supervisors, Rad and Chem. And on the average, most of the time when a promotion comes to the next box, it comes from the chemistry side. You have a guy in that box, and the RPM is another step down. It's a step worse than Tom described.

MR. KNIGHTON: Except with that in mind, the

requirements we are putting on the RPM, as an example, was a controlling function, in that he must have experience in that area and good experience in that area. You can't have a chemist in that without having good experience in the radiological area.

MR. NEHEMIAS: Not the situation where an RPM is down here, where they promote a chemist.

MR. KNIGHTON: Does that mean that the plant is not going to have as good performance out of the RPM, because he lacks experience or anything?

MR. NEHEMIAS: It is a reasonable question about the degree of contact at the top.

MR. KNIGHTON: I think Tom's point about the new plants starting -- usually all chemical aspects in one group is, as he said, an economic situation, and in the early part of that plant can be usually justified. I think as Tom said, as they go on and get older and they have to have so much health physics coverage during maintenance -- maintenance increases very highly with age, and activity in the systems increases. This usually demands a heck of a lot more health physics support.

And so what you see, then, is they start having either to train more or hire more health physics people. That seems to me to be a natural change, and if that is going on I'm not surprised.

MR. KREGER: Not only natural but acceptable, and I think it's worth pointing out that ICRP 26 in their recent review of radiation protection standards guidance very specifically addresses the issue that cost-benefit considerations are very important, and that no radiation protection, so to speak, processes or equipment or design or whatever, should be instituted without there being a real benefit in exposure reduction or in ability to meet limits, or whatever.

So, you know, the business of an evolving program that best fits the needs of the moment is entirely within good radiation protection practice and guidance at the very highest level which I consider ICRP 26 certainly an example of high-level guidance in that area.

MR. KNIGHTON: Then the question of cross-training, I think, is extremely important in that you are educating people who normally aren't in the HP area. You are making them aware of the area, you are making them aware of the requirements, you are making them aware of the procedures, and when they are not acting in that context they are doing their normal function, they more readily will be following the HP requirements of writing out the appropriate records, being aware of the exposures they are getting.

And so as you see plants today, many of them have an individual maintenance man follow these procedures. They make him read them and teach him what they are, and he goes in there

and does his work and will not necessarily have an HP with him if he has certification from the management.

Just giving a lecture to a man is certainly not as effective as cross-training him in a function. So I believe from a certain point of view cross-training is very good and should be considered.

MR. MIRAGLIA: We have been dancing around this area of training all morning, and maybe we should get into it a little bit more specifically.

And in looking at the training area, I guess what we'd like initially is to get understanding of what the present requirements are with respect to training, not only of the general radiation protection technicians but also health physics training for the rest of the station staff, and also we'd like to get into the area of qualifications of the individuals, including the management, in those functions.

MR. MURPHY: Jack, do you want to take that one on to start with?

MR. NEHEMIAS: Well, the basic requirements are in the ANSI Standards 3.1 which is referenced in our Reg Guide 1.8. I am not sure of the present status of that 1.8.

MR. KREGER: It would be a revision, Revision 2 or 3.

MR. MURPHY: ANSI 3.1 is only an upgrading of ANSI 18.1.

MR. NEHEMIAS: But it's a significant upgrading,

both for technicians and for RPMs.

With reference to training, the only requirement in the regulations for training is in 19.12, which says if you are going to go into a restricted area you have to have training appropriate to the risks.

We have out for comment a reg guide which defines an acceptable training program in terms of content and scope.

MR. MIRAGLIA: This would be more directed at --

MR. NEHEMIAS: We are talking about reactors, yes.

MR. MIRAGLIA: This would be more directed at the training of nonradiation protected individuals?

MR. NEHEMIAS: Training of everybody who is not a --

MR. MIRAGLIA: -- health physicist.

MR. NEHEMIAS: The qualified people wouldn't have to have that training except as it pertains to specific equipment.

MR. MURPHY: Let me clarify that. There are some words in that guide on the training of radiation protection personnel, too.

MR. NEHEMIAS: Yes.

MR. MURPHY: But it is primarily for nonprofessional or nontechnical radiation protection training.

MR. MIRAGLIA: With respect to what is in the ANSI standard, is that directed down to the technician level?

MR. MURPHY: Yes.

There are qualification in there down to the technician level. And those qualifications are pretty much used by the Office of Inspection and Enforcement, to my knowledge, in reviewing the qualifications of radiation protection technicians who are in responsible positions.

MR. MIRAGLIA: What about requalification or requirements for continued training in various areas?

MR. MURPHY: That's fuzzy.

MR. NEHEMIAS: The new reg guide without a number yet addresses the question and would require a renewal.

MR. MURPHY: But it doesn't say how often.

MR. NEHEMIAS: Right.

MR. MURPHY: Is that true? It doesn't say, "You will have training once every three months" or "once every six months" or "once every three years." It says, "You shall have retraining and a retraining program," but it doesn't say how often.

MR. NEHEMIAS: That's right.

MR. MIRAGLIA: Do we have any requirements directed to where the responsibility for that training function should rest within the organization?

MR. MURPHY: Yes, in Reg Guide 8.8 we have a section on training which discusses the fact that the radiation protection manager should have input into the -- and I have forgotten the exact words. What happened to that reg guide?

MR. BLOCK: There it is.

MR. MURPHY: There is a section on training.

MR. BELLAMY: It is right there on the left-hand side: "The training program should be approved by the radiation protection manager and presented by competent instructors."

That's the statement that is made. That's it.

MR. MIRAGLIA: What are the criteria for judging competency of the instructor?

MR. KREGER: I&E judges it. We don't.

MR. MIRAGLIA: What would be the criteria for a person taking the, quote, "competent instruction" as shown demonstrated proficiency?

MR. NEHEMIAS: A written exam.

MR. MIRAGLIA: Is that required?

MR. NEHEMIAS: The guide puts it down as acceptable. It isn't required.

MR. MIRAGLIA: The reason I asked about where the function is vested, Tom, is that once again in the focus of the inquiry on TMI, at TMI the training function with respect to radiation protection training of not only the radiation protection technicians but the conduct of the general training that is required by Section 19 and also the training that is required of the general contractors and nonradiation protection personnel was vested within the radiation program program in the management.

And again this is another dilution of his efforts. And the training at TMI in the radiation protection area with respect to technicians was almost nil. It constituted basically all on-the-job training and little, if any, formal training of those individuals.

And the management of that operation has indicated that they neither had the time nor the personnel to spare to conduct training.

MR. NEHEMIAS: Which people are you referring to? Are you referring to his HP technicians --

MR. MIRAGLIA: Both.

MR. KNIGHTON: Let's take them one at a time. Does he say he doesn't have the manpower or men or time to train his HP technicians?

MR. MIRAGLIA: That's correct.

MR. KNIGHTON: And second, he has none of these things --

MR. MIRAGLIA: They did via tapes and all that, but in order to provide instructors, it stretched the available resources of the organization to provide that kind of training.

MR. MURPHY: That doesn't surprise me. That's another management-type concern that I have, and it's not just for training; it's the total.

One of the things we have never discussed in any of our reviews or even looked at is the depth that is required

in an organization, in a radiation protection organization.

We have set qualifications for the radiation protection manager under the assumption that if you had somebody in that job that was a competent professional who knew what he was supposed to do and could communicate that to management and get management support of that, that that would solve 90 percent of our problems.

And then on the other end of it, we have an ANSI standard that talks about the qualifications of the technicians and what they should have.

But we don't have anything in the middle that says the radiation protection program ought to have some degree of depth to it that provides professionalism in terms of numbers of people or in terms of specific functional area. Should we have professionals that are in charge of specific functional areas of the radiation protection program?

MR. MIRAGLIA: Do we specify even the areas in which training should be conducted?

MR. MURPHY: Yes. Well, in the reg guide --

MR. NEHEMIAS: It spells out the curriculum.

MR. MIRAGLIA: It does spell out the curriculum as far as number of hours, et cetera?

MR. NEHEMIAS: Yes.

MR. MIRAGLIA: That's in the draft.

MR. MURPHY: No, it's out for comment.

MR. MIRAGLIA: What are the requirements that the existing facilities have to meet with respect to training?

MR. NEHEMIAS: This will be the first formal guidance they have.

MR. KREGER: Except what it says in 8.8, and that's on guidance also.

But I think in further comment on what Tom has been saying, we have examined that from time to time since I have been here -- five or six years -- in primarily radiation protection. We have said: Should we say numbers of people? Should we say numbers of instruments? Should we say details about qualifications all the way down the line?

It hasn't been that we haven't examined those kinds of things.

One of the things that has come up time and again when we have said, "Should we go this much farther?" and weighed that against the admonition we have always had, "Don't design the program for them," was that it is so much people-dependent and so much situation-dependent that one plant running such and such a way and having such and such an experience could perfectly well get along with only three of these and five of that people or equipment, whereas another plant might very well take 20 of those and 13 of that, you know.

It hasn't been that we haven't examined those kinds of things. Every time we have examined them we have found more

reasons why we shouldn't get to that kind of depth.

Things that we have added in Reg Guide 8.8 -- and generally speaking, we have been adding over the years more detail and more specificity -- have been where we have done that kind of examining and said, "Yes, we do need more details about how the training program ought to go or more details about the numbers of procedures that ought to be written down and available to look at," and things like that.

MR. BLOCK: As far as operating reactors, TVA a couple of years ago sent us for review a copy of their proposal for training, and the training was extended from the top-level management to a visitor. I think I looked at it and sent it over to Tom for your review, too, as I remember, Tom. And it was an excellent program, very details on the subject matter, and the number of hours they'd be spending for each of these people.

So if TVA is an example of what industry should be proposing in the training program, it's a very good example.

MR. MURPHY: But TVA is not a very good example of what necessarily exists as the prime model.

MR. LYNCH: That's true. At TMI they had insufficient personnel with insufficient training.

MR. KNIGHTON: When you say they are insufficient, you must have some basis on which to determine their insufficiency. That is a judgment call. That is all I'm trying to put down.

MR. LYNCH: One would have to be an absolute blind person, among other things, not to see the inadequacies of that program.

MR. KNIGHTON: I was just trying to clarify what your comment was based upon.

MR. KREGER: Can you tell me what I&E was saying about their program? Is that what the I&E guy says, "I saw an insufficient program over and over?" Is that what he says?

MR. MIRAGLIA: I think we are digressing here, the point being that one can take the approach, Bill, as saying as a result of TMI, a hard look was taken at TMI. That's a fair statement. A number of inquiries are ongoing.

I&E published an investigation report with Reg 0.600. And if you will look at the potential numbers of non-compliance in there, many of them deal with health physics and radiation protection aspects. If you read the bulk of the several hundred pages of that report, there are things in there that indicate other deficiencies and weaknesses that the investigating team of I&E felt they could not cite as items of non-compliance because rules and regulations or reg guides were nonspecific.

So it is fair to say, I think, if you look at what happened at TMI in retrospect, that a large number of deficiencies existed with respect to their radiation protection program.

It is also clear that some of these deficiencies were in existence prior to the incident, because there is a copy of an NUS report, an audit of the program, of which I'm sure you are all aware.

So if you take those facts as given, one can ask a number of questions. One question that one could ask was the question you just raised: What did I&E look at and why weren't these deficiencies noted? Why did they go undetected for any period of time?

Another question I think one can ask in fairness and completeness is: What were the requirements in that area? What were they required to do? Did they meet the requirements? If so, one should question the adequacy of those requirements.

And I think we have to look at the entire ball of wax, and that is what these inquiries are about.

With respect to training, it appears that there are little requirements out there.

MR. KREGER: You said noncompliance, and one of the things we come up against over and over again in our review and in what we call audit review where we don't even look at every single line of every single guide and measure them against every single line of every single guide -- not regulation but guide --is that you are making in a sense subjective judgment after subjective judgment after subjective judgment as to whether the program does measure up against some very many

subjective guidelines or whether it doesn't.

I admit -- I am agreeing that you've got to go someplace farther along in getting much more specific, that you can't allow what happened to happen again. That means you've got to get more quantitative probably in some areas. And we face that from time to time, and maybe we faced it wrong. Maybe we should have said, "Yes, there have to be at least eight guys of this kind and seven guys of that kind at a very minimum. Anything over that is compliance, so to speak. Anything over 20 dozen imperfect cutie pies is compliance," and so forth. We are still going to wind up with a program that has some subjective, just some guidance versus regulatory requirements.

MR. LYNCH: Aren't you getting up to the old question that comes up with every health physics organization, "Define good health physics practices." That's all subjective.

MR. KREGER: We thought 8.8 was the best definition we could write of good health physics practices.

MR. LYNCH: And to get to Tom's statement, it all depends on the people.

MR. KNIGHTON: And the situation.

MR. MURPHY: That brings us back to training because that is a people type of question.

MR. MIRAGLIA: There are a number of alternatives or suggestions that have been made with respect to training and

qualifications of individuals, and I will try to give you a range of alternatives, and I'd like to get your reactions to those alternatives with respect to the pros and cons of them, and perhaps you have some thoughts that haven't even been expressed.

In the area of training and qualifications there have been suggestions that perhaps the radiation protection managers should be certified health physicists in the sense of going through the American Health Physics Society's certification. Maybe that should be a minimum requirement.

That there should be perhaps consideration given to licensing health physics personnel from the radiation protection manager down to the technician -- have various degrees of licensing, similar to the 10 CFR 55 requirements for operator licensing.

There have been suggestions that perhaps the training program and minimum acceptable qualifications for various levels of training be so specified as far as in terms of curricula, in that we either approve of that program or a school that can give it. In other words, you certify what would be competent instruction in these areas, and people in order to hold these positions would then have to go through some certified school -- certified by NRC or the utilities or whatever.

And the other alternative is of becoming more and

more specific and getting involved in, quote, "the design of the program."

So there is a range of alternatives out there.

And in view of Three Mile Island and the introspection that all of us have done with respect to these various areas, I'd like to get your reaction to that range of alternatives and what others may exist there.

MR. KREGER: Let me mention quickly two things that came to mind.

One is that in a sense NRC has been working with the American Board on this whole business of having a certification examination that relates to reactors rather than the ones that existed before where you could choose some options but none of them really stressed the things that were strongly related to reactors.

So when we went through this whole process of revising Reg Guide 1.8 on qualifications of radiation protection managers, we finally wound up with a position that said we won't require certification because there isn't the right certification test. And then we started working with the American Board to see if they wouldn't come around with a test that we could say was so appropriate that we should start requiring certification.

So we are already in that path sort of.

MR. MIRAGLIA: Is that for the RPM?

MR. KREGER: Yes, for the RPM only.

The second thing that Jack Nehemias is involved in right now is that we have been interacting with a group in Texas that has been developing training curricula for technicians, among other things, in reactors. And they have been developing under a grant from the U. S. Office of Education some very specific curricula, some very specific training plans, manuals, and so forth, including the health physics technician area.

One of the reasons for working with that kind of people and helping them get a curriculum and training manual developed that would strengthen the radiation protection technician included the possibility that eventually when such things were on the books and were readily available -- and in this case the government supported the development of it -- that maybe we'd want to go to the extent of a formal requirement rather than just the guidance we have now in the various regulatory guides.

So there have been things going on in that regard, and I think they would tend to move us toward that. Again, as I say, we started out with Reg Guide 1.8 years ago, a three-page or five-page document, touching on a bunch of things. And now we have a 402-page document with a lot more detail in a lot of areas. And I think training is one of them. And I think although it is more touched upon in some of these other

guidelines, it will go farther and farther in that regard.

And I would think those moves are logical as the material is developed. I don't know whether we have staff and manpower -- we, NRC, NRR, I&E, and so forth -- to write the training manuals that would result in stronger programs.

MR. MIRAGLIA: The training programs that have been specified, Jack, are they directed more towards the normal operational kinds of things, or do they consider the maintenance and refueling and accident situation?

MR. NEHEMIAS: No.

(Inaudible.)

MR. NEHEMIAS: It includes whatever the individual is going to get into in principle.

MR. MIRAGLIA: But do you have or are there any plans under way right now in view of Three Mile as a result of any of the Lessons Learned that have been conducted to change requirements of the area with respect to qualifications and training that you are aware of?

MR. KREGER: I am not --

MR. MURPHY: No.

MR. KNIGHTON: I don't believe in Lessons Learned.

MR. MURPHY: As you indicate, there are five or six different ways to skin that cat, and they all might be acceptable.

I personally feel that it goes back to management

acceptance of the need for a health physics program, number one. And number two, it also revolves around a need for balancing of the overall perspective of how much resources do you put into a radiation protection program.

Obviously, we could design a radiation protection program that would cover all of these areas, but we might also make it so expensive that you wouldn't be able to operate the plant.

MR. MIRAGLIA: What level would you consider necessary? You have to make the determination during the licensing process that the radiation protection program is acceptable to protect the health and safety of the worker and also off-site populations. What criteria are used to make the judgment now?

MR. MURPHY: Right now the criteria that have been used are that the radiation protection manager meet the qualification requirements of Reg Guide 1.8. And, secondly, that the radiation protection technicians meet the requirements of ANSI in 3.1. That's as far as we've gone with that subject.

MR. BLOCK: You might be interested to know, Frank, that the people out in the utilities are demanding -- well, not demanding, but at the present time have their high-level certified health physics people in the upper-level management quarters. They don't want them at the sites because they don't feel that there's enough challenge to have a certified health physicist at an operating reactor.

As an example, Oconee or Duke have all their certified health physicists at their headquarters. They have seven certified health physicists at headquarters and none at any operating plant. And they were fighting us tooth and nail about having a certified health physicist on site.

This is actually the problem that we are having trying to get an equivalent to a certified health physicist on site with the health physics staff.

MR. KREGER: It is the same problem you were having when Earl was talking to industry about having this very high level, very competent engineer sitting in the control room at all times to be able to answer questions, so to speak, and the argument came back, "Well, what would keep the guy stimulated and intellectually challenged?" and so forth and so on. That is a lot of subjective stuff.

I would like to say, retrospective to Three Mile Island and having seen a lot of things I didn't like and a lot of things that I was just astounded at right from the beginning, the radiation protection experience there in terms of both violation of our exposure limits and in terms of ALARA I think have been amazingly good. I can say, "Boy, that program stinks," and I could say a lot of things just sort of subjectively, but they haven't had what I really think is a terribly bad experience considering that what happened up there was something that none of us thought would ever happen.

MR. MIRAGLIA: What do you think accounts for that?

MR. MURPHY: I don't agree with that.

MR. KREGER: Well, he doesn't have to agree with me. You could have said there should have been nobody overexposed and half as much collective man rems and so forth. All I'm saying is I am surprised it wasn't a lot worse when I think about what I think I saw in efficiency, that's all.

MR. MURPHY: I want to continue on and answer your question. I told you what criteria we use now, and where do we need to go from there, I think, is the next part of that question.

My answer to that is, we have an idea of what the qualifications of these people should be. I think the next thing we need to address is the depth of those organizations.

Can we really survive in a radiation protection environment if we are going to make the determination of that group that that group needs to be able to respond to the type of accident that we had at Three Mile Island? Can we allow those organizations that existed at Three Mile Island before the accident with basically one professional in the organization, and he was, in my view, marginally qualified as a radiation protection manager. He just met the Reg Guide 1.8 qualifications, had five years' experience. All of it was at Three Mile Island. And that's about it.

He did have a professional education in health

physics at Georgia Tech.

But, you know, what bothers me about Three Mile Island and what bothers me a little bit about the whole industry is that there is a lacking of professionalism in the health physics organizations generally speaking -- no, I don't want to say generally speaking. There is a lacking of professionalism in a good number of organizations.

I have been, in the last six months, meeting with, for example, the Edison Electric Institute Task Force on Health Physics. That is an organization of radiation protection managers for all the utility industry radiation professional people. They meet twice a year and discuss radiation protection matters -- reactor radiation matters.

This past September they invited me to that meeting, and prior to this time we have been specifically excluded from those meetings.

MR. KREGER: Not entirely.

MR. MURPHY: We have been specifically excluded from attending those meetings unless invited and unless invited to specific sessions of the meeting.

MR. KREGER: We have gone to other meetings.

MR. MURPHY: This time I was invited to the full meeting, to participate in the full meeting, and after I got out there they decided to exclude me from part of the technical sessions that they were having.

That, to my way of thinking, is a manifestation of the lack of overall professionalism that exists in that group from an industrywide viewpoint.

There are maybe 30 to 40 percent of the people in that group that have control of that organization and have a lot of influence in that organization, and a lot of influence with the people in that organization. And I want to reiterate to you that the people in that organization are the radiation protection managers at these plants.

But there is a conservative element in that group, maybe 30 to 40 percent of the people, who have not grown professional with the industry. They have tried to keep their problems to themselves in a relationship that doesn't allow outside influence to come in and help them solve some of their problems in a professional way, such as perhaps the Health Physics Society might do or the American Nuclear Society might do -- that kind of thing.

MR. KREGER: But, remember, here it is a paranoia against the regulator. Our problem with them is a paranoia on their part.

MR. MURPHY: No, it's not a paranoia against the regulator. It's a paranoia against any outside influence. They will not allow people to attend those meetings who are not radiation protection managers at nuclear power plants unless specifically invited to specific sessions, and you come

in and participate in what they want you to talk about, and that's it. It's that kind of thing. They won't allow outside consultants in; they won't allow instrument manufacturers in except for those kinds of things.

I take exception to that and I took exception to that at their last meeting, and I told them so, and I probably won't be invited again because of that.

(Laughter.)

But my problem with it and what I am passing on to you, which I think is important, is that there is a lack of professional development and professionalism that exists in that whole health physics community that we have not been able to crack.

MR. MIRAGLIA: You know that is the point that we are trying to deal with, I think, Tom, and what one says is if one looks at how do we foster appreciation for the role of radiation protection with the utility management --

MR. MURPHY: I gave you an idea of how I think it ought to be done. I think it ought to be a one-on-one session with utility management, that they ought to be in here, they ought to come in to the NRC, and they ought to be exposed to not just the Harold Dentons but they ought to be exposed to the people at the technical level who have the technical concerns, and they ought to be told what types of things they ought to be expecting from their radiation protection programs, what

kind of radiation protection programs they ought to have, what kind of professionalism they should expect from their people, and they ought to have it put in perspective.

MR. MIRAGLIA: If one did that, Tom, the attitude at the next level of the RPMs is that closed-mindedness, would that be effective.

MR. MURPHY: I think so because I think the closed-mindedness is a manifestation of the overall utility posture.

MR. MIRAGLIA: So you think they are reflecting management's attitude?

MR. MURPHY: I do.

MR. LYNCH: What you are saying sounds very familiar. It sounds like Naval Reactors.

MR. MURPHY: That is similar.

MR. LYNCH: They bring the shipyard managers or RADCOM managers.

MR. MURPHY: I am not talking about bringing RADCOM managers in now. They not only bring their RADCOM managers in but, more important, they bring every CO and PCO into Naval Reactors for four months of charm school prior to assuming command.

MR. LYNCH: And health physics in that program is part of it.

MR. MURPHY: It is one aspect of that whole program. The spend two, three, four weeks of their tour in Naval

Reactors with the Radiological Control Organization at headquarters. And believe it, it's the kind of thing that leaves lasting impressions on them in terms of their overall management of the program. And I think it's something that we ought to consider personally.

MR. LYNCH: They also have a procedures manual for all shipyards, don't they?

MR. MURPHY: Yes, they do.

MR. LYNCH: And each shipyard in its turn has its own implementation of that manual, but they have --

MR. MURPHY: That procedures manual is a combination of our Reg Guide 8.8 and our 10 CFR Part 20, and some good health physics program and health physics practices built into the manual.

MR. LYNCH: Would something like that work for the nuclear industry?

MR. MURPHY: I have looked at that and searched my soul on that one for years. I have never been able to convince myself that it would necessarily be the cure to the problem. I think that the cure to the problem is more in the people than it is in the procedures.

MR. KREGER: While we were developing 8.8, we were using things like that and some of the better programs as guidelines for saying, "Hey, how far do we want to go with 8.8?" Each time we'd say, "This is how far we want to go.

We don't necessarily want to incorporate all of it."

MR. MIRAGLIA: Let me say this. We keep getting to the point that it depends upon the people. It is my perception that our regulatory process is based on an implicit assumption that the people out there are going to do what is expected to be done by them.

This fact that we keep coming back to is that it depends on the people. Is that a fatal flaw in our regulatory approach? If we can't convince the people as to the reasons for the requirements and the role that radiation protection should play -- if you can't get that element nailed down, then should we change the regulatory approach to being more dictatorial, as saying, "This is what is required," and be more specific?

These are both ends of a spectrum, and I'm saying --

MR. KREGER: We see both ends of the spectrum out there. We know there are some good health physicists in some of the places, even though they maybe can't control the Edison Electric group of radiation protection managers.

MR. MIRAGLIA: But what should the goal of the regulatory program be? Should it be one where we want to maintain everybody at an acceptable level, perhaps subjectively defined?

MR. KREGER: The very worst end of the spectrum is at an acceptable level. Is that what you want?

MR. MIRAGLIA: That's what I'm saying. Do we have that? And if we don't have that, what has to be done to attain at least that minimum?

I think ideally what we'd like to see them do is exceed the acceptable level because that is what the whole regulatory process has been about, the lowest reasonably achievable with respect to effluent releases, and so on. I think there is a demand for doing better than the acceptable.

MR. MURPHY: I don't think we know what is acceptable. I think that has been our problem.

MR. MIRAGLIA: Yes, I say it's subjective.

MR. MURPHY: We thought we knew before the accident what was acceptable, and now we have confounded that with the accident, and with the knowledge that at least at Three Mile the program that existed up there, to my way of thinking at least, was not acceptable in responding to the accident.

But it is not clear to me that collectively we know right now what would be acceptable or what would be a minimum acceptable program.

MR. MIRAGLIA: I will grant you that, but my question is, Tom, the whole basis of the regulatory process, the premise of the regulatory process, is that if we did define that well enough, there's a group of people out there that would do that as a minimum.

And we keep coming back to that, that it's so

people-oriented.

Is there any hope of even achieving that? That's my question. Or do we have to abandon that approach and say --

MR. KREGER: What is your alternative?

MR. MIRAGLIA: I don't know. Where are you guys coming out with respect to that? What are your views? Do you have a view on it?

MR. MURPHY: I told you what mine is. If it's not clear to you --

MR. MIRAGLIA: I understand your view because your view is saying that you maintain that approach but you are going to make sure that the people are the people you want out there by giving them this education. And I'm saying that will work if indeed that thing is effective.

And I'm saying if it's so people-oriented, is that a fatal flaw in that kind of approach?

MR. KNIGHTON: Let me interrupt a second. I heard Bill talk about his time up there to really meet the people.

I think from a regulatory point of view we have to set the criteria which are acceptable -- not on the basis of an individual. We have to say, "Here's what you have to have to run a safe shop."

Now, after he gets his license and he meets these criteria, he, one would assume, has competent people as we have defined it to run the job.

Now, when you go and you talk to those people and watch them work, now you are getting down to individualized things, and that is the quality of the individual against our regulations.

Now, that, as far as I'm concerned, is kind of I&E's real bag. I don't see that that should affect us in the, quote, "establishing requirements" point of view unless we find we keep getting incompetent people meeting our requirements. And the feedback is we have to go back and relook at our requirements.

As far as I can see now you have regulations here, you have reg guides -- maybe we can in some areas that we are learning, but you do have them. You have programs that are submitted and reviewed as far as the FSAR.

We have had over the years reasonably good response to our requirements, and where we have seen failures I believe we have upgraded our reg guides, and we are trying to keep up with this learning experience.

But it seems to me my answer to you would be, generally speaking, we have had a good program going. We obviously have found problems as we went along, and we are trying to take care of them.

Now, with TMI it's opened our eyes to some other problems which we are now addressing, and that is what I see us doing right now.

With respect to training of the individual, this is probably one of the areas you are pointing to, that we don't have well-defined training programs which at various levels they must have experienced. The problem now, Bill, I guess, is do we really want to have one?

MR. KREGER: You know, one of the things we have hassled about over the last couple of years, again, is scoring, ranking. We have had a lot of conversations back and forth between RAB and I&E about scoring and ranking.

And we say, yes, we could probably subjectively, against our big measuring stick, which is all these documents and the papers they write -- we could objectively score an applicant.

MR. MURPHY: "We" NRR or "we" I&E?

MR. KREGER: We, RAB, could score, in a sense, against the criteria and the words that we see and going out and intereacting with the applicant as he is developing and finalizing his program. We could probably score them. I am not saying it would be a very good score.

We have talked with I&E about, "Hey, can you score a licensee? Can you rank them?"

For example, this number for man rem, on which Sydney Wolfe wrote his paper saying the plants went from this number to this number, all the way from several thousand man rem down topractically very few man rem, and therefore this plant up

here at the top is a terribly bad plant radiation-protectionwise and this guy down at the bottom must be terribly good radiation-protectionwise.

He didn't say those words -- I am paraphrasing -- and this is what he said, "You ought to be sitting on those guys at the top because they are bad programs."

We talked to I&E about it and asked, "Are they really bad programs? Can you guys at I&E go out and score those, and would that score against our measuring sticks?" Because that's all we've got. We've got either subjective judgments that that is a good program and that is a bad program, or we have judgments which are based against this measuring stick we use which is th[illegible] kinds of documents (indicating).

"Can you score those guys, and would that score in any way relate" -- let me go further. "Can you take that score and then can you adjust the man rems for what he had to do during the year?" Because the man rems has related fairly significantly to whether it's just operation or its special maintenance or it's a year of refueling or whatever, or it's an accident.

"Can you adjust somehow that man rem number against what he's had to do in operation, which means you weight it or you unweight it, really. And then would that number correlate reasonably with the kind of scoring you might do against a yardstick, however objective or subjective that yardstick would be?"

We have gone back and forth on this.

And finally, this year my understanding is that I&E has put together a kind of a ranking program of some sort -- at least I've gotten that kind of feedback, that, yes, they are going to kind of go out and say, "Can I score?" And we have said, "Boy, we'd sure love to have that information because we'd like to compare that with what we might have subjectively thought about that plant when we licensed them."

And admittedly, our licensing in the past has not been very people-oriented. When we finally write the SER at the OL stage, most of the time I'd have to say to my knowledge we really don't know much about the radiation protection manager. Do we really know that one is a good one and that one is a bad one at that point?

MR. MURPHY: What we know about him is his qualifications on paper in his resume, and if those qualifications meet the criteria --

MR. KREGER: If they meet the criteria --

MR. MURPHY: We have never interviewed the person, gone out and formally interviewed him. Frequently we have met them and we have had dealings with them on various occasions during the review process. They are generally some of the people who come in and answer some of the questions.

MR. KREGER: But we have been trying to get closer to some way you can score before you issue, and then compare

the scoring, get feedback, from Inspection & Enforcement, and they start making that program work.

MR. BLOCK: Well, I am not sure that would work. That is also subjective because each individual has his own way of scoring, and I'm not sure they'd be related.

MR. KREGER: Yes, it is like each individual has his own way of applying Regulatory Guide 8.8, but we have 8.8 and we have written it in more and more detail so there is less and less subjectivity and presumably more and more objectivity.

And the more details you get in writing down the so-called minimum criteria, because I don't think what we have done is anything more than try to lay out what is a minimum set of criteria to be applied hopefully by intelligent, competent people, and they will carry it up to whatever level they feel they need to do the job the way they want to do it.

MR. MIRAGLIA: Would you care to give us your opinions or views on ranking any of the licensee programs?

MR. KREGER: I can't. I personally as a manager have not reviewed a plant.

MR. MIRAGLIA: Based on the ones you are aware of, if we look at a bell-shaped curve, where would you say the bulk of the radiation protection program that you have licensed and approved fit on that bell-shaped curve? Where would you put TMI?

MR. KREGER: Against normal operation or against

accidents?

MR. MIRAGLIA: Let's do it both ways. The program that existed at TMI prior to the accident. Where would you put it?

MR. MURPHY: From what we know about it since the accident or what we knew about it when we licensed it?

MR. MIRAGLIA: Let's talk about when you licensed it.

MR. KREGER: We spent more time at Three Mile Island than at most other plants because we went up there to compare Unit 1 and Unit 2 at one point.

MR. MIRAGLIA: Say before the accident based on what you had available and what you knew about the plant on a ranking of A to B or 1 to 10. You wouldn't care to do it?

MR. MURPHY: I couldn't.

MR. BLOCK: Just to show you how difficult it is to do that based on people, Oconee -- Duke has seven RPMs that are certified health physicists, and their score with respect to a man rem, if that is one criterion for scoring a plant, is not any better than other plants who don't have any certified health physicists.

So, you see, that's why it is so very difficult to score on that kind of basis.

MR. MIRAGLIA: I realize that. I think you have to look at what the plant's operating experience is.

MR. KREGER: Whether you use man rem or whether you

construct yourself a much, much more complicated and elaborate score sheet, I'm not sure you are much better off. I didn't mean to imply you could possibly feel a single number like man rem was in any way, shape, or form a score, although Sid Wolfe wants to make it a score.

Did any of you guys do Three Mile Island?

MR. NEHEMIAS: Yes.

MR. KREGER: OL?

MR. NEHEMIAS: Yes.

MR. KREGER: What would you say about his question?

MR. NEHEMIAS: The same way you folks did. I couldn't say it was significantly better or worse than the others, among the ones I reviewed.

MR. MIRAGLIA: As far as the paper program was concerned?

MR. NEHEMIAS: Yes.

MR. MURPHY: I'd like to expand it and ask the other two if they could do it for any of the plants. Charlie, you have probably had the most experience in the last few years.

MR. KREGER: Could you score the plants?

MR. NEHEMIAS: Could you pick out one that stuck out above the others?

MR. MIRAGLIA: Do they all strive to be acceptable or are some behind, or do some stick out ahead?

MR. NEHEMIAS: I can answer that. One of the plants

I reviewed stood out on the high end.

MR. LYNCH: I think you have a problem with what they show on paper and what they do. You guys essentially review the paper.

MR. KREGER: What I said initially at the beginning of this discussion is I am very much concerned now that that is not enough.

MR. MURPHY: I think that is one of the things we have learned from the whole thing.

MR. LYNCH: I was going to ask you guys what did you learn from your own personal experience at TMI.

MR. KREGER: Maybe you hadn't come in yet, but --

MR. LYNCH: I was probably here.

MR. KREGER: I say my own personal attitude from TMI was that in the future I don't believe it will be adequate to accept just the paper. I think we will have to get more involved with the people at the licensing process than we do.

MR. MURPHY: But we haven't decided how we are going to do it.

MR. KREGER: That's right.

MR. MURPHY: Or how much resources to commit to that.

MR. KREGER: How much we can afford. Do you live with them for the last six months? Do you live with them for two months? Do you bring them in here for discussions?

MR. NEHEMIAS: It seems to me there is an underlying

hole under this that you should be aware of. We can define technical competence in great detail, and we can satisfy ourselves to whatever length of detail we want to go. We can interview and live with them and meet them as persons, but none of that is going to determine or certify that the guy is going to be smart during an accident. There is no way you can close the hole.

MR. KREGER: Do you want to use the word "not"?

MR. NEHEMIAS: I don't believe you can ever guarantee a guy will make the right decision under pressure.

MR. LYNCH: I don't believe we are just talking about their response to an accident. We are talking about the whole health physics program at reactors. It is obvious, I think, from TMI, from their performance, that at the time of the accident they had some definite faults before the accident. And if you look at what they did before the accident, then you can see what the faults were with the program in general.

I don't think we are just homing down on the accident response at all.

MR. NORTH: But, Ollie, I think there is another factor here. If there hadn't been an accident --

MR. LYNCH: Yes.

MR. NORTH: -- they probably would have come back up on the curve and have operated pretty smoothly the way they had before. As it was, they were at a low point because they

were refueling, and they were caught short on instruments; they lost some people, as you know.

MR. KREGER: They may have had a good man rem method.

MR. MURPHY: Yes, they did, because they had good radiation fields at that point.

MR. KREGER: They had a good designer, too.

MR. MURPHY: I want to pursue a little of what Harry talks about, and that is -- I've lost it; sorry.

MR. MIRAGLIA: I wanted to ask you: How do you interact with I&E in the area of radiation?

MR. KREGER: Over the years now we have done a whole bunch of things.

First of all, we instituted a series of training sessions at which we described, at their agreement, to I&E personnel how we go about the licensing process. We described that here in some lectures, and then we went out to each of the five regions and spent I think it was two days or one day --

MR. MURPHY: A day.

MR. KREGER: A day. -- reacting with the radiation or health physics personnel or whatever you want to call them at the regions. And we say, "Here is how we do our business. How do you do yours?"

We asked for an annual counterpart meeting, which has been somewhat spotty -- that was mostly for our benefit -- in which we could hear the I&E inspectors talk about what they were

seeing out at the plant and which of those things they were seeing ought to be fed back into the licensing review process so that we could be looking for weak points, soft points, issues that needed more attention, and so forth.

Those kinds of things we have been trying to keep going. And the third thing -- Babby Falkenberg initiated it so we can have one or more slots in their training program -- we have instituted a thing where now we have quite a fair number of slots in their training program, and our guys sit in on the week-long BWR, health physics, radioactivity, waste management -- courses that they give.

Now, the other thing that I wanted to mention was that we asked that we be on the distribution list for the I&E manual and have all the updatings of the manual so that RAB people could keep abreast of how I&E was changing the review criteria that they have in the inspection manual.

In fact, we asked if they'd do that at a draft stage so we could make some comments about whether the things that were being added to the program were consistent with the things we were doing in the licensing process, or if in fact they weren't and we thought we were the ones that were deficient, we could add the things they were adding as appropriate in the licensing process.

Now, I don't think that I should be characterizing that as a particularly effective thing, because I don't think

it's resulted in many changes either way, one way or the other way, that we have suggested, "Hey, you did that. You should have done that differently," or, "Yes, we will change our thing because of what we saw."

But at least the possibility exists through that mechanism.

MR. MIRAGLIA: In view of Three Mile, would you change it?

MR. MURPHY: I'd like to augment that before you answer. That leaves you with the impression that the only time we talk with I&E is on the special biennial occasions that we might get together with them, and that is really not true. I would say we are in contact with I&E people, our counterparts in Leo Higgenbotham's and Jim Sneesam's organization, if not daily at least on a several-times-a-week basis, in discussing all aspects of the radiation protection program, including doing technical work for them in helping them set up specific criteria for doing inspections and helping them set up criteria for what is acceptable in terms of radiation protection, training programs, qualifications, and that kind of thing.

You know there probably are very few weeks that go by that I haven't been in contact with Jay Cunningham half a dozen times during the week.

And in addition to that, we have communication with branch chiefs in the regions, George Smith and Al Gibson and

Jack Sutherland and Herb Book, and on occasion I talk with Harry North if we have a specific problem in a specific plant kind of thing.

MR. KREGER: We instituted a program whereby each of the review guys was supposed to once a year, at a minimum, go out with an inspector to a reactor. Each one of these guys was to go annually.

MR. MURPHY: In all honestly, we haven't followed up on that for various reasons. All our people have been out in plants with inspectors at various times but not as often as we'd like to see.

MR. KREGER: We were trying to do it annually.

MR. MIRAGLIA: How would you change, as a result of Three Mile Island, your interactions, if any, if at all?

MR. KREGER: Our interaction has increased so significantly that I haven't really thought about how we'd go further.

MR. KNIGHTON: Let me cover what DOR does because they really haven't covered it. We are working with them with respect to operating reactors, and we have a monthly meeting with them, a management meeting with them, for any specific problems that are coming up, covering more than HP -- it covers everything. We review all their inspection reports, that is, we scan them and pick out the ones which are of interest to the branch -- pick them out, and we look at them sufficiently to see

if there is anything that is of interest to us or to DSE.

We look at the LERs which come through which are in our area. We talk to the specific inspectors about spills --

MR. BLOCK: Citations.

MR. KNIGHTON: That type of thing. So we have a one-on-one discussion there.

Many times in their inspections they get to the point they don't have a criterion to inspect against for some aspect. They get in touch with us and we provide them the technical support if they need it to supply that criterion.

And it is a pretty close relationship in terms of what is happening out there and what we at DOR do.

As an example, we also watch various events that go on. If we see significant numbers of them, we may analyze what the situation is, and we get in touch with DSE to point out these ares which may or may not be covered by our regs or reg guides and so forth, and then they take those under consideration.

So it is a process that we were doing before TMI, which is a valid process post-TMI.

MR. BLOCK: In many cases, or at least several cases, we have contacted a region with respect to the contents of an RPM, for example, where they are transferring one person to become an RPM from another part of the facility. And we would normally talk with the inspector and ask him if he feels he meets the qualifications of Reg Guide 1.8 or can do the job.

We have had several occasions where that has occurred, and we have had direct contact with them in that regard.

MR. MIRAGLIA: I think this might be a convenient time to break for lunch and reconvene at 1:00.

(Whereupon, a luncheon recess was taken at 12:15 p.m., to reconvene at 1:00 p.m.)

AFTERNOON SESSION

MR. MIRAGLIA: Continuing with the agenda, the next item on the agenda is Personnel Dosimetry.

What we'd like to discuss is: What are the requirements with respect to personnel dosimetry of a licensee as far as the records, the organizational set-up, equipment, things of this nature?

MR. BLOCK: Part 20 is the basic regulation. The only thing that Part 20 doesn't mention, which is specific for all instrumentation in power reactors, is calibrations of these instruments. That is a nonspecific item in the regulations, and I believe it is being clarified with -- is it a Reg Guide, Jack?

MR. NEHEMIAS: The ANSI standard.

MR. MURPHY: It has changed to a regulation.

MR. BLOCK: There will be a regulatory change. But at the present time the operating reactors, at least, submit annual reports on occupational exposures which is reported in a NUREG document, and the manner with which they operate their personnel dosimetry program is as required by Part 20.

MR. KREGER: I think there is a section in the Standard Review Plan that refers to Paragraph 402, 401, 407, on personnel monitoring, bioassays, recordkeeping, and Reg Guides 8.2, 8.3, 8.9, 8.7, 8.13, all on that personnel monitoring,

bioassay, reporting doses.

MR. MIRAGLIA: Are the requirements specific enough, or do they include any requirements for the individuals responsible for reading the dosimetries -- maintenance of the equipment?

MR. BLOCK: I think most of them are done through processors.

MR. KREGER: Film badges.

MR. BLOCK: They are sent to the processors, and they return the doses. Some of the licensees do their own, but I don't think too many do.

MR. MURPHY: I'd like to make a comment on that.

For the last three or four years the Office of Standards Development has had a research contract to conduct a pilot study on the performance criteria of personnel dosimetry functions. The program has been conducted by the University of Michigan, and they have looked at a bunch -- a bunch; almost all -- of the different processors' external personnel dosimetry devices, and with some fairly enlightening results.

Primarily the results have indicated that there is a wide variation in the performance of individual dosimetry processors.

The Office of Standards Development is moving toward developing a regulatory change that would require the implementation of -- and I have forgotten the ANSI standard number.

Maybe, Sholomo, you may remember it; I don't.

MR. YANIV: I don't remember the number.

MR. MURPHY: There is an ANSI standard out that discusses the acceptable criteria for personnel dosimetry programs.

And we have basically accepted the ANSI standard as being acceptable criteria. The problem is that the processors have not been uniformly able to meet those criteria.

MR. YANIV: You are referring to the standard developed by a group of the Health Physics Association?

MR. MURPHY: Right.

So where we are moving in that area is to develop regulatory change, a regulatory change, that would require our processors to submit to a program for monitoring the performance of their process and to meet certain criteria in order to be an approved processor by ANSI.

MR. BLOCK: Tom, I am not contradicting you, but I think the requirement will be that licensees must submit their personnel dosimetries to certified processors, that the licensees have the responsibility, and the inspectors would insure that this requirement is met by finding out who was processing a licensee's dosimetry and checking it against a list of certified processors.

MR. MIRAGLIA: Who certifies the processors?

MR. BLOCK: Whoever gets the contract. That hasn't

been decided yet.

MR. KREGER: They will have to submit -- the certified processors will have to every so often go through a sample-submitting program whereby they submit some dosimeters exposed to -- no, they process dosimeters that have been exposed to a known amount, and then they read out what they read and they submit their number back, and it is checked against what it was known to be exposed to. So they will be served by knowing if they score well on such a process.

MR. MIRAGLIA: Will that be a continuing certification process?

MR. BLOCK: Yes.

MR. MIRAGLIA: Or a one-time only?

MR. BLOCK: No, continuing, I think annually.

MR. MURPHY: Who is going to do the certification?

MR. BLOCK: It hasn't been established yet.

MR. NEHEMIAS: No, the choice is open.

MR. MURPHY: The University of Michigan, however, is the one that was doing the pilot study.

MR. BLOCK: I don't think the Bureau of Standards wants that, from what I understand.

(Simultaneous discussion.)

MR. NEHEMIAS: The University of Michigan has an ongoing certification lab.

MR. MURPHY: What is the most probable?

MR. HINSON: Well, they were talking about a facility that wasn't supported by the government, that was self-supporting by the funds of the processors that submitted the badges, the film. That is what they were striving toward. But one of the alternatives was a government-run one. I think there are two different types of government-run facilities, and then a self-supporting one. And then they were talking about having several different certifying facilities instead of one. But then they'd have trouble comparing the different facilities to each other qualitywise.

MR. MIRAGLIA: With respect to personnel dosimetry, at TMI they did their own, and this function was again the responsibility of the radiation protection program. And one of the problems that was noted there was that because of the rotating nature with respect to the technicians, there was no one that was trained particularly on that equipment. They had initial training, but it might be as much as a year or more before they fell into the particular function of reading TLDs. Do you have any regulations as to how personnel dosimetry should be conducted?

MR. BLOCK: They would have to be certified, also. Licensees would also have to be certified if they did their own.

MR. MIRAGLIA: Yes.

MR. KREGER: There are regs on this but I don't think

there is anyone that says, "Here is how you, Licensee, actually have to do yours."

MR. NEHEMIAS: This has not been regulated before.

MR. YANIV: Wouldn't this be part of some kind of licensing condition?

MR. MURPHY: It hasn't been.

MR. MIRAGLIA: The only requirement is that they have personnel dosimetry.

MR. BLOCK: Yes.

MR. MURPHY: And it be conducted in accordance with one of the guides or the ANSI standards implementing that guide.

There is one ANSI standard, not the one Sholomo and I were talking about, but another one.

MR. KREGER: The thing they don't go into is who has to collect the dosimeter, where he takes it to read it, how he reads it.

MR. MIRAGLIA: Does it address the control of the dosimetries at all?

MR. KREGER: I don't remember.

MR. BLOCK: I don't think they do. Just to tell you how bad the program is, the University of Michigan results showed that they allow processors a plus or minus 50 percent error on Cobalt 60 exposure, and only 26 percent of the processors were able to get within 50 percent of a Cobalt 60 irradiation.

MR. LYNCH: Using what?

MR. BLOCK: Whatever the dosimeter --

MR. LYNCH: TLD?

MR. BLOCK: TLD, whatever they were using. Which shows there is a little bit to say about how they are conducting this business.

I might add as far as personnel monitoring for neutrons is concerned, there is another research program going on with respect to Reg Guide 8.14 on personnel dosimetry for neutrons, and this research is being conducted by Battelle Northwest and Rensselaer Polytechnic Institute looking at maybe a dozen reactor containments where the neutron problems exist, to study the spectral distribution of the neutron fields and to look at the personnel monitoring techniques that are being used as a measurement criterion for those spectra. And we hope by the end of next year to come out with regulations on which of the recommended methods that NRC spells out in 8.14 should or should not be used.

MR. MIRAGLIA: Is there a similar type of requirement with respect to personnel like TLDs? What constitutes the primary agency's performance as to Part 20? What dosimeters they use?

MR. BLOCK: No, Part 20 doesn't specify.

MR. MIRAGLIA: There is no regulation guide?

MR. BLOCK: The Reg Guide for neutrons is 8.14, and

Bill mentioned the others.

MR. NEHEMIAS: And it has to be a (inaudible).

MR. MIRAGLIA: But what constitutes the criterion for appropriateness is the subjective judgment of the I&E inspector?

MR. NEHEMIAS: His knowledge of the instrument. If it won't measure what they claim it will measure, he cites it.

MR. KNIGHTON: Does I&E have some calibration capability now? I'm just asking.

MR. MURPHY: Not for film.

MR. KREGER: One of the things we try to do is keep the people in the staff up to date on state ER in each of the areas that we require them to perform. And one of the ways we do that is to both collect material from suppliers on performance specs and capabilities of equipment, plus keep abreast of the literature in the field. So that presumably -- as I believe does I&E -- each of our review people is to some extent an expert in these regions that he is reviewing.

What we have done in RAB, for example, is made each of the individuals responsible for a certain subset of these areas of knowledge like solid waste treatment or film badges or -- oh, you could go down the list here -- bioassay and things like that. So if a question comes up someone can be identified or has been identified in the past, at least, as the resident purveyor of additional knowledge in that area.

MR. MINNS: Frank, I think you made a mistake. I

think the film badges at TMI are being processed by Ford and Ferguson.

MR. LYNCH: No, in the first place they don't use film badges. They are using TLD. And they are processed on site.

MR. MINNS: I was down there recently and I notice they have taken the data --

MR. MURPHY: No, they are just doing the analysis, John, not the work. The licensee is doing the work. The licensee -- Ira Siebold is the person who is in charge of that operation now.

MR. NORTH: That is post-accident.

MR. MURPHY: But I am not sure that is really quite what we are talking about in this case. They've got a little bit different situation there now.

MR. MURPHY: Part of the problem was they weren't even following their own procedures at Three Mile. They had reasonably adequate procedures for running a personnel dosimetry program, and they weren't really following them, from what I could tell. And it took them a while even post-accident to get up to speed to be following it.

MR. KREGER: That is what we noticed for a bunch of things post-accident. They weren't doing things that they had been doing, even, and had been doing reasonably adequately. They dropped them for a while, and then they went back to them

as they got more manpower and got their thoughts collected or whatever you want to call it.

MR. MIRAGLIA: What about the bioassay requirements? You say they are also included in these reg guides?

MR. KREGER: Right. Actually, there is a revision, isn't there, that is a special bioassay?

MR. MIRAGLIA: These requirements are regulatory guides, and the applicant describes his program, and by some manner these things are reflected in the technical specifications at the facility.

MR. MURPHY: The bioassay is a little bit different in that it is pretty clear in the regulations what the requirements are. In 20.103, in order for the licensee to demonstrate compliance with that paragraph, it filters down through the bioassay program and the respiratory protection program.

MR. KREGER: 8.92 bioassay as well.

MR. MURPHY: Our requirements for bioassay are, shall I say, vague in the sense that the bioassay is used as a confirmatory measure for determining compliance with our regulation, determining compliance with meeting 20.103. And 20.103 is a fairly detailed accounting of how you are supposed to control intake of radioactive material.

MR. NEHEMIAS: The requirement for bioassay is in 20.108, and that only says we may require a new bioassay.

MR. BLOCK: But there are two reg guides.

MR. MURPHY: There is also a confirmatory requirement in 20.103 that says if you have exceeded or something -- I've forgotten the exact words.

But the control -- let's go back. You are saying, "What about bioassay?" and really what we are talking about is the control of the intake of radioactive material. And that is really not controlled by bioassays; it is controlled by a program of airborne radioactivity monitoring and engineering controls and respiratory protection when required, and that kind of thing.

And we assign in our present regulatory posture doses from internal uptake of radioactivity based on MPC hours, not necessarily based on the results of a bioassay program.

So it is not a straightforward requirement of our regulations that a bioassay program has to be conducted once a week, and these are the people that you've got to conduct it with, and that kind of thing.

I will just put in a plug. Maybe one of the good reasons for revising our regulations to be a little more consistent with ICRP 26 might help that situation.

MR. BLOCK: There are, however, two reg guides on this. One just came out on bioassay, 131 and 135. It came out a couple of weeks ago.

And then there is one that I know is being developed on internal dosimetry for fission and activation products.

And in that reg guide it specifically states that anyone who enters a radiation area or an area where there is a possibility of getting an internal burden of any quantity would be bio-assayed on the annual program, or whatever the routine they have is. I think it's annual.

So there is a requirement for bioassay.

MR. MIRAGLIA: We have been talking, however, about a lot of reg guides that are in process, in comment. What is the procedure and the practice for backfitting these guides?

MR. KREGER: That is determined on each guide as a part of the issuance process, and in fact that is one of the issues that the RRRC used to address at each regulatory guide review: What shall our requirement be with regard to this guide and its backfitting on existing plants?

And those were pretty much guide-specific. I mean there is no real formal guidance on that that I know of. If it was felt that a given guide was extremely important and critical and a lot of health and safety was involved, so to speak, they might specify backfitting to all plants within six months or something like that. Other ones just said, "This is only going to be applied for those plants that are licensed after such and such a date."

So it is purely a guide-specific item. And in writing the guide Standards usually made some recommendation in that regard, and that was an issue at the RRRC meetings.

MR. NORTH: With respect to the backfit requirement when the RRRC committee made a recommendation, it is my understanding this was not a requirement imposed on the organization that would in effect carry out the backfit. Is this correct?

MR. MURPHY: I don't understand your question.

MR. NORTH: I will give you a for instance. Reg Guide 101 was reviewed by RRRC before issuance and was found to be, I think, a Category 3 backfit. When it went through and it got to the organization that was to implement it, the decision was, "We don't have the manpower to backfit all the existing facilities. Therefore, we will do it only on the basis of when somebody submits a change to their emergency plan." And the RRRC committee had no responsibility for follow-up to ensure there was in fact a backfit accomplished or that there was some response to that recommendation. Is this my understanding?

MR. KNIGHTON: I can respond to that. DOR implements any of the backfits, and when we receive that one as well as others -- we have others in the same category -- somebody has to decide what priority we put on that backfit, and within the manpower and budget constraints that we have.

Generally we look at the problem of the accident or the significance of it, and that one, as an example, was a situation that either you handled in the SEP program, which is what we are doing anyway for 11 plants right now, or because we did not consider it a high priority item -- probability, I

should say, not priority. We looked at what programs they had and we found that the incremental change would not necessarily justify immediate backfitting. So we put it on the basis you just explained.

As they would come in with a fairly significance license change, we would then review them on that particular aspect also.

We have others in house.

MR. KREGER: I would characterize that part of the reg guide as kind of an instruction to the staff by which, as you say, the staff is being instructed to try to implement them on such and such a kind of basis, but then you have leeway to adjust that according to manpower and all that.

MR. NORTH: So the RRRC is essentially an evaluation group that looks at the items that it reviews with respect to their relative importance and says, "Yes, this is a very important one and this is not so important."

But then it is up to the staff to implement this as best they can with the available resources.

MR. KNIGHTON: I can say post-TMI the priority for that particular one has significantly changed.

MR. KREGER: And you stole a whole bunch of people away to do it.

MR. MIRAGLIA: Has it significantly changed?

MR. KNIGHTON: Yes. For example, on the radiation

monitor. Parts of that are being implemented right now.

MR. MIRAGLIA: Has that reconsideration that you have discussed been in terms of the priorities that were assigned to those kinds of things? Has the reexamination gone back where perhaps the RRRC considered whether things should be Category 1, 2, or 3?

MR. KNIGHTON: No.

MR. MIRAGLIA: There hasn't been that kind of retrospection?

MR. KNIGHTON: No.

MR. MIRAGLIA: Are there any requirements as to the type of respiratory protection program they have to have?

MR. KREGER: Reg Guide 8.15 is the acceptable program for respiratory protection, and that is backed up by a NUREG document that is about three-quarters of an inch thick.

MR. MURPHY: It actually comes from the regulations, 20.103. The respiratory protection program is probably one of the most specifically called-out programs that we have in terms of detail, because it flows from the regulation which also references the regulatory guide and requires compliance with the regulatory guide i. certain aspects of compliance with the regulation. And the regulatory guide refers to a NUREG document, NUREG 0041, which also contains additional guidance to the licensee on how to conduct a respiratory protection program.

MR. MIRAGLIA: It doesn't get specific as to telling

them what the minimum acceptable numbers of respirators are?

MR. BLOCK: No.

MR. MURPHY: That is an emergency planning function, I would think, not a respiratory protection function. My reaction is you have to be able to meet --

MR. KREGER: Protect your whole staff if you need to.

MR. MIRAGLIA: The reason I am asking questions is at TMI they had no -- they just had particulate filter respirators. They had no iodine protectors.

MR. MURPHY: I will go one step further. There is no approved --

MR. KREGER: There is no approved iodine respirators. Two years ago we asked the Los Alamos Scientific Laboratory --

MR. LYNCH: For many years.

(Simultaneous discussion.)

MR. MURPHY: We have put in a request to have one approved and Standards and Los Alamos have been working on it, and I understand they are getting closer.

MR. NORTH: My understanding was there was one approved.

MR. MURPHY: That was ad hoc, an ad hoc approval.

MR. KREGER: It says right on the purple canister one.

MR. BLOCK: As a matter of fact, it says the canisters they were doing, the interaction between the iodine and charcoal and whatever it was was providing toxic gases

which you'd be breathing in, so they disapproved the canister, according to what I heard.

MR. MURPHY: Is that recently?

MR. BLOCK: Three months to six months ago.

MR. MURPHY: I knew they were doing the study. I didn't know they had reached that conclusion. As far as I know, up to now there is no approved iodine absorbing or adsorbing respiratory device.

That is not to say that there weren't some devices that had activated charcoal filters that were providing some effective protection from iodine. And with respect to the fact that we have never approved one or NIOSH hasn't approved one, we were using them at Three Mile post-accident and we approved their use based on knowledge we had from data from Los Alamos on their ability to absorb iodine. But they were only used for that short period of time when it was necessary to put people into areas with high iodine concentrations, number one; and number two, we were still applying -- I take that back. I can't remember. I think we were still applying the MPC hour criterion on it, too.

MR. KREGER: It means if you put people into areas where there is higher MPCs than those of concern -- we have this table that says you can take credit for the fact of 10 for this and 50 for that, and so forth, but it means you can't take credit, even though there may be some, for reduction in

concentration.

MR. BLOCK: They call them precautionary devices. Isn't that the word?

MR. MURPHY: I think there was a period of time when we were trying to take credit for it, though, post-accident, for some period of time I don't remember -- several weeks.

MR. MIRAGLIA: The next area we want to talk about is -- this agenda basically reflects the agenda we discussed with the I&E people so it's with respect to personnel exposure to contamination. For our purposes we were interested -- with respect to personnel overexposures it is probably clear enough -- with respect to personnel contamination. There were a number of instances of contamination of individuals at Three Mile Island, and for various and sundry reasons, one being no facilities available, some of these people were contaminated for long periods of time.

What guidance requirements are there in the area of personnel contamination and decontamination? Do we have any specific guidance in regulations or requirements?

MR. MURPHY: I don't think so. Jack, will you take that one on?

MR. NEHEMIAS: No.

MR. BLOCK: Normally when you dress out or dress down or check out, you are supposed to check yourself before you leave the area.

MR. NEMEMIAS: The only way we address it is indirectly through I&E looking at the procedures. There has to be a procedure.

MR. MURPHY: But we don't have, for example, a criterion that says in Part 20, "You will not exceed so many microcuries per square inch of surface contamination before you leave," or exposure criteria.

We don't even have a criterion in Part 20 that would relate back to exposure -- let me put it this way. You could probably infer a criterion based on either external exposure or infer a criterion based on uptake from internal exposure from our regulations, but not in terms of skin contamination of an individual.

For example, you could assume or you could calculate skin dose based on a contamination incident that could be related back to our criterion in Part 20 for exposure of the skin. But we don't have it called out in terms of microcuries per square centimeter of a specific isotope. You'd have to do the calculation each time.

MR. MIRAGLIA: We are saying what is acceptable or not acceptable or an action level.

MR. KREGER: We have a skin dose limit.

MR. MIRAGLIA: Do we have requirements or guidance in the area of what decontamination techniques should be used? Are there requirements that indeed the staff be trained in

personnel decontamination procedures?

MR. MURPHY: John.

MR. MINNS: 8.21 -- I showed you, Jack, 8.21.

MR. NEHEMIAS: It is a real oldtimer which would put limits on surface contamination in the shop. But it has been in the works for 15 years --

MR. KNIGHTON: And never went out.

MR. NEHEMIAS: It is very difficult to get a consensus on numbers.

MR. MURPHY: Is that on skin contamination or surface contamination?

MR. NEHEMIAS: Surface contamination.

MR. KREGER: You would expect normally that a training program had in it how to dress out, how to undress, how to get rid of your dress-out stuff in a way that wasn't recontaminating both you and the whole area that you were in.

We would assume that it had things in it about how to wash off contamination.

But we don't have that specified. That is a normal health physics kind of training.

MR. MIRAGLIA: What I am saying is: Do the requirements on training, whatever they are, specify even to the extent that there should be a procedure for personnel decontamination?

MR. KREGER: In the training program?

MR. MIRAGLIA: In the training program -- or wherever.

MR. MURPHY: I believe we have in our Standard Review Plan a requirement that there be a procedure for personnel decontamination. That is as far as we go.

MR. MIRAGLIA: How about facilities?

MR. MURPHY: Facilities for personnel decontamination?

MR. KREGER: It says (inaudible). That is one statement. That is regarding procedures, "Procedures to control movement of radioactivity; procedures to control contamination." That is in here, too.

MR. YANIV: Regarding calculation of skin dose from skin contamination, the calculation of the dose, particularly in the case of partial skin contamination, is not exactly a straightforward procedure, and there are several ways to do it.

(Discussion off the record.)

MR. MIRAGLIA: Why don't we just take a break.

(Whereupon, a short recess was taken.)

MR. MIRAGLIA: Let's get started.

MR. YANIV: Will you just read what I was asking.

(The reporter read the record as requested.)

MR. YANIV: There are several ways to calculate the dose using the ICMP, et cetera. And we do have now in existence a certain controversy regarding some potential overexposure at TMI, where different calculations show different results.

Now, my question is: Is there any guidance on how to assess this dose in order to determine whether it meets the

regulatory requirements or regulatory limits?

MR. BLOCK: I don't think there are any limits for skin contamination.

MR. YANIV: There are limits for skin exposure.

MR. MURPHY: There are limits for skin exposure. It doesn't make any difference whether it's on the skin or off the skin. The criterion still exists.

And Sholomo's question is, "Hey, have we agreed on what model we ought to be using?" That is the old controversy we have had all along, not just for calculating skin contamination, but I am not sure we have all come to an agreement as to what models we should be using for calculating internal dose from uptake.

MR. YANIV: But here we have even more complications than internal contamination. You have a partial skin exposure, and are you averaging whatever the dose comes out to over the whole skin or over part of the skin? Under what conditions do you exceed the regulatory limits?

MR. BLOCK: I think ICRP -- one of the ICRPs specifies that skin dose is considered a skin dose with respect to the limits if 1 square centimeter of exposure is received with that dose.

That is skin dose.

MR. YANIV: That is ICRP?

MR. BLOCK: Yes.

MR. YANIV: What about NRC?

MR. BLOCK: We don't have any specification from NRC.

MR. MURPHY: I am not aware of any. Are you?

MR. YANIV: No.

MR. MIRAGLIA: Do you have anything else in this area?

MR. YANIV: No.

MR. MIRAGLIA: The next is Instrumentation, Portable and Fixed, and we sort of discussed some of it in our discussions earlier in the day.

With respect to the process of instrumentation being pegged, I guess certain of that instrumentation isn't even looked at by your group. But with respect to area monitors, implant radiation monitors, is there guidance as to type, numbers, range of those things available?

MR. KREGER: There is guidance. We have a section in Chapter 12 that is called "Area and Airborne Radiation Monitoring." That is part of both the Standard Review Plan and Reg Guide 8.8. We have in the health physics section instrumentation of facilities, where we state what the radiochem lab should be trained to do, the portable counting room, personnel monitoring instruments, security-issued personnel protective equipment, personnel protective clothing and equipment, and health support facilities.

It is a listing of about two pages long that is in both the Standard Review Plan and 8.8.

Generally speaking, it does not get into the range of those equipments or the rates. It doesn't get into manufacture or equipment type.

MR. MIRAGLIA: How about numbers or placement?

MR. KREGER: I have said earlier this morning that we have debated whether you should have as a minimum eight cutie pies, and we have decided that in the past it was not a regulatory position that we needed to take.

MR. MIRAGLIA: How about calibration?

MR. MURPHY: I don't want to leave that there, being perhaps a misconception.

In terms of fixed area monitors, we have had a lot of internal interaction on the subject and a lot of internal agreement on what ought to be required.

Sy, when he was in our branch, was a member of an ANSI standard working group that was put together to come up specifically with ranges and numbers -- numbers, locations, and ranges of area, fixed area, installed area.

MR. KREGER: You said numbers and locations? I thought all we really specified was locations, "These areas have to be covered by fixed instrumentation." Was it numbers, too?

MR. BLOCK: No, he is talking about the locations.

MR. KREGER: But the real decision was locations that need to be equipped with particular kinds of monitors.

MR. MURPHY; And there's been a fairly straightforward approach to that, and at least in the plants that have been reviewed in the last four or five years, that's been reasonably consistently reviewed.

Now, one of the things that hasn't happened is that instrumentation was not reviewed for accident conditions, number one.

Number two, specifically the location of the airborne radioactivity and process monitors that were monitoring gas or airborne radioactivity -- the location of those I don't think was specified properly. And obviously we learned that from Three Mile Island, that the location of those process monitors left a lot to be desired, and as a matter of fact contributed significantly to our inability to use those as effluent monitors.

MR. KREGER: Let me say what the criterion was that started all this out. It was that there be area and airborne radiation activity monitors in all areas where an individual is likely to be and where the radiation level is likely to change without his knowledge, without his predetermined knowledge.

And that was supposed to mean that in looking at an area to decide whether we would require a fixed area or airborne radioactivity monitor, we would say, "What's going on?" Are people likely to be travelling either through or in the area? And is there a source near by, a thing, a piece of equipment,

that could fill up with radioactivity or leak radioactivity or disperse radioactivity in such a way that he wouldn't be forewarned of, so that an alarming radiation monitor was the thing that had to be there to tell him, "Hey, something happened behind that wall" or "behind that door" or "in the room I'm in."

That was our criterion. Well, at least it ought to be this location and this location and this location and this location.

MR. MIRAGLIA: As a result of any Lessons Learned, are you looking at that aspect of in-plant monitoring?

MR. BLOCK: Just high-range monitors as far as I know.

MR. MURPHY: Well, it is my intention to make sure we look at it in terms of airborne radioactivity monitors -- the location of those and their ability to survive the type of environment that existed at Three Mile and still be able to work.

MR. MIRAGLIA: High backgrounds?

MR. MURPHY: Yes, both high backgrounds for direct radiation and also from the release of noble gases.

And my feeling is that we are going to have to locate those devices in an area that always has possibilities of having fresh air to it, not contaminated air, and in an area which will be basically unaffected by increases in direct radiation background and increases in direct radiation from other monitors. I mean, that was another part of the problem, that Monitor A was

sitting next to Monitor B, sitting next to Monitor C, next to Monitor D, and part of the increase in the background was from the collection of high quantities of radioactivity on the monitors themselves, one increasing that of the monitor next to it, not making just one monitor inoperative but three monitors inoperative. That is something we learned.

MR. KREGER: In the case of that kind of an accident, though, when almost every single area radiation monitor either went off scale or went up in some way or another, except for the people that might have been in a particular location -- and I don't think there were hardly any people in the fuel handling building at the time. But except for the people that were in those locations who would have heard alarming things go off, you then start to follow the next step. And that is you know you've got contamination but you are not really sure where it is. Then you start doing everything with portable instrumentation that you possibly can. You don't go anyplace without having a portable monitor with you.

And so to some extent that says you don't necessarily now, because of what happened at Three Mile, saturate everything with fixed, alarming air and airborne radiation monitors. Maybe we even had enough. Maybe their range wasn't great enough and things like that, but even so there were enough of them.

MR. KNIGHTON: Let me make one more comment on that. In the area monitors now you have two to five times background,

extremely low. Your sole purpose is to show that increase, and they are going to be absolutely useless to you under an accident condition.

MR. KREGER: They will be alarming, though.

MR. MURPHY: No, they read out in the control room and tell you what the radiation level is there even if it's exceeded the alarm level.

MR. KNIGHTON: Let me carry it one step further. From my information to date, you may be running into an instrument which will give you the instrument we need between normal and accident operation, and this will end up giving you two instruments rather than one.

(Inaudible discussion.)

MR. LYNCH: What does bother me, though, is the remark that now we will worry about the kind of radioisotope we saw at TMI, namely, noble gases and high backgrounds due to that. And I think we'd better not stop there, that we'd better be able to measure fission products coming out of there, not just noble gases and a little iodine.

MR. KNIGHTON: A guy that came in showed me something that will cover it.

(Inaudible.)

But it turns out to be several instruments, not just one.

MR. LYNCH: Most of your higher-range instruments

have two tubes in the end of it.

MR. MIRAGLIA: With respect to calibration, the requirements for calibration of this instrumentation, both fixed and portable, is specified in the tech specs, or are they specified in the form that they should be calibrated and then the implementation of that "shall" is reflected in the procedures in the reg guide?

MR. MURPHY: The latter is a reflection of how it works. There are several of the instruments that are required to be calibrated on a periodicity specified in the tech specs, but not generally the area radiation monitors. There may be a couple that are called out in the tech specs.

MR. MIRAGLIA: And similarly for portable instrumentation?

MR. MURPHY: No. As far as I know, the portable instrumentation, other than a very vague statement in the tech specs that says, "You will have calibrated instruments," is not called out.

MR. MIRAGLIA: Not minimum frequency --

MR. MURPHY: No, there is another regulatory change we have been working on for years.

MR. KREGER: There is a reg guide of quality assurance related to monitoring.

MR. MURPHY: There is also a change in the regulation.

(Inaudible.)

MR. MIRAGLIA: We have discussed the fact that numbers of instruments, both fixed and portable, are not necessarily specified, and at Three Mile Island at the time of the incident a large number of portable instrumentation was unavailable. One factor that is cited as a possible cause for this situation is the fact they just came out of a fueling-out stage.

But if you look at TMI and look at some of their previous history, it appears that maintenance of health physics instruments sort of was considered a low-priority matter as compared to maintenance and repair of processor operational models.

In tech specs there are certain pieces of instruments, certain instruments that are required to be repaired in a timely manner by the condition in the specifications. Is there any thought given to maintenance of health physics instrumentation in a similar regard?

MR. MURPHY: In the sense that if you don't have X number of instruments available at all times, you have to shut the plant down.

MR. MIRAGLIA: Or whatever, some action level.

MR. BLOCK: I think, Frank, you get into the question by saying the tech spec people don't want any more health physics things in the tech spec because they are so heavy now they don't want to add anything to it.

MR. MIRAGLIA: What is so heavy?

MR. BLOCK: The tech specs themselves, the quantity of it.

MR. KREGER: Usually when you inspect on a health physics basis, you go look at the racks of equipment. And I have seen inspection reports from the health physics inspectors because, as was mentioned by George, we look at them also. We look at the reports for every plant.

And I have seen lots of times, you know, things that say -- because they have to report it; either on the instrument itself or someplace where they store the equipment, there has to be a record of the calibration and service and that kind of stuff. And I have seen health physics inspections that say some fraction of the instruments either were not calibrated when they were supposed to have been or weren't maintained when they were supposed to have been.

So it would appear to me that there is something going on in that regard, and certainly the regulatory guidance says you shall calibrate and you shall maintain and you shall do this, that, and the other, but not the frequency and things like that, although this regulatory guide we are talking about will have some of that stuff in it.

What I was interested in up at Three Mile when I was there was a guy would pick up an instrument and he'd turn it on and maybe the battery check wasn't right or he'd say something like, "Oh, this one isn't working right for such and such

a reason." But I never saw a case where a guy couldn't find one that he needed to go inspect an area.

And I was curious as to whether you'd gotten some feedback that said there were a whole bunch of cases or they just couldn't find one to survey the area.

Guys are coming back all the time with survey data. Whether you believe it is something else.

MR. LYNCH: (Inaudible.) In some cases the right kind of instrument could not be found.

(Inaudible.)

There are a number of statements by the personnel involved that they had difficulty in finding the proper type of instrumentation. I guess there's even an indication where perhaps entries were made with no waiver at all but a guy was told to go in with a pocket dosimeter and look at it.

MR. MIRAGLIA: NUREG 0600 covered the period up to midnight of the 30th of March, which was basically about eight hours after we arrived on site. So we didn't see all of those things.

By the time we got there, they had mobilized enough and were getting instrumentation in and getting people in and people were coming with their own instruments, bringing them with them.

They had Ralph Jacobs from Rad Services who had already been on site and had started to get on top of their

instrument calibration problem, that kind of thing. That was two days later.

NUREG 0600 was right in those first few days hurting badly because of the depletion of the instrumentation from --

MR. NORTH: The 30th made a big difference because Ralph Jacobs came in with a lot of stuff, and they got the entire shelf stocked with every line.

MR. MURPHY: So your experience did not reflect what had arrived.

MR. MIRAGLIA: I'll grant you that. The question that comes to mind, though, is: Based on the experience that one did gain, are any changes in this area warranted?

For example, by license they had required four emergency kits to be equipped in a certain manner. At the time of the incident, one emergency kit had an instrument that was out of service for maintenance. In the second kit the instrument in that kit failed shortly after the team was deployed.

These suggest things as to perhaps where changes or new emphasis or focus or attention should be given to the area.

And I guess the question is: Is that something that one ought to consider with respect to instrumentation required, as to the number?

MR. MURPHY: My feeling is we have to look at that subject again.

MR. KREGER: The answer is absolutely yes. It has to be reconsidered.

MR. MURPHY: I don't see how we can not reconsider it.

MR. MIRAGLIA: One of the things the licensee has done with respect to instruments up there, as I understand it, is he has his own maintenance group.

MR. NORTH: They have gone out on contract.

MR. MIRAGLIA: Yes, but they've gotten that kind of capability.

MR. MURPHY: Wait a minute. I just want to say that the situation up there now is a heck of a lot different than it was pre-accident. And the needs are one heck of a lot different than pre-accident. And the fact that they've got an instrument calibration program up there with calibration facilities and maintenance facilities right on site is not necessarily reflective of what would be necessary for an operator.

MR. LYNCH: Yes. However, there is evidence within the record, if you want to call it that, that there was such an insufficient number of instruments during the normal routine operation that they even had waivers where people could enter radiation areas without instrumentation.

MR. NORTH: I'd like to add that at the time of the accident, Met Ed was already consulting or negotiating with Ralph Jacobs to come in and set up this calibration service that he has done for Rad Services. So that when they contacted

him and asked him to come, they were already talking about it.

MR. MURPHY: Yes, but now they've got that thing on site, right there.

MR. NORTH: Yes.

MR. MURPHY: The only point is their negotiations with having Rad Services in to handle their instrument maintenance and calibration program didn't necessarily mean they'd set up a facility on site. They could have operated that out of Laurel with the rest of the clients.

But I agree in terms of the point Mr. Lynch made, and that is they just didn't have the capability to respond to the accident at the time is correct. And that is an unacceptable program.

MR. KREGER: But you have to say it is an unacceptable health physics program. And if I were the health physics manager of the plant, I wouldn't be caught dead with the situation they had, I don't think, of being willing to have a shelf full of stuff that I had a pretty good idea might or might not be working. If I were the health physics manager at a big facility like that and I knew my business, I think I might not have needed anything more. I might have needed it working. I wouldn't be a health physics manager at a place and not be pretty much sure where it stood and that I had enough stuff working.

So the question I think gets back to what we have

hit on a lot of times today. Do we need to do more to make sure that the people have got the right smarts, or do we just need to give them so damn many just absolute fixed requirements they can't blow it? And I really feel it's more the people.

I don't like to think that we'd have to get into the posture that you tell them, "212 masks with iodine canisters, 110 cutie pies, and 514 pocket dosimeters," and that kind of thing. I really hope we don't get to the point where we are just going to have to specify that kind of stuff. But I sure hope we get to the point where we can depend on the quality of radiation protection management and personnel to make sure that they've got their program working.

MR. BLOCK: I think we have to train the I&E to be able to inspect against an adequate survey meter monitoring program. In other words, part of the inspection would be to see how many instruments are in working condition and cite the licensee if the number that he feels or that he is instructed to insure himself satisfy the program are not there.

MR. MIRAGLIA: Well, if the inspections are going to be conducted against some criteria, don't you think in fairness to the licensee the licensee should know what those criteria are?

MR. NORTH: Sy, I agree with you. However, you have to remember that the inspector in the field operates under somewhat different rules. He's got to have something so that

he can tie things down. He can't go in to the management and say, "I think you don't have enough instruments," or he is going to say, "Where does it say it?"

Let's say the FSAR is changed and they come in and say, "We are going to have this many of this kind of instrument, and this many dosimeters," and so on; that's fine. The inspector can go out and he looks at it and sees if they have what they said they were going to have.

If the FSAR said instead, "We will have this many operable instruments and this many masks or breathing devices available for use," then you give the inspector a tool he can utilize in looking at the plant on a continuing basis.

Maybe that would not be adequate. It would place the added burden on Licensing to look at it and say, "Does this look like it's going to meet their needs in normal conditions or accidents and so on?"

MR. MURPHY: I have no problem with that. We do it now.

MR. KREGER: I had a health physics inspector say he was glad that Part 20 just said you had to have an adequate program, because he could then go and determine if it was adequate. "If we had a fixed number, like 12 survey meters," he said, "and that is all I had to go by, I would be strapped."

MR. NORTH: That is not what I'm saying. I don't think you can say what a licensee commits to an FSAR means he

has an adequate program. If you tie it to that, he can say, "I have 12 instruments and therefore my program is adequate."

The inspector can go in and say, "I don't care how many instruments you have. You are not covering the areas you are supposed to cover."

So that is one thing. Having a requirement that says you have to have so many instruments available is something else.

MR. KNIGHTON: I can see what our problem is. We are going through the same thing.

But I think the real key to this is the RPM out there that has got to set up this program has got to convince his manager of what the dollar outlay is going to be in order to perform properly. And that gets pretty tough sometimes. This is where some of the problems come in where you find you don't have enough instruments, they are broken, some will get sent away for calibration, and they don't have enough there. The argument is, "Well, I am getting them calibrated."

The answer is if they come in with a program which includes the number of instruments they need as they perceive it, and the calibration schedules and everything else, that is darned near the best we can do as long as we look at it and find it's acceptable.

MR. NORTH: During the pre-open phase, while they are looking for a license, most HP organizations at the utilities

I have visited don't have any problem getting money to buy things. They can buy anything they want during this because it all goes into the cost of the facility. It is the replacement afterwards and, as stuff breaks down and wears out, trying to get a replacement is a major problem.

MR. KNIGHTON: But I am pointing out if he gives you a good program at the time when he can afford it, he has now established a program which we have approved. Now they have to maintain that program until such time as they come in and get relaxation or whatever is necessary.

That is the point I am trying to make, and I think that is the discussion we are having here: What can we do to make sure they have adequate programs? And your question was should we put down specific numbers of instruments. I think what you are hearing is we are not sure we can do that.

MR. BLOCK: Frank, when I was on that ANSI standards committee for area monitors, we reviewed many licensees' area monitoring programs by way of their FSARs and found that the numbers of area monitors varied from a minimum of 12 at one plant to a minimum of 50 in one plant.

And we wondered what does the 50-area-monitor plant know that the 12-area-monitor plant doesn't know in order for him to want 12?

So I am saying that for the number at plants, what one RPM might think would be satisfactory for this program may

be completely different from what another RPM might think would be satisfactory for his plant. And therefore, it would be very difficult to set a number arbitrarily of what we would think would be the proper number.

MR. NORTH: Also, often the RPM doesn't have much to say about it.

MR. BLOCK: That is true.

MR. KREGER: That's why we said that criterion should say they shall be where the radioactive levels may change. That sets a level for the plant, and the plants are designed differently, but that is a criterion you can work to, it seems to me.

MR. MIRAGLIA: What did you mean by "The RPM doesn't have much to say about it"?

MR. NORTH: In most cases the RPM doesn't get into the plant soon enough. Designs are fixed. The introduction of health physics planning in many plants -- it has improved substantially, but it is still not that good.

MR. KREGER: We have a requirement that health physics look at the design from the very first start of the plan.

MR. MURPHY: And we have had feedback, too.

MR. KNIGHTON: I think it is true that it was not the RPM who was in on it but management and AE and so on.

MR. NORTH: Yes, but you have set some kind of

criterion for the man who is going to fill the slot of RPM. What kind of criteria have been established for the AE or for the guy in the corporate office who is doing this kind of a review? It isn't necessarily the same kind of criterion as the man who is necessarily going to run the plant.

MR. KREGER: Yes, but a competent health physicist has to review the facility design at the very earliest stages from a health physics viewpoint and have influence on the design from a health viewpoint.

MR. MURPHY: Yes, but the criteria are not directed toward the AE. They are directed to --

MR. KREGER: -- the utility company.

MR. MURPHY: That's right. And what we have seen happening is that utilities are getting more and more into the review of their design at an early stage, which is what we have been trying to have them do.

MR. NORTH: My perspective may be a little insular coming from Region 5, because we don't have that many new plants or new ones coming on line. But this is something that I have seen and a comment that I have received from a lot of different people talking to the people in-plant. And they say, "Everything was fixed when I got here."

MR. MURPHY: That is a true statement for most of them. All I am saying is that that process is starting to change, and we see in the plants that are given construction

permits that they've got radiation protection personnel on board. The applicant has them on board, not just the AE. And those people are starting to get involved in the review process early on in terms of design and instrumentation.

You probably saw it also with Southern California.

MR. MIRAGLIA: Do you have any more questions on instrumentation?

MR. LYNCH: No.

MR. YANIV: I do.

(Simultaneous discussion.)

MR. KREGER: AEs have told us they have hired health physics people to be involved in their designs.

MR. MIRAGLIA: We are straying from instrumentation. Sholomo has a question.

MR. YANIV: We have been talking a lot about instruments but not about the type and quality of instruments. Are there any requirements anywhere for the minimum performance specs on instruments to do their job?

MR. MURPHY: One of the things we found from the accident obviously is that the instrumentation that was generally available out there was not adequate for measuring beta radiation adequately, particularly at the higher dose rates.

MR. YANIV: That is one thing.

MR. MURPHY: Yes.

MR. YANIV: The impression I really got was that one

could satisfy the specs by hanging a bunch of cheap GMs around the plant for all purposes. And theoretically, they'd be complying with whatever requirements there are. Correct me if I'm wrong.

MR. BLOCK: Did you say cheap?

MR. YANIV: Yes, I said cheap.

MR. BLOCK: Portable instruments?

MR. YANIV: Oh, hanging up a $50 instrument, just getting a Geiger counter for $50 and hanging it up.

MR. BLOCK: I don't think you can buy a Geiger counter for $50 anymore.

MR. YANIV: You can. But that's a different story.

MR. MURPHY: I think there are requirements that they be --

MR. LYNCH: They have to be appropriate for the kind of measurements you have to make.

(Simultaneous discussion.)

MR. MURPHY: That is a requirement of the regulation and, as Jack pointed out earlier, the instrument would be appropriate for the radiations being measured.

MR. YANIV: Does it say the numerical guidelines?

MR. MURPHY: The CDV 700, the old hunks of junk.

MR. BLOCK: They are not hunks of junk. They are good instruments.

MR. YANIV: I am familiar with material licenses, and

if you are doing material licenses there's a condition that says where you are doing a leak test on a source you have to do it with an instrument having so much sensitivity of detection, and it is clearly specified by number what the minimum sensitivity is.

Is there anything parallel to it in reactor instrumentation?

MR. KREGER: We do have those kinds of specifications on effluent monitors where in the tech spec we specify the minimum sensitivity on effluent monitors. We have some specifications regarding environmental monitors.

There are some ANSI standards that relate to instrumentation but don't specify the kinds of things you're talking about. And I guess from my knowledge there is not a piece of written description of the standards of various aspects of performance of monitoring equipment.

MR. BLOCK: I might mention that 90 percent of area monitors are Geiger counter types which operate in two modes. They operate in a count-rate mode and a current mode when we start getting into the hour for our region.

So far as I know, the quality control of these instruments is very good because they are manufactured by very competent people. The manufacturers of these Geiger counters are very competent people.

So I am not sure I understand your position.

MR. KREGER: They aren't really cheap.

MR. YANIV: I didn't say that.

MR. MURPHY: There is a requirement that the licensee submit as a part of his submittal the types and ranges of the instrumentation -- and he does that. That exists in every SAR that we get.

What doesn't exist, Sholomo, is a nice, neat little package tied up with a red or blue ribbon that says, "All instrumentation at reactor plants will have this instrument and this instrument sensitivity."

Unfortunately, what happens is that the instrumentation gets reviewed individually for each plant each time a licensee submits an SAR. And we look at the sensitivity of the interpretation and say, "This is adequate for the purpose for which it is intended."

But we don't have either a regulatory guide or a regulation that says, "The instrumentation will be thus and such," with numbers.

MR. KREGER: I come back again to the quality of the health physics manager, where we are making assumption, by not specifying those kinds of details, that the guy that is going to run that program is of a sufficient quality and experience -- because we have an experience requirement -- that he knows what he needs, what he's going to need.

MR. MIRAGLIA: But what becomes a -- (inaudible).

MR. KREGER: He has to have told us a range of things he's going to equip himself with that is going to be adequate.

MR. HANIV: Does this apply also to portable equipment?

MR. KREGER: Uh-huh.

MR. MURPHY: Excuse me, but all of the SARs have in them the number of portable instrumentation that is going to be available, the types and ranges that they are capable of measuring. That is in the SAR; correct?

MR. NEHEMIAS: Yes.

MR. YANIV: But he has to submit it and if he submits that he is buying exclusively, let's say, a Geiger counter with 100 grams per millimeter squared windows, you would not approve it?

MR. NEHEMIAS: He wouldn't buy it.

MR. BLOCK: They don't make them.

(Laughter.)

MR. KREGER: But we don't go out to that plant at the licensing stage. We said ours is a paper licensing review. We don't go out to the plant and count them. He doesn't go out to the plant with the FSAR in hand and say, "He said there are 20 and I'll count them."

MR. NORTH: Yes. The point is if the FSAR said, "I will have an amount of operable instruments," and you let him figure out what kind of backdrop he has to have to maintain that, it gives a better handle on controlling his organization.

If he says, "I have 20 of these but only four are working," then he'd be in compliance.

MR. KREGER: I don't think he's in compliance. If the senior inspector I was talking about went to him and said, "You haven't read 20.4" --

(Simultaneous discussion.)

MR. MIRAGLIA: We have touched on the question of the role radiation protection plays in the design of the facility. And there was some discussion saying that with the advent of Reg Guide 8.8 there appears to be an improvement in this area.

Is Reg Guide 8.8 again directed towards looking at the adequacy of design for normal operation?

MR. BLOCK: Yes.

MR. KREGER: And anticipated operation.

MR. MIRAGLIA: In looking at TMI --

MR. MURPHY: It wasn't anticipated.

(Laughter.)

MR. MIRAGLIA: It wasn't anticipated. I think what our group has been doing in looking at the rad waste system design, you can say that was exceeded since I guess the design is 1 percent failed fuel.

But there are a number of systems in the plant other than the rad waste system that have various design pieces -- the ECCS system, the RHR system. And in conducting a review of the system with regard to the adequacy of the shielding design,

what design bases are used to examine the adequacy of shielding?

MR. MURPHY: Well, up until about 18 months ago we were using 1 percent failed fuel as a design basis for shielding.

About 18 months ago, after looking at that closely and also looking at the failed fuel experience at the plants, we changed it to basically a 10th of a percent failed fuel.

MR. KREGER: Even though the equipment itself was still being designed was 1 percent, but the shielding design was changed.

MR. BLOCK: Did you consider crude build-up at that time at all?

MR. MURPHY: Sure.

MR. KREGER: Yes. Crude build-up was an additional condition, and they had to have in their source term a way of accommodating to crude build-up, a realistic growth rate, and so forth.

MR. MURPHY: There are no plants as far as I know that are out there that have been designed to the 10th of a percent failed fuel fraction as far as shielding is concerned.

MR. BELLAMY: They are all designed for higher.

MR. MURPHY: They are all designed for 1 percent.

MR. KREGER: Furthermore, there are conservative values of calibration, which always results in even more shielding than would result with 1 percent failed fuel.

MR. BELLAMY: Does this include sample lines?

MR. MURPHY: It should include everything, every aspect of the design, including sample lines, but it hasn't. I think in practice it hasn't.

MR. BELLAMY: What do you mean? Have there been oversights? Lines neglected?

MR. MURPHY: Yes.

MR. KREGER: One of the things we were fussing about a lot over recent years is -- what do you call it when you run a line that isn't in the design?

MR. BELLAMY: Field-run piping?

MR. KREGER: Field-run piping. We found a lot of piping that had to carry it and shielding was forgotten. So as one of the things in 8.8 about the design of the plant, it was specified that all field-run piping shall be reviewed for the purpose of appropriate shielding.

MR. BLOCK: What about occupancy of the areas? Do you consider that?

MR. KREGER: Occupancy of the areas was the basis on which zoning had to be done. You know, a plant is zoned anywhere from one to five different zones depending on the zone rate expected in that normal operation.

MR. MURPHY: Let me continue on with a couple of points.

I want to go back to the statement I made about changing the criteria from 1 percent failed fuel fraction to

a 10th of a percent. I think it's a demonstration of the mentality that we were in pre-Three Mile Island. And that was normal operation, and part of the motivation for that was, "Hey, there's money being spent on shielding that we have already demonstrated from normal operations is a nonproblem." The doses outside the shields for normal operation were very low, and it was a very conservatively designed type of situation. And if the zoning criteria were met in all cases, the source design criteria, it could be less conservative than what we had originally indicated.

So that is the mentality that we were in, and I think it is important that you understand that we were going that way.

It is not clear to me that we would make that same decision again today, and it is not clear to me that we may not go back and change it again, go back to where we were, just to provide that additional degree of conservatism towards the accident situation, which really is what the 1 percent is all about.

That's number one.

Number two, in answer to Bellamy's comments about what did I mean about the shielding wasn't necessarily always conservatively placed, I think the sampling sink in the sample room was a good example of that situation, which was really completely overlooked -- at least it was overlooked by me in terms of its significance.

In terms of designing cubicles for tanks and cubicles for pumps and separating tanks from their associated pumps and controllers and things like that, I think we had gotten a fairly good handle on that type of thing. But we hadn't tumbled onto some of the more significant things that you might get into in terms of an accident, and this sample room situation I think was an excellent example of that. And that whole sample room was just not designed for an accident situation, and it wasn't even really designed to handle 1 percent failed fuel as well as is reasonably achievable. If they got radiation numbers in there that would be intolerable for normal operation, they would be getting fields up there of 100 milllirem per hour. And after a while that is going to be unacceptable for normal operation.

There were some holes in their criterion. They said, "Hey, we designed the sample room for Zone 4," or "Zone 3," or something like that, which is basically 15 millirem per hour or something like that. And that is fine for a normal operation and probably what they got with the failed fuel experience they had at Three Mile, which was pretty good, but that is not going to work in an accident situation.

And if you are going to need that sample room for accident sampling and understanding the condition of the reactor coolant system and the core and things like that, then we are going to have to redesign that for our radiation

protection plan.

And I think that came out of one of the Lessons Learned.

MR. MIRAGLIA: Did you focus on things other than the sampling room in your Lessons Learned, for example, the residual heat-cooling system?

MR. MURPHY: That was focused on in terms of the criteria for access to vital equipment and shielding necessary to vital areas. Yes, that was focused on in the Lessons Learned. That is one of the things that was focused on in the Lessons Learned.

You needed to have access to specific areas, and they were enumerated.

MR. MIRAGLIA: That is going to be factored into shielding?

MR. MURPHY: That has to be factored into the short-term review from the Lessons Learned activity. And the sample room has to be factored in also.

MR. MIRAGLIA: What factors are going to be established for that?

MR. MURPHY: I don't remember, but there have been criteria settled on. I think it's in the criteria given to the reviewers who were reviewing that.

MR. BLOCK: Tom, I want to ask you a question. There are three source terms one can design a source for, a 14.484,

the failed fuel, and Three Mile Island. If you change your thinking in terms of designing shields for the sample rooms, what kinds of energy or source terms would you use to design that shield? Which one of those three criteria would one use? Because I know that we are using TID for looking at dose rates for equipment qualification, but it is different from TMI by a large measure.

What do you use in your design criteria now based on a shield?

MR. MURPHY: What we are using is the TID source.

MR. MIRAGLIA: Is that the one that says 50 percent of the source material and 100 percent noble gases?

MR. MURPHY: Can I ask for a recess to make a phone call?

MR. MIRAGLIA: Surely. Why don't we take a 10-minute break.

(Whereupon, a short recess was taken.)

MR. MIRAGLIA: Why don't we start up again.

While we are on the area of design and radiation considerations and protection during the design phase, certain other things became apparent at Three Mile. One was the problem with control compatibility, and I believe there was something in the Lessons Learned study on that. Is that correct, Tom?

MR. MURPHY: No, control compatibility is out of my area of expertise. It is not part of our review process, and

itis not something that I paid much attention to other than I was aware of some of the consequences.

MR. BELLAMY: Does that include the shielding of the control room?

MR. KNIGHTON: We looked at the operating reactors and one of the problems we ran into there was that Unit 1 at Three Mile had a control room problem, and most of the reviews we have looked at don't recognize the second unit on site. All of the sensors that you have for isolating and protecting the control room are designed basically around the unit that the control room is in. And what happens is some of them have or do not have automatic closure, so that it gets an alarm in the control room, and then they have to do a manual.

MR. BELLAMY: Would you be specific? That is automatic closure of the inlet lines on high radiation?

MR. KNIGHTON: Yes. With particular interest on TMI, that is kind of where we ran into the problem.

I don't know about Unit 2. Their control room conditions I don't remember exactly. Did they isolate it often?

MR. MIRAGLIA: They had apparent problems with airborne control.

MR. MURPHY: No, there was a definite movement of noble gases into the control room. I don't think there is anybody that would argue with that.

MR. KNIGHTON: The question there was: Was it

through the air intake, and was it isolated, and did they have this activity even though it was isolated?

MR. MIRAGLIA: There are several postulations. One is that the meteorological conditions were such that it just meandered around and hung around the intake structure that supplied air.

MR. BLOCK: Did they have automatic closure of air intake?

MR. BELLAMY: It has automatic closure, but it goes on recirculation of 1500 CFM filtered outside air. So if you are filtering with outside, your filter isn't going to do anything for noble gases anyhow, so you defeat the purpose.

MR. MURPHY: There is a difference between having noble gases in there and having fission product activity, too. And if you were aware that it was noble gases, you may not have gotten anywhere near as excited about the situation as you did with not knowing what it was, or making the assumption that it was iodine activity, which is what I understand happened.

MR. MIRAGLIA: That gets me to the next point of design that I want to pursue, and that is the fact that the counting room capabilities were lost at TMI. Is this part of the review of the design, as to where the counting rooms are located, what the shielding of the counting rooms is, and what the ventilation is?

MR. MURPHY: I don't see how we can avoid changing

our whole posture on that or at least looking at that and at least reviewing it and setting criteria from the point of view of what was learned from Three Mile and the fact that those counting rooms were out of commission.

However, there are other ways to skin that cat. You don't necessarily have to do it by relocating the counting room. And that might turn out to be a better approach to it.

MR. KREGER: That is one place where we already had fussed about some of the design, where they put the counting room too close to some of the hotter sources, and we would have fussed with the applicant about changing the location for normal operational purposes.

MR. MIRAGLIA: What is the involvement of Radiation Protection in the review of the ventilation systems, in the sense of having the airflow from contaminated areas, from less contaminated to more contaminated areas?

MR. MURPHY: We review the radiation protection features of that in the sense that we have determined that the licensee has a commitment to design the ventilation system for moving air from clean areas into contaminated areas. We don't have ventilation engineers on the staff and we haven't looked at the ventilation systems in a lot of detail. And basically all we are interested in and all we look for is whether or not the licensee recognizes the need for designing the systems in the fashion that is going to contain the radioactivity and

keep it out of clean areas.

MR. KREGER: It is one of the very specific items in 8.8.

MR. BELLAMY: It is or is not?

MR. KREGER: Is.

MR. MURPHY: What do you mean?

MR. KREGER: A design with ventilation moving from areas of low to high.

MR. MURPHY: But we have not gotten into, for example, looking at airflows, air volume turnovers.

MR. BELLAMY: Would you worry about the size of duct-work?

MR. MURPHY: No.

MR. BELLAMY: Out-leakage of contaminated air from ductwork?

MR. MURPHY: No.

MR. BELLAMY: How about balance of airflows prior to start-up?

MR. MURPHY: No.

MR. BELLAMY: Do you know of anybody in the Commission that does?

MR. MURPHY: No.

(Inaudible.)

MR. MURPHY: I think ETSB does some looking at that from the point of view of making sure they make sure where the

sources are. But it is not clear to me that they do it from the point of view of knowing -- ETSB, I think, does it from the point of view of knowing what the effluent is going to be.

MR. BELLAMY: ETSB looks at the filters. I am trying to get at the point that I don't believe anybody in the Commission ever looks at any of the ductwork.

MR. MURPHY: I think you are probably right.

MR. LYNCH: Except probably I&E.

MR. BELLAMY: No, I don't think they do.

MR. NORTH: (Inaudible.)

MR. KREGER: The people who review Chapter 9 have some ventilation system things under their concern but not with regard to radioactivity. They are with regard to airflow, cooling capacity, and things like that. I don't know whether that would cover what you are talking about or not.

MR. BELLAMY: It does not.

MR. HINSON: When I do my reviews, I always make sure that the rooms, such as the machine shop and sample rooms, anything that might have sources other than the rad waste areas, are always ventilated and monitored upstream -- I always make sure there is radiation monitoring before and after the filtration systems. Because if you have monitors after a filter, it is not going to serve you any good as to what kinds of radiation the people inside are getting because it's been filtered already. So I make sure for a control room and other

areas they are monitored upstread and downstream. I make sure the compressor to the solid rad waste has filters and is adequately ventilated, and the chemistry rooms.

MR. LYNCH: How do you know it is adequately ventilated?

MR. BELLAMY: You don't worry about whether it's 100 CFM or 1000 CFM?

MR. HINSON: Usually I have asked questions of the applicant to say that he can adequately detect so many MPC in the room with the smallest flow rate where personnel may be in the plant.

MR. MURPHY: You are talking monitoring and they are not talking monitoring.

MR. LYNCH: None of your group does any ventilation checking?

MR. MURPHY: Other than just an audit to determine that as far as the licensee is concerned, he is moving air in the right directions as he says he is.

MR. KREGER: He has to make a commitment to move air in the right direction.

MR. KNIGHTON: They usually show you that in the form of pressures in the room.

MR. LYNCH: They have had problems at TMI with ventilation.

MR. MURPHY: Yes, my understanding is they have

problems in a lot of plants with ventilation.

MR. LYNCH: Maybe because nobody ever reviews it. All those commitments have very little value.

MR. MIRAGLIA: Do you have anything else on design?

MR. MURPHY: That is true, and you need a ventilation engineer to do it properly. We don't have any on our staff. I don't know if there are any in NOR.

MR. LYNCH: It doesn't take much to learn to do that.

MR. BELLAMY: Hogwash; baloney.

MR. KNIGHTON: They have to look at ventilation with respect to dilution of air and so on. They do, in fact, look at that. ETSB does, as a matter of fact. Because you have to get some assurance of what release there is going to be. And unless you know -- and they usually know, by fan output and so on, the approximate airflow. So that is a ventilation form.

They also look at it, I have been told, by an estimate of releases from their turbine room in terms of effluents.

So there have been definitely looks at ventilation by ETSB in determining what they have established -- not, I'm sure, at the whole plant.

MR. BLOCK: They don't look at the number of room changes of air per hour or unit of time. I think that's what you have in mind.

MR. BELLAMY: What about the review of a unit such as a Unit 2 when there is an existing Unit 1? Tom, if you

assign a case to a specific reviewer, that he is now the assigned reviewer for Unit 2 at a certain facility, does his area of responsibility include Unit 1 at all? Or can the reviewer for Unit 1 be an entirely different person? Is there any communication between these people?

What I am getting at is: Can this be a crack in the review procedure and the reviewer of Unit 2 ignores Unit 1?

MR. MURPHY: Well, I am not quite sure I understand that question, because --

MR. BELLAMY: I will give you a specific example.

MR. MURPHY: Maybe it's a specific case, but in most cases he would either review both units at the same time when a facility comes in for an operating license -- we basically look at both units at the same time -- or if it's a construction permit if there are two units, we look at both of them at the same time. Or if their plant, for example, where we had --

MR. BELLAMY: I will get to a specific case, Three Mile Island.

MR. MURPHY: Three Mile Island was looked at as two separate units basically.

MR. KREGER: And it may well have been two different guys.

MR. BELLAMY: The specific example I am trying to get at is the primary coolant sample line from Unit 2. There

was an FSAR commitment to shield the sample lines of Unit 2. Unfortunately, as soon as those lines left Unit 2 and went to Unit 1, the shielding stopped. That is the sort of thing you would hope would not occur in review of an application.

MR. MURPHY: I am sure we never tumbled to that.

MR. KREGER: We wouldn't have even if the same guy had reviewed it.

MR. BELLAMY: Do you think so?

MR. NEHEMIAS: Probably not.

MR. BELLAMY: That is disheartening.

MR. LYNCH: Would the diagram show the location of the sample line?

MR. NEHEMIAS: My drawings wouldn't necessarily show where it went.

MR. KREGER: If anything we have said implies that our review is so thorough that we would have looked at every PNID that had radioactive flow, I don't think that is the case, is it?

MR. MURPHY: Well, PNID wouldn't show whether it's shielded or not.

MR. BELLAMY: The primary coolant sample line is a pretty important line to look at.

MR. KREGER: Would we see the shielding of that line for the whole length of that line in the things we would review?

MR. MURPHY: No, it is not apparent on the drawings

that we get.

MR. BELLAMY: Would you look at the shielding of a primary collant sample line?

MR. MURPHY: Not necessarily, Ron.

MR. BELLAMY: No. There is really no design for it?

MR. NEHEMIAS: Not before now.

MR. KREGER: We look at the shielding of all the cubicles, the installed shielding, the wall shielding, things like that, not a given piece of pipe. It isn't something we ask to be submitted specifically.

MR. BLOCK: What kind of zone is that? Is that Zone 1 or Zone 2?

MR. KREGER: The sample line area is probably a Zone 1.

MR. BLOCK: So there is no -- the radiation levels are so low --

MR. KREGER: It is zoned for normal operation. There is a review made for zoning for other purposes in certain areas.

MR. MURPHY: That is true. That is one of the things that ended up in the Lessons Learned, the original one. That was one of the things that we learned, that there may be situations out there where we haven't shielded all of these sources in areas where we were going to need access after an accident.

MR. BELLAMY: I guess I'm trying to get more at the point that if there is a Unit 2 being built at a location, the reviewer should not put blindfolds on and look just at Unit 2. He has to look at Unit 1 also.

MR. MURPHY: In the areas where there are interfaces, I'd agree with you.

MR. BELLAMY: I think I'd go further and say in areas where the interfaces are not as obvious as you would normally think they would be, and the reviewer should become as familiar with Unit 1 as he would be with Unit 2.

MR. LYNCH: I don't think there are that many plants that pose that much of a separation in a dual-units plant. Most of the recent ones are together.

MR. BELLAMY: You have the Three Mile case, you have the Millstone reactors. If there are not that many, then Dr. Kreger doesn't have a real good argument for not doing it based on a lack of manpower.

MR. KREGER: I wasn't arguing for not doing it. I was arguing that we did not do it.

MR. BELLAMY: I agree.

MR. KREGER: I was not arguing that we should not do it.

(Simultaneous discussion.)

MR. HINSON: A lot of times the reviewer who did the first one has left and you get the subsequent one. So you are

saying two different reviewers at the same time, and they are not there. Usually when I have reviewed a plant three or four years ago, if they come up with a new one I do it because it's the same site and I did the first one. But usually the guy is not there.

MR. KREGER: Ron, I would argue with you. You made a statement a few minutes ago about becoming as familiar with Unit 1, I think you said, as the unit he is actually reviewing.

MR. BELLAMY: I did.

MR. KREGER: I question whether that would be justified. I think the interfaces and the interactions that would catch the kind of thing we are talking about might not need nearly the depth of looking that you'd look at for a CP review.

MR. BELLAMY: If all the interfaces could be identified, then.

MR. KREGER: Yes.

MR. BELLAMY: I agree.

MR. MIRAGLIA: Is there anything else on design?

MR. BELLAMY: Nothing further.

MR. LYNCH: No.

MR. MIRAGLIA: The next area we had on the agenda is Contamination Control. With respect to personnel, we have discussed that, and we have equipment and area contamination control.

I guess we are under the impression that there is no

requirement for minimum acceptable level of contamination, that areas should be maintained at a specified level. At least NRC does not have a position relative to this.

MR. KREGER: The zoning in a sense establishes to some extent contamination control because the plant is zoned for a given amount of R per hour, MR per hour, R per hour, on the basis of occupancy and a lot of other things.

MR. MIRAGLIA: We are talking about spreadable contamination.

MR. KREGER: I know you are. All I'm saying is if you were to significantly contaminate an area and spread it, you would very quickly start having to change the zoning of the plant, and he would have to submit something that said, at least in retrospect, "I have rezoned this area from this to this." And if you started to explore why he is rezoning this area and found out it was because of contamination, you'd still have a regulatory basis for fussing at him.

MR. BLOCK: Bill, don't we have a reg guide -- we talked about it before, I think -- on surface contamination or equipment contamination? Don't we use that same guide for surface contamination?

MR. NORTH: There is a criterion for release.

MR. KREGER: Yes, 186.

MR. MIRAGLIA: It is not even directed at release of equipment in the sense of normal kinds of release. It is

talking about release and abandonment of a site that is decommissioned. That is Regulatory Guide 186.

MR. NEHEMIAS: We have issued --

(Simultaneous discussion.)

MR. NEHEMIAS: There are limits for surfaces in the plant. There is a reg guide in the mill, but it is coming very slow.

MR. MURPHY: It is based on an ANSI standard which is coming slower than the reg.

MR. LYNCH: That has been a traditional area of extreme slowness within the old AEC -- very, very slow.

MR. MURPHY: It is an area where we have no criteria, Frank.

MR. NEHEMIAS: And no consensus.

MR. MURPHY: But excuse me. I want to clarify that to a certain extent. We require that the licensee have internal implementing procedures, and to my knowledge, generally all of those procedures contain a number that for the most part is an industry generally accepted number, something like 1000 rem per 100 centimeters.

MR. MIRAGLIA: Is that area addressed at all in Reg 8.8?

MR. MURPHY: Not in the quantitative area.

MR. KREGER: The thing that is addressed is just as much thrust about keeping your plant clean as there is thrust

about keeping radiation low.

MR. MIRAGLIA: With respect to the ALARA program, what is going to be the implementation document there? In other words, what are the Inspection and Enforcement people going to use? Is it going to be reflected in tech specs? Is it going to be reflected as conditions of the license? What is the end product of the ALARA review? An approved procedures manual?

MR. MURPHY: The end product is going to be a written ALARA program of the licensee which will be reviewed by the Office of Inspection and Enforcement.

MR. KREGER: Twelve specific written procedures.

MR. MIRAGLIA: How is this review going to be conducted by I&E? Is it going to be completely absent of any input from NRR at all?

MR. KNIGHTON: Not necessarily. There is going to be a big workload. There will be, I suspect, a very good possibility we may have to --

MR. MIRAGLIA: With five different regions, what is the approach or attempt to get an assurance of consistency, of acceptability, whatever that is?

MR. BLOCK: We have developed what we think is a generic one, and we are going to tell the licensee that if he adopts the one that we have written, there will be no I&E inspection required. However, if he does his own, then there

would be review by I&E, in other words, if he changes it completely.

Is that right, Bill?

MR. KREGER: I thought you'd look at it in either case. What you are saying is we are goin- to give them enough guidance in the document that goes out with the requirement for an ALARA program -- enough identification of what the elements of that program should be that we hope we get fairly uniform response back, and we hope that we'd also have a fairly uniform basis for the inspectors to use that yardstick for measuring the licensee's program.

But it's the same as everything else. I mean it is probably less specific than all the things we have been discussing today, like 8.8. It shouldn't say it's less specific because what it does is it says that your ALARA program shall have in it commitments that relate to Sections 1(a), (b), and (c) of 8.8.2(c), (d), and (e)(3), et cetera, et cetera.

So that becomes the yardsticks for both I&E inspectors to use and for that first inspection when he submits it the first time.

MR. MURPHY: Let me make another comment on that. That program was conceived and developed before the accident. And to be perfectly frank with you, it is not clear to me that all the bets are still on in terms of how it is going to be done.

Before the accident there was an agreement between Davis and Denton that we would do it that way.

After the accident, two things have happened.

Number one, the resources at I&E have been so much committed in other areas that, to be perfectly frank with you, I'd be surprised if they would still consider taking on this one. I mean, they are after us to help them out in some of these areas that they want to do. And to be perfectly frank with you, I am not sure that the resources still exist in I&E to be able to continue doing that.

Number two, there are probably priorities on other aspects of the radiation protection program that are going to get looked at and dealt with before we get into the ALARA program. And my reaction is that it may be a while before this thing gets implemented at Operating Reactors.

I point out to you that there is a paper in front of the Commission right now, 78-415, that sets up a requirement for ALARA programs for all licensees. And the Commissioners have not acted on that yet, and it may be a while before they act on it, number one.

MR. KREGER: But that is the one that both talked about their plan and changed Part 20 to make it mandatory for licensees to provide a program.

MR. MIRAGLIA: So that has been since '78? Did you say that?

MR. MURPHY: I believe it went out in like July of '78, yes, to the Commissioners. It's been over a year.

MR. KREGER: But it is pending not in the sense that it's just sat there. They have come back with, "Give me additional stuff." The staff has provided a second paper -- or has that ever gone out?

MR. MURPHY: No, the staff resources have been zapped up onto other aspects of the radiation protection program, and to be perfectly frank with you, the specific ALARA programs and the implementation of ALARA has just not received a high priority as it was before the accident.

MR. MIRAGLIA: Has there been any indication, Tom, as to whether the ALARA program that was constituted prior to the accident may require some reexamination to determine whether any changes are necessary?

MR. MURPHY: As far as the ALARA program is concerned?

MR. MIRAGLIA: Yes.

MR. MURPHY: I don't think so.

MR. KNIGHTON: I think that is where we'd lose time if we had to do that.

MR. MURPHY: There might be changes to the way we look at radiation protection programs in general.

MR. KREGER: The ALARA program for licensees is just like the one, in a sense, that 8.8 implements for applicants. It is a program for something like eight conditions of

operation of which accidents is not one. And I would say regarding Tom's statement that we certainly ought to look at that ALARA program just like we are now looking at our Standard Review Plan and Reg Guide 8.8, in a sense thinking about at least how do we change those if we add that criterion of accidents. It seems to me we have to look at that and say: Should we have anything -- even if it's the word "accidents" as a condition of operation in the thing? That much we ought to look at.

MR. KNIGHTON: My point is that there would be nothing wrong with implementing what we have and then supplementing it.

MR. MIRAGLIA: But I think Tom's point is that the ALARA program is based upon improving the radiation protection program that is out there, and what Tom is indicating is that perhaps the basic radiation protection programs are going to be changed in some areas with perhaps a higher degree of priority.

MR. MURPHY: That is what I'm saying.

And I am saying that I view ALARA a little differently from the radiation protection program. I see it as part of it but not necessarily synonymous with it.

MR. KNIGHTON: One other point is that even if we implemented it today, I have a sneaking suspicion it would be almost impossible for licensees to do anything with it for a while until they get through Lessons Learned and Bulletins and

Orders and a few other things. Because they have to come up with a plan, and they have to submit it for review, and then they have to implement it. It is a difficult problem.

MR. MURPHY: And my experience in the last six months is that not our concept of ALARA but our focus on ALARA has slipped significantly, and we have been focusing on a lot of other things and not necessarily on ALARA per se. And that probably will exist for a while.

MR. KREGER: We have been reviewing all the revised emergency procedures of Three Mile for ALARA purposes.

MR. MURPHY: Excuse me. It's a different situation. You know, I don't see what we are doing at Three Mile that's got any relationship at all to an operating reactor plant.

MR. KREGER: Well, I certainly hope it does.

MR. MURPHY: Not the way we are doing business up there. We are not letting them go to the bathroom without looking at the procedure up there and approving it specifically.

MR. KREGER: What I am talking about is the extrapolation of all kinds of things that that is telling us into the other ways we do business. And if somehow you are shutting a door that prevents any of that learning process from getting into the other part of our business, then something is wrong.

MR. MURPHY: I agree. I didn't mean to imply that.

MR. MIRAGLIA: I think I understood what Tom was saying. I didn't interpret what Tom said to be that. He is

talking about the NRC involvement in Three Mile Island 2's recovery and the radiation protection that is going on there right now. What is done there is not necessarily going to be the blueprint for what has to be done in radiation protection programs on a general basis.

MR. MURPHY: That's what I said.

MR. MIRAGLIA: The next item on the agenda is Emergency Planning.

I know that we don't have emergency planning folks here and Harry has a particular interest in that. We did touch some of the areas of emergency planning already here. Did you have any other specific questions you might want to address to maybe Bill, since that is in Bill's area of responsibility now, and maybe he can do the best he can with that.

MR. NORTH: Well, since you indicated there wasn't going to be anybody from emergency planning here, I haven't put together a list of questions.

At any rate, swinging back to instruments again, one of the problems at Three Mile Island was their inability to evaluate the presence of iodine with all the noble gases that were around. Is anything being contemplated in the way of research or anything like this to develop such an instrument, something which is a fieldable instrument that can detect iodine in the presence of noble gases?

MR. BLOCK: Is this off site or on site?

MR. NORTH: Anyplace. I am thinking of something that is portable.

MR. BLOCK: In Brookhaven an iodine monitor, which is a silver-activated silica gel, where you collect a sample, was developed and patented at Brookhaven. And the sample cartridge, this silver-activated silica gel, is inherently applicable for iodine and not so for noble gases. In other words, its efficiency for collecting noble gases is very small compared to its efficiency for collecting iodine.

And we are testing it right now. The NRC has a program at Idaho Falls for checking it out to make sure that the specifications, design specifications, that were developed at Brookhaven are in accordance with their testing procedures. In other words, we are confirming their results independently.

And if it works as they say it does, then we should be able to collect an iodine sample in the presence of noble gases with a fairly good degree of accuracy.

To give you some numbers, the collection efficiency for iodine range from 90 percent, and its efficiency for collecting noble gases is about a 10th of a percent, in that order of magnitude. So you should be able to do it.

And the way you read it out is after you collect it you take the CDV 700 modified with a Victorine Geiger counter of much more sensitivity and put it into the canister which has collected the sample, and the readout can be related to a

five-year-old child thyroid dose by the count rates.

This is part of the report that Brookhaven put out.

The trouble is they tested it at Three Mile Island but there wasn't any iodine so they didn't have a good test.

MR. KREGER: There is that Lessons Learned item on iodine monitoring capability. I am not familiar with the details.

MR. MURPHY: I don't think you should say that there is no capability for measuring iodine in the presence of noble gases. You always can collect the sample on an activated charcoal filter and either purge the filter or wait for decay.

MR. NORTH: I have heard conflicting arguments about the purging and loss of iodine. Sholomo and I talked about that.

MR. YANIV: We did not talk about the purging, but you're right.

MR. NORTH: Well, flushing it with an aerosol or something like that. I was just curious whether you were aware of anything, and I'm glad to hear about it. And I don't think I have any other questions.

MR. MIRAGLIA: The next area is the area of Environmental Monitoring. I think that you and I talked yesterday and you said that you weren't planning to bring anybody down.

MR. MURPHY: Well --

MR. KREGER: What do you want to know?

MR. MURPHY: We might be able to answer some of your questions.

MR. MIRAGLIA: I think we have a fairly good understanding of what the environmental monitoring program has been and what it is up to date.

MR. KREGER: Do you know about the change that has been proposed?

MR. MIRAGLIA: No.

MR. KREGER: The position change?

MR. MIRAGLIA: Since Three Mile?

MR. KREGER: Yes.

MR. MIRAGLIA: That was my question. I think we have a pretty good idea of what it was up to that time, and as a result of Three Mile what changes are being contemplated?

MR. MURPHY: There are several things that are going on. You are aware that I&E has --

MR. MIRAGLIA: -- 50 TLDs at all sites; yes.

MR. MURPHY: We have changed our monitoring requirements for direct radiation from what exists in the branch position right now.

MR. KREGER: And in the standard tech specs.

MR. MURPHY: And in the standard tech specs, which basically has something like 12 locations or in that order of magnitude, to basically requiring two monitors in each of the 16 sectors around the site, plus another eight monitors in selected locations around the site -- schools and places where

people might be, towns.

MR. KREGER: "Two" is misleading in a sense. At each of the two stations, one on the vicinity of the site border and one in the three- to five-mile ring, we require two TLDs. That is 32 stations plus 8 special stations.

MR. MIRAGLIA: So you'd have 50 stations.

MR. KREGER: Forty.

MR. MIRAGLIA: This would be in addition to what I&E is doing?

MR. MURPHY: Yes, in addition. This is what would be required for the licensee to have. That was arrived at by a working group of people from I&E, Standards, NRR, both DOR and DSE, as being what would be adequate to do dose calculations in the event of an accident.

MR. MIRAGLIA: What about air samplers?

MR. MURPHY: We haven't changed that from what it was.

MR. MIRAGLIA: You haven't changed that at all?

MR. MURPHY: We haven't changed anything else. The only thing that is still controversial to some extent is the use of real-time monitors off site for direct radiation.

MR. MIRAGLIA: Is this being considered?

MR. MURPHY: It is still being bandied around by the staff. There is again a number of people on the staff -- by the way, we haven't excluded real-time monitors in our position.

We haven't required them. The question is going around: Should we require some? Well, how many do you require if you require any at all at $40,000 or $50,000 a shot?

MR. KREGER: Part of the argument there relates to having increased the requirement for effluent monitoring in real time.

MR. MURPHY: If you make the effluent monitors work, then there probably is not a requirement or need for having real-time monitors.

MR. KREGER: That is being coupled with recommendations about real-time meteorology, improvement in real-time meteorology capability. So if you couple real-time effluent measurements and real-time meteorology, your calculation of dose, location of plume, et cetera, et cetera, becomes a much more real possibility.

MR. NORTH: Bill, what do you mean by "improvements in real-time meteorology"? What kind?

MR. KREGER: Using an ARAC type of capability of feeding release stuff and the meteorological indication on site, plus now going ahead and requiring all the operating reactors to backfit their meteorological requirements of 1.23 would enable you to input to ARAC, and then we have gone out to try to see if we can't get ARAC terminal capability here and a bunch of things would be coupled together.

MR. MIRAGLIA: That is being looked at now?

MR. KREGER: Yes.

MR. MIRAGLIA: By NRR?

MR. KREGER: Yes.

MR. MIRAGLIA: In concert with anyone else?

MR. KREGER: I am just trying to think of who all is involved in that.

MR. LYNCH: How about the AFOS system?

MR. MURPHY: What is that?

MR. LYNCH: That is the National Weather Service's computer that has a special three-hour, four CRT display read-out terminal that enables you to get real-time weather and hone in on specific locations.

MR. MURPHY: I can't answer it.

MR. KREGER: We have been using Weather Service input, but I didn't know it as AFOS.

MR. LYNCH: There is a special terminal that enables you to sit down and look at the weather maps and develop them. Depending on what you need, the computer will develop these for you, and you can hone in on the specific area of interest and go on down to a very large scale. A lot of terminals are being developed around the country for that. It is a standard system they have.

MR. MIRAGLIA: Do you have anything else on environmental problems?

MR. YANIV: No.

MR. MIRAGLIA: I guess that brings us to the end of the agenda, except for the last item, "General Impressions." I guess what we'd like to know: Is there any areas we haven't discussed where you are contemplating making changes that we didn't discuss today? And I also would like to get your general impressions of one suggestion that has been made relative to radiation protection, and that suggestion goes along the lines that in order to cope with the operations orientation of utilities, perhaps an alternative would be to have the health physics function at the utility report to a different management, ala the FAA approach.

MR. MURPHY: FAA?

MR. MIRAGLIA: Yes, the Federal Aviation Administration has inspectors --

MR. LYNCH: Controllers.

MR. MIRAGLIA: They have the controllers and also they have certain inspectors in the plants that are building.

MR. KREGER: Are you going as far as to say they should be our employees?

MR. MIRAGLIA: It could go that far. And then there is a range of alternatives in there.

MR. KREGER: One thing I can say about that, and that is that the concern we have heard about, "They are just a thorn in our side," it seems to me would be amplified considerably if you were to put health physics on that kind of a

basis. And in talking to a lot of the radiation protection managers -- not a lot, talking to some of the radiation protection managers at plants that have achieved a good relationship with the various aspects of the utility company operation, I think it is possible to achieve a good radiation protection program and a good working relationship with the radiation protection people being employees of the utility company.

Whether you would get a better radiation protection program under the other circumstances in spite of potentially a worse relationship, which I can conceive of as being one result, I really don't know. Because I think you can obtain it the way it is now or you can obtain it making that much of a barrier between them as far as goals, relationships, interactions, and so forth. I don't really know.

But part of that comes from I don't really know how well it works for FAA.

MR. KNIGHTON: Also it really puts you in the spot of weighing the radiological program to, for example, reactor operations. When you start weighing these things, you say, "Gee, in the health physics program I need to have government control," it seems to me it leaves the door open to reactor operations.

MR. MIRAGLIA: In fact, a suggestion regarding that came first in the area of reactor operators and was extended to radiation protection.

MR. KNIGHTON: Yes, that leads you on to the next group. How about the electricians? How about the mechanical people? Why doesn't the government take over the reactors?

MR. YANIV: That has been suggested, too.

MR. MIRAGLIA: That has been suggested as well.

MR. KREGER: One of the problems would be who would have the bucks? The other thing that has happened is that some of the people I have talked to have said, "If my utility will give me a million dollars a year" -- which some of them have -- "I can build a beautiful program." You go to another reactor where he says, "They will only give me a couple hundred thousand a year," and he has troubles.

If you put the radiation protection management, operation, equipment, and everything onto some outside group, would you also then have to say that they shall be funded by an outside group with the adequate funding they need and so forth? I think all those things would have to be tied together.

I think it can be accomplished the way it is with the right amount of money and the right kind of people.

MR. MURPHY: I have a comment I want to make on this whole subject, too, and that is a caution, at least in my mind. We've got to be very careful, I think, to put this whole business in perspective. You know, we are talking about exposure of in the order of 30,000, 40,000 man rems per year for the existing reactor program. And translating that into potential

fatalities or cancer or what have you, and what may be saved in terms of potential changes in the program by the application of a large amount of money judiciously spent someplace, and what the change in the bottom line is going to be in terms of either changes in fatalities, potential fatalities from cancer or what have you, or even if you want to put it into changes in public perception -- I don't care what criteria you want to use.

But before we make a lot of changes in the program, I think we ought to examine very carefully what the expected benefit is going to be from that, and then be willing to pay for it.

It is not clear to me that we can do -- we should be doing a lot in terms of spending a lot of resources to improve the radiation protection programs for what the expected benefit is going to be from it.

MR. KREGER: I think you could turn that around. You could even go so far as to turn that around. You said, "I am not sure we should." We have looked at that 30,000 man rem in terms of hazards in the workplace, and in fact the Environmental Protection Agency in coming up with their draft new guidance on occupational exposure limits and so forth has also looked at that.

And it has pretty much shown that work in a nuclear fuel cycle workplace is pretty safe work, both before and after Three Mile Island, as an industrial workplace.

And I think Tom's point is that you'd have to see some pretty damn significant improvements possible in man rem, in that you'd have to be able to feel like, "I can cut that in half" or, "I can really do big things with that" by the kind of move you're talking about in order that you could even begin to justify it on a cost-benefit basis.

Now, perception is something else, and if you are talking about, "I am going to do the things that makes working in a nuclear environment seem a lot safer or be perceived as a lot safer regardless of the numbers," that's something else. We haven't measured risk perception yet, and there are studies being done on radiation risk perception.

But you'd have a hard time at 30,000 man rem a year, which isn't going to be influenced very much by Three Mile -- it might be by some other event -- and no fatalities in the work-place, only latent, much-later cancer probabilities. You'd have an awfully hard time justifying changes that would cost a significant number of dollars.

MR. MURPHY: That is all I have in terms of general impressions. I think that we have all got to keep that in mind, personally.

MR.NEHEMIAS: I'd like to expand it a little bit personally. It seems to me if you are going to look at all the possible ways that a man could survive it without serious exposure problems, you are going to close it down, given the

probabilities. If that is where you want to wind up, it will never work.

MR. MURPHY: Say it again.

MR. NEHEMIAS: If you tried to design a plant so you could have a LOCA without discomforting yourself.

MR. NORTH: The cost-benefit is such that you'd probably do better to spend the money someplace else, maybe in an entirely different field.

MR. MURPHY: Yes.

(SImultaneous discussion.)

MR. MURPHY: I think it is important that you understand that that perception and that type of thinking exists in our branch and in the people that are doing this review, and it is one of the reasons why the program exists the way it is today, why it existed the way it was pre-Three Mile, and it is part of the reason that we are not often necessarily selling radiation protection programs, very expensive radiation protection programs, too.

MR. KREGER: You may be aware that in the Naval reactors program they have reduced the man rem per year of operation, whereas in the power industry that number is still going up. And we have spent a lot of time talking with Murray Miles particularly on how they finally turned that around and achieved the kind of reductions they have achieved in man rem. And their man rem may still be higher per unit of

power produced. They are still higher per unit of power produced.

And he is very frank that part of the reason is because they have been able to control both the dollars and the people without having to justify to anybody except -- well, Bureau of the Budget, but that is hidden down in a budget so big that the radiation protection part is pretty small. They have been able to control both the dollars and the people.

MR. MURPHY: They have a generally more disciplined program than we do.

MR. LYNCH: They also have the very top management supporting it 100 percent or 150 percent.

(Simultaneous discussion.)

MR. KNIGHTON: Remember, you really have to concentrate on that because there is a fairly big difference between a naval operating unit and a profit nuclear power plant. It has nothing to do with profit. It has to do with the functional operation of it.

MR. LYNCH: You can't afford to have in a closed system like submarines any kind of contamination.

MR. MURPHY: That isn't to say there aren't things that can be learned from the Naval reactors program. There are things that can be learned.

MR. KNIGHTON: They are out for a period of time. They are out for six months and come back in for a while and go

back out again. It makes a lot of difference as compared to a 24-hour-a-day operation.

MR. LYNCH: I don't understand. A submarine works 24 hours a day, too.

MR. KNIGHTON: Not for a full year.

MR. LYNCH: It will go out for six months and come back and change crews.

MR. KNIGHTON: And they will also alter it and do work on it. You don't get that opportunity with the other.

MR. LYNCH: And it gets a complete overhaul.

MR. KNIGHTON: There is a big difference.

MR. MURPHY: There are things we can learn from the Naval reactors program, and it is mostly from the discipline, from the organization, and they way they have done business.

And we do. And I don't think anybody can accuse any of us in this room of not advocating an ALARA posture for our agency. And we do. And we push it and we will constantly be pushing it. But I just want to caution that the ALARA concept involves an understanding of both the benefit and the costs that are associated with it. And we ought to make sure that when we are doing things and making changes that the benefit to be achieved warrants the cost.

MR. KREGER: I think to some extent that governs the decision we have made not to go to numbers in a lot of cases. If you went to numbers and said, "That's all you have

to have," you might find that is what everybody did, whereas we know a lot of the companies, utilities, where the radiation protection manager has been able to get more dollars out of his management and build a bigger, better, heftier program and maybe achieve out of that some exposure reductions, even though nobody is asking him to justify them on a cost-benefit basis.

We have felt to some extent on a cost-benefit basis if you start laying out the program in the last little fine bit of intimate detail that you might result in less benefit purchased than more.

Once you say a number, people will say, "Oh, that's all I have to do. I don't have to worry about whether I spend more. I don't have to spend my administrative time thinking about whether I need 20 instead of 12. They said 12 was okay."

MR. NEHEMIAS: We had a meeting and there was a big storm, "Give us numbers." They requested it, demanded it.

MR. BLOCK: There is a paradox in this because there is an NRR position to reduce exposure, and one of the big sticks NRC is coming out with to preclude accepting that position is our ALARA program. And if we are going to reduce our time that we can spend for ALARA because of other commitments and other high priorities, then our basic ammunition, so to speak, against the position is going to be lost. So I say I think it's a paradoxical situation.

Actually the hearing is coming up in a few months.

MR. MIRAGLIA: Does anyone else have any comments that they might want to make?

MR. MURPHY: Can we have a copy of the record that has been developed today?

MR. MIRAGLIA: Yes. As soon as it is available. It will be a while before they are available. It's likely to be a week or 10 days.

MR. MURPHY: But sometime in a week or 10 days we should expect a copy?

MR. MIRAGLIA Yes.

MR. MURPHY: Because there are several things that have come out today that I think are significant enough to us.

MR. MIRAGLIA: Does each individual want a copy?

MR. MURPHY: If you have one for each of the branches.

MR. MIRAGLIA: So that would be three copies.

MR. MURPHY: That would be enough.

MR. MIRAGLIA: Okay, no problem with that.

I'd like to thank you fellows for taking the time to sit down with us. We appreciate your coming.

(Whereupon, at 4:15 p.m., the meeting was adjourned.)

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