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# Official Transcript of Proceedings

## NUCLEAR REGULATORY COMMISSION

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1 APPEARANCES:

2

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11

12 On behalf of the Intervenor:

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19 On behalf of Licensee:

20 ALFRED L. EVANS, JR., ESQ.

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I N D E X

<u>WITNESSES:</u>	<u>DIRECT</u>	<u>CROSS</u>	<u>REDIRECT</u>	<u>RECROSS</u>
Nicholas Tsoulfanidis				
By Mr. Evans	1928	--	1977	--
By Mr. Johnson	--	1940	--	1978
By Mr. Turk	--	1958	--	1980
Rodney D. Ice				
By Mr. Evans	1988	--	2038	--
By Mr. Johnson	--	1993	--	2039
By Mr. Turk	--	2008	--	2054
John Harding Galloway				
By Ms Carroll	2068	--	--	--
By Mr. Evans	--	2108	--	--

E X H I B I T S

<u>EXHIBIT NO.</u>	<u>DESCRIPTION</u>	<u>IDENT</u>	<u>REC'D</u>
Staff:			
21	4/28/88 Letter, Grace to Downs	1926	1926
22	6/17/88 Letter, Grace to Downs	1926	1926
Georgia Tech:			
1	Tsoulfanidis Vitae	1929	1940
2	Tsoulfanidis Report	1929	1940
3	Ice Vitae	1989	1992

PROCEEDINGS

1  
2 CHAIRMAN BECHHOEFER: Good morning, ladies and  
3 gentlemen. We're back on the record resuming the hearing  
4 that started last week. We're glad to see you all here.

5 Before we start, -- I guess we're prepared to  
6 have two witnesses today for Georgia Tech. Before we  
7 start, are there any preliminary matters?

8 MS. CARROLL: We have a couple of process  
9 questions. We would like to know about the ex parte  
10 allegations. I mean we think we understand that, but we  
11 want to make sure, that there's a regulation that allows  
12 for an ex parte -- an allegor to present findings to the  
13 Board ex parte, and all the other parties are equal, none  
14 of us know what's been presented to you for consideration,  
15 and it may influence your decision.

16 CHAIRMAN BECHHOEFER: Except the staff --  
17 except the staff.

18 MS. CARROLL: Except the staff. And there's a  
19 law that provides for that, so that Georgia Tech and GANE  
20 can't but agree.

21 CHAIRMAN BECHHOEFER: It's a policy statement  
22 which the Commission issued some years ago. And I don't  
23 think it's been changed in the last few years, to my  
24 recollection.

25 MS. CARROLL: If this information influences

1 your decision, it would be referred to --

2 CHAIRMAN BECHHOEFER: It can't.

3 MS. CARROLL: -- in your order.

4 CHAIRMAN BECHHOEFER: It can't.

5 MS. CARROLL: It can't. Well then, why would  
6 you spend any time on it?

7 CHAIRMAN BECHHOEFER: Because if the  
8 investigation is completed, the results then can be  
9 released by the staff and we could take evidence on it  
10 then.

11 MS. CARROLL: And all the parties could see  
12 that.

13 CHAIRMAN BECHHOEFER: And all the parties would  
14 see that then. This is to protect allegers and the  
15 Commission does not want to reveal names of allegers and it  
16 doesn't want to compromise its own investigations.

17 MS. CARROLL: And if they just want to alert  
18 you that there is something in the works that may be  
19 relevant so that you keep an open mind towards that?

20 CHAIRMAN BECHHOEFER: Well, that's correct,  
21 that we are aware of it at least. And if we think it might  
22 change a decision which we otherwise would be issuing, we  
23 might keep the record open until the allegations are  
24 revealed and then -- whatever the staff finds would be made  
25 available to parties, and if it were relevant, a hearing

1 could be opened or re-opened to include it.

2 MS. CARROLL: And it would be conducted in  
3 camera perhaps?

4 CHAIRMAN BECHHOEFER: Well, it depends, it  
5 depends. After it's revealed, it probably wouldn't be,  
6 although there could be names that are just redacted and  
7 letters, -- individual X advised the Commission -- to  
8 protect the allegers and there are separate procedures to  
9 handle that kind of thing, including perhaps in camera to  
10 keep names confidential.

11 So, as of now, we would take no action on what  
12 we've heard, it wouldn't go into the record and it wouldn't  
13 go into our decision either.

14 MS. CARROLL: It would give you enough  
15 information to have some sense of how much weight this  
16 might have on whether you would keep the record open or  
17 not.

18 CHAIRMAN BECHHOEFER: It could, yes.

19 MS. CARROLL: Our next process question is --  
20 goes to -- you know, we know that we for sure want to bring  
21 Mike Solart from A Current Affair in, in June, and we had  
22 two other potential witnesses who have come out of the  
23 woodwork, and I don't know what our deadlines are, what is  
24 allowable and not allowable. And I thought sometime in  
25 these three days we probably need to talk about it and

1 advise GANE how quickly they have to get prefiled testimony  
2 in or notify people, get subpoenas or what-have-you.

3 MR. EVANS: Your Honor, we would certainly  
4 object to any more witnesses at this point in time.  
5 They're supposed to have filed a list of witnesses and  
6 prefiled testimony had a date about a month ago, I think,  
7 early May. And we would certainly object to any attempt to  
8 bring another witness into the case.

9 CHAIRMAN BECHHOEFER: Well, it depends what the  
10 subject matter of the witness' testimony would be. If it's  
11 new information, we would be authorized to hear it,  
12 irrespective of previous --

13 MR. EVANS: Are we going to have a chance to  
14 depose that witness? Are we going to have a break so we  
15 have an opportunity to depose --

16 CHAIRMAN BECHHOEFER: Well, that would depend  
17 on the scheduling. It would depend on the subject matter  
18 of any proposed new testimony.

19 MR. EVANS: All right, we can face that I guess  
20 during the interim.

21 MR. TURK: I would note that GANE did file  
22 discovery answers to the staff as well as to Georgia Tech.  
23 The discovery requested the names of any witnesses who  
24 would be appearing on GANE's behalf. If GANE now knows  
25 that there are going to be additional witnesses, they are

1 under a duty to supplement their previous interrogatory  
2 answers, and then we would see what steps to take after  
3 that.

4 But in terms of when to give notice, if GANE is  
5 aware of something, they are under a duty right now to  
6 supplement their discovery responses, without waiting for  
7 subpoenas or a schedule for pre-filing testimony. That is  
8 something that must be complied with.

9 CHAIRMAN BECHHOEFER: Right. If you have  
10 witnesses, new witnesses, you should identify them and then  
11 we could discuss whether -- if they had new information,  
12 different information, not cumulative, then there are  
13 standards for permitting that to come in. But you should  
14 notify the parties as soon as you find out.

15 MS. CARROLL: It's a balancing act of whether  
16 to pursue these potential witnesses if we can. I mean, you  
17 know, we're pretty overwhelmed just trying to keep pace  
18 with this, so if we spend energy going down a blind alley  
19 after a witnesses we cannot get on the stand -- that's  
20 actually where my question goes. So it sounds like it's  
21 possible, but I'd better get my ducks in a row and alert  
22 everybody and then we'll continue to argue about what we  
23 can do.

24 CHAIRMAN BECHHOEFER: And it would depend a lot  
25 on whether that particular witness was available to you

1 before, or that you knew that you might want to call him or  
2 her, or what the subject matter is. If it was just more or  
3 less duplicating what's already in the record, it's  
4 unlikely we would permit it. But if it was something new,  
5 then it's open for consideration.

6 MS. CARROLL: Well, I think I can tell you  
7 pretty broadly, Mike Solart just -- I thought we could put  
8 the Current Affair tape in and the suggestion that he needs  
9 to testify as to his intrusion, we've all been party to  
10 that discussion. And a big part of my question is when do  
11 we book a plane flight for him. But you know, you folks  
12 can expect that we will bring Mike Solart in to talk about  
13 his intrusion.

14 And we have --

15 CHAIRMAN BECHHOEFER: The staff circulated -- I  
16 think it was the staff -- circulated a transcript and it  
17 was my understanding that perhaps the parties might agree  
18 that you wouldn't have to bring a person in to authenticate  
19 the tape.

20 MS. CARROLL: Well, I'm not sure I saw it just  
21 for that. I mean, what would he relate, -- and I can ask  
22 him about this, -- what would he relate beyond what footage  
23 was considered sexy enough by Fox network to air -- you  
24 know, what wasn't on that TV program that he can tell us  
25 about his experiences. So maybe the transcript -- if I

1 show him a copy of that, maybe he'll agree this is all  
2 there is and you'd be wasting your money to bring me down  
3 here. But I mean, he had the experience of intruding into  
4 the facility and none of us have.

5 CHAIRMAN BECHHOEFER: You tried.

6 MS. CARROLL: No, I didn't.

7 CHAIRMAN BECHHOEFER: Many years ago, many  
8 months ago.

9 MS. CARROLL: No, that is their perspective on  
10 it. I was having my picture taken by a kid for a  
11 newsletter and I was clinging to the fence and they thought  
12 I was climbing it. And they were wrong.

13 CHAIRMAN BECHHOEFER: Oh, okay.

14 MS. CARROLL: The other person that's been  
15 identified is new, you know, could provide technical  
16 support on our newer information, be an expert witness I  
17 suppose on newer information.

18 And the other witness has remembered something  
19 that he didn't remember until recently and I'm still not  
20 sure whether we would want to call him or not. But since  
21 he has remembered and only he can testify to what he  
22 remembers, that's a possibility.

23 So these are the three, you know, possibilities  
24 I'm checking out.

25 CHAIRMAN BECHHOEFER: Would he be available,

1 assuming he were to come in, would he be available during  
2 that last week in June that we have --

3 MS. CARROLL: I haven't gotten that far. I  
4 presume he would but I'm not sure.

5 CHAIRMAN BECHHOEFER: Because the other parties  
6 --

7 MS. CARROLL: I'm not sure if any of the  
8 parties are, I haven't gotten that -- well, Mike Solart is  
9 available that week in June. The other two parties I would  
10 have to find out.

11 CHAIRMAN BECHHOEFER: The Board has decided  
12 that you ought to identify all of these people this week so  
13 that if we decide to permit additional witnesses, the  
14 parties then would have -- the other parties would have  
15 time to take their depositions between now and the last  
16 week in June when we have a week scheduled.

17 MS. CARROLL: And by the way, except for Mike  
18 Solart from A Current Affair, I believe they would probably  
19 be hostile witnesses. So that would mean that we wouldn't  
20 expect to be able to get them to cooperate on prefiled  
21 testimony.

22 MR. TURK: I don't accept, Your Honor. I think  
23 that unfortunately is either not understood by Ms. Carroll  
24 or it's being misused by Ms. Carroll.

25 If she knows there are witnesses with

1 information, there's no reason why she can't provide a  
2 summary or a statement of the testimony she expects to  
3 produce, especially at this --

4 MS. CARROLL: That I can do.

5 MR. TURK: -- especially at this late date.

6 And I don't understand why they are hostile to GANE. It  
7 appears that they are people who have approached GANE with  
8 information. They are inherently not hostile to GANE.

9 MS. CARROLL: They have not approached GANE,  
10 they've been identified by GANE and they are -- they work  
11 in the industry and I presume that the same experience we  
12 had with Mr. Boyd and with Ms. Long, that they don't stand  
13 with GANE, they don't support GANE's basic premise, but  
14 happen to have relevant information on this particular  
15 case, is the only time our paths may ever cross.

16 MR. TURK: I do not understand that they are  
17 hostile to GANE. They may not be GANE members, they  
18 doesn't make them hostile to GANE. If they're witnesses  
19 that GANE knows about and GANE knows what they will say,  
20 there's no reason why they can't work with GANE to prepare  
21 their testimony in advance or why GANE could not provide a  
22 summary of the expected testimony.

23 CHAIRMAN BECHHOEFER: Well, I don't think there  
24 would be time -- if we heard these witnesses, so to speak,  
25 if we heard them the last week in June, perhaps summaries

1 of their testimony could be distributed. I'm not sure  
2 there's enough time --

3 MR. TURK: Well, I think there certainly is.  
4 The alternative is that we have to go to the expense of  
5 flying down to Atlanta or wherever else these people are  
6 just to depose them to find out what it is they're going to  
7 say. If we see a summary beforehand, we can decide if it's  
8 even worthwhile to pursue depositions.

9 MS. CARROLL: Oh, I believe we can provide a  
10 summary. I just --

11 CHAIRMAN BECHHOEFER: Well, a summary is what  
12 we had in mind could be required. We'd have to hear more  
13 before we decide who it is or what it is. I think  
14 everybody has been more or less on notice that somebody  
15 from Fox TV might be called upon to at least authenticate  
16 the videotape, and I don't think that would be a surprise.  
17 The surprise might be the name of the person.

18 MR. EVANS: Your Honor, if I may, it's not the  
19 question of surprise so much, it's the question that we  
20 have a right to do some discovery of potential witnesses by  
21 deposition or, as I quite agree with Mr. Turk, if we have  
22 an adequate summary, we may not have to do their  
23 deposition. But if we have at least a summary of what  
24 they're going to say --

25 CHAIRMAN BECHHOEFER: I'm not contradicting the

1 summary part might be useful. I don't know that there's  
2 any --

3 MR. EVANS: We may or may not need a  
4 deposition, I don't know.

5 CHAIRMAN BECHHOEFER: Yeah. I'm not sure we  
6 couldn't rule out all discovery if we chose to, if we found  
7 adequate reason to. But I reserve on that one. There are  
8 some cases saying nobody has a right to discovery except as  
9 authorized by the Commission or the board enforcing it.

10 But be that as it may, we ourselves would want  
11 a summary before we would decide whether further testimony  
12 might be warranted at all.

13 MS. CARROLL: Your Honor, is this discovery  
14 you're referring to, would that be the other parties' right  
15 to do a deposition? Would that fall under the purview of  
16 discovery?

17 CHAIRMAN BECHHOEFER: Well -- yeah, we could  
18 say no discovery, just bring them on the stand and let them  
19 testify -- it's not likely we'd do that without at least a  
20 summary of what they're going to say.

21 MS. CARROLL: I don't believe GANE would oppose  
22 a deposition being taken. I could understand that that  
23 would be a hardship on the other parties to muster that,  
24 but I don't think we would oppose for fear that they would  
25 find out -- I mean, that's not any part of our purpose. We

1 just happened to find out about these people just now and  
2 that's the only reason why we haven't produced them  
3 already. So, anyway, it'd be up to y'all.

4 CHAIRMAN BECHHOEFER: Well, as I say, as soon  
5 as you identify people you might wish to rely on, then we  
6 can decide what degree of discovery there should be or  
7 whether or not to even accept the testimony. We can't rule  
8 without having a very definite basis for ruling however we  
9 rule. So we would have to have a record. So you should be  
10 prepared and then we can set dates for you to file an  
11 official summary, if not full testimony, that's up to you.  
12 But I think the parties would be entitled to know in  
13 summary what's coming.

14 Off the record for one second.

15 (Discussion off the record.)

16 CHAIRMAN BECHHOEFER: Back on the record.

17 Are there other preliminary matters before we  
18 start?

19 MR. TURK: Yes, Your Honor.

20 During the questioning of the staff's panel A  
21 last week, the Licensing Board Chairman inquired as to the  
22 enforcement conference that was held with Mr. Downs. At  
23 this time, Your Honor, I would like to offer and have  
24 marked first for identification two documents. The first  
25 as Staff Exhibit 21 for identify, a letter from J. Nelson

1 Grace to William H. Downs dated April 28, 1988. And  
2 second, as Staff Exhibit Number 22 for identification, a  
3 letter dated June 17, 1988, again from J. Nelson Grace of  
4 NRC to Mr. William H. Downs, and it's that second letter  
5 that includes the summary of the enforcement conference  
6 which was held with Mr. Downs.

7 I'll distribute those to the Board members and  
8 parties at this time.

9 (The documents referred to were  
10 marked for identification as Staff  
11 Exhibits Number 21 and 22.)

12 MR. TURK: And I would, at this time, Your  
13 Honor, offer these two documents into evidence and ask that  
14 they be admitted.

15 MR. EVANS: No objection.

16 MS. CARROLL: No objection.

17 CHAIRMAN BECHHOEFER: Did you offer both?

18 MR. TURK: Yes, S-21 and 22, chronologically.  
19 The April letter would be 21, the June 17 letter would be  
20 22.

21 CHAIRMAN BECHHOEFER: Well, without objection,  
22 Staff Exhibits 21 and 22 will be admitted.

23 (The documents, heretofore marked as  
24 Staff Exhibits Number 21 and 22, were  
25 received in evidence.)

1 MR. TURK: Thank you, Your Honor.

2 MS. CARROLL: Y'all, I was going over our paper  
3 over the holiday weekend and sorting through it and I have  
4 a staff exhibit without a number on it and I'm not quite  
5 sure what the tidiest process is for making sure I'm with  
6 everyone. Should I talk to the court reporter about it on  
7 a break or --

8 MR. TURK: Could we go off the record for a  
9 minute?

10 CHAIRMAN BECHHOEFER: We'll just go off the  
11 record, yeah.

12 (Discussion off the record.)

13 CHAIRMAN BECHHOEFER: Back on the record.  
14 Are all preliminary matters finished?

15 MR. EVANS: One point of information, I guess  
16 it's housekeeping just to explain what I've been  
17 distributing.

18 For the convenience of the panel, I attached to  
19 the person who will be testifying about it, of our three  
20 witnesses, all of the exhibits 1 through 20. This morning,  
21 to comply with what I understand the rules to be, I have  
22 distributed the same documents 1 through 20 which will  
23 cover all of our witnesses, the top page is an index page.  
24 So whichever way is more convenient for you, you have it,  
25 either attached to the prefiled testimony or separate by

1 sequence and it's 1 through 20 and that's the reason the  
2 other day we started with 21.

3 MS. CARROLL: But these are all attached  
4 already to the prefiled statements.

5 MR. EVANS: Yes, ma'am.

6 CHAIRMAN BECHHOEFER: All right, with that, Mr.  
7 Evans, I guess you can present your first witness.

8 MR. EVANS: We would call Dr. Nicholas  
9 Tsoulfanidis to the stand -- the stand being the table over  
10 there.

11 Whereupon,

12 NICHOLAS TSOULFANIDIS

13 appeared as a witness herein, and having been first duly  
14 sworn, was examined and testified as follows:

15 DIRECT EXAMINATION

16 BY MR. EVANS:

17 Q Dr. Tsoulfanidis, would -- have you prepared  
18 written testimony to be introduced in this case?

19 A Yes.

20 Q Do you have before you a document entitled  
21 Testimony of Dr. Nicholas Tsoulfanidis, and looking at the  
22 last page prior to the exhibits, you see where it's  
23 submitted this 3rd day of May, 1996?

24 A Yes.

25 Q Have you reviewed this carefully?

1 A Yes.

2 Q Is it indeed your testimony?

3 A Yes.

4 Q And are there any changes you care -- or  
5 corrections you care to make at this time?

6 A No.

7 Q Do you have attached to this marked as GT-1  
8 your vitae?

9 A Yes, it is here.

10 Q And do you have attached to this as GT-2 a  
11 written report you made concerning Georgia Institute of  
12 Technology Management Structure and Safety Issues?

13 A Correct.

14 (The documents referred to were  
15 marked for identification as Georgia  
16 Tech's Exhibits Number 1 and 2.)

17 Q Is that your report?

18 A Yes.

19 Q Is it your intent to have that report included  
20 as a part of your testimony?

21 A Yes.

22 MR. EVANS: We would at this time tender into  
23 evidence as the direct testimony of Dr. Nicholas  
24 Tsoulfanidis -- we would tender this into evidence as his  
25 direct testimony and we would at this time also move the

1 admission of Georgia Tech Exhibits 1 and 2 into evidence.

2 MS. CARROLL: No objection.

3 MR. TURK: Your Honor, I wouldn't object to the  
4 offer. I would like to conduct limited voir dire of Dr.  
5 Tsoulfanidis.

6 CHAIRMAN BECHHOEFER: Yes.

7 VOIR DIRE EXAMINATION

8 BY MR. TURK:

9 Q Good morning, Dr. Tsoulfanidis.

10 A Good morning.

11 Q Dr. Tsoulfanidis, my name is Sherwin Turk, I'm  
12 a lawyer for the NRC staff. I just want to ask you a few  
13 limited questions about your background.

14 A Okay.

15 Q In particular, I notice in your testimony that  
16 you are being proffered as an expert in health physics.

17 A Yes.

18 Q And I wanted to ask you, first of all, in your  
19 studies either at the baccalaureate level or post-graduate,  
20 did you take courses in health physics?

21 A Courses titled health physics or courses  
22 covering the subject.

23 Q Let's answer both of those.

24 A As a graduate student, I did not take courses  
25 entitled health physics. However, the topic was covered in

1 other courses.

2 Q And in what courses was the topic of health  
3 physics covered?

4 A Reactor physics, radiation shielding,  
5 laboratory courses.

6 Q And do you recall approximately how many of  
7 your courses did get into the subject of health physics?

8 A At least four I would say.

9 Q And I notice also that in your current  
10 position, you teach a course in health physics?

11 A Yes.

12 Q Is that current, you currently teach that  
13 course?

14 A Yes.

15 Q And how many years have you taught health  
16 physics?

17 A Oh, 20 years on and off.

18 Q In your work at the University of Missouri, do  
19 you -- have you had occasion to supervise health  
20 physicists?

21 A Yes.

22 Q And in what position did you serve at the time  
23 that you supervised health physicists?

24 A I still serve as the radiation safety officer  
25 for the campus and in that capacity, I supervise the health

1 physicist.

2 Q One?

3 A One health physicist and technicians.

4 Q And how many technicians current report to you?

5 A The number changes, from two to three.

6 Q And I notice also that you're a member of the  
7 Health Physics Society?

8 A Yes.

9 Q Is that membership based upon qualification or  
10 is it open to anyone who wishes to join?

11 A No, it's based on qualifications.

12 Q And do you recall the qualifications necessary  
13 to be admitted to the Health Physics Society?

14 A No. But I know I had to prepare an application  
15 indicating my qualification and provide letters of  
16 reference.

17 Q There is a certificate that is awarded to  
18 health physicists, is there not? Are you familiar with  
19 that?

20 A Yes. You mean certified health physicist?

21 Q Yes.

22 A Yes.

23 Q Are the -- is the health physicist who works  
24 for you a certified health physicist?

25 A No.

1 Q And are you certified?

2 A No.

3 Q In your health physics course that you teach,  
4 can you describe the curriculum that makes up that course?

5 A The syllabus of the course?

6 Q Yes.

7 A Yes. The current syllabus of the course treats  
8 radiation sources and ways to reduce -- calculate and  
9 reduce the dose under various circumstances of a dose, and  
10 shielding materials between the source and the person that  
11 might be exposed. So it is a combination of health physics  
12 and shielding, radiation protection. Also we discuss  
13 regulations and policies that people have to follow when  
14 they do health physics, like the ALARA principle, for  
15 example. And the title of the course is Radiation  
16 Protection Engineering, because it is going beyond health  
17 physics, it is also engineering involved.

18 Q Do you teach anything having to do with means  
19 of determining doses received by individuals, the different  
20 devices that you would use or --

21 A You mean dosimeters and film badges?

22 Q And liquid scintillation and all sorts of  
23 different devices.

24 A Yes. The course covers ways by which dose is  
25 determined, dosimeters.

1 Q Does your course also get into subjects like  
2 bio-assays?

3 A A little bit.

4 Q What would it take for you to become certified  
5 as a health physicist?

6 A You have to take the exams.

7 Q Would those exams cover the same subject matter  
8 as are covered in the course you teach?

9 A I don't know, I did not feel the need to be  
10 certified, so I don't know the details.

11 MS. CARROLL: Your Honor, is Mr. Turk  
12 conducting his cross examination or is this some  
13 preliminary questioning?

14 MR. EVANS: Preliminary.

15 CHAIRMAN BECHHOEFER: The title is voir dire,  
16 it's to determine the expertise of the subject matter of  
17 the testimony of the witness. That can be done  
18 preliminarily.

19 MS. CARROLL: I just wanted to make sure I was  
20 keeping up.

21 CHAIRMAN BECHHOEFER: Before the direct  
22 testimony gets put in the record.

23 MR. TURK: Your Honor, I would not oppose the  
24 appearance of Dr. Tsoulfanidis here today. I notice that  
25 his testimony does not really go into the area of health

1 physics. If it did go into health physics more directly  
2 then perhaps I would do further voir dire with respect to  
3 the particulars of health physics. But given the scope of  
4 the direct testimony that's being offered, I do not oppose  
5 his admission -- the admission of that testimony or his  
6 qualification as an expert herein.

7 (End of voir dire examination.)

8 CHAIRMAN BECHHOEFER: Before ruling on the  
9 direct testimony of Dr. Tsoulfanidis, it's my understanding  
10 that the report is part of your testimony, the attached  
11 report, GT-2?

12 THE WITNESS: Yes.

13 CHAIRMAN BECHHOEFER: I'm not sure that at  
14 least one segment of the report, one or two other  
15 sentences, are technically admissible, those dealing with  
16 cobalt 60. I might say that if those are put into the  
17 record, the parties have a right to cross examine and the  
18 Board has a right to examine on that subject. We have  
19 essentially ruled that out for jurisdictional reasons.

20 MR. EVANS: I think the point is well taken,  
21 Your Honor, and I would suggest that we just -- since we  
22 don't have a jury, we could just agree to delete all  
23 references to cobalt 60 and that would be a part of the  
24 record. We would delete that from the testimony.

25 CHAIRMAN BECHHOEFER: Well what I was referring

1 to appears on pages 4 and 5 of the attached report, of GT-  
2 2.

3 MS. CARROLL: If GANE has a viewpoint, should  
4 we express it?

5 CHAIRMAN BECHHOEFER: Yes.

6 MR. EVANS: On the report, are we talking  
7 about?

8 CHAIRMAN BECHHOEFER: Of GT-2.

9 MR. EVANS: We would delete risk from CO source  
10 on pages 4 running over to 5, starting -- under the title  
11 "Risk from CO Source". We would agree to deletion of that  
12 running over to page 5 ending above "Recommendations for  
13 Changes."

14 ADMINISTRATIVE JUDGE LAM: Also, on page 1, in  
15 the summary of recommendations, item 3 should be deleted.

16 ADMINISTRATIVE JUDGE KLINE: And also page 9,  
17 there is a diagram related to dose from cobalt 60.

18 MR. EVANS: Okay, summary recommendations, 3 is  
19 a moot point. And the diagram on page 9 would also be  
20 moot.

21 May we get off the record so that I can explain  
22 to the witness what we're about?

23 CHAIRMAN BECHHOEFER: Well, let me just add,  
24 perhaps the last sentence on page 4 prior to the Risk from  
25 Cobalt 60, the very last sentence of the previous

1 paragraph.

2 MR. EVANS: The last sentence on page 4 of the  
3 report?

4 CHAIRMAN BECHHOEFER: No, the paragraph that  
5 ends just prior to the Risk from the Cobalt 60 -- just the  
6 last sentence.

7 MR. EVANS: Yeah, if we could -- we would agree  
8 certainly to the deletion of the last sentence.

9 If I may, I'd like to get off the record to  
10 explain to the witness.

11 MS. CARROLL: When does GANE get to speak on  
12 the record?

13 CHAIRMAN BECHHOEFER: Well, would you like to  
14 go off the record? We have to hear GANE's reaction to the  
15 proposal really that we have made. But let's go off the  
16 record.

17 (Discussion off the record.)

18 CHAIRMAN BECHHOEFER: Back on the record. Ms.  
19 Carroll.

20 MS. CARROLL: Well, we think, much as the line  
21 of questioning was allowed for Copcutt, there are  
22 management aspects to this cobalt 60 and we would ask that  
23 the testimony stand. It's also further reinforced by the  
24 fact that the operator Bill Downs, having cracked the hot  
25 cell window with a wrench was NRC business, and we

1 understand that although the material is licensed by the  
2 state of Georgia, that the hot cell and the storage pool  
3 are also under NRC jurisdiction, and we're talking about  
4 the integrity of the pool, and I think it's relevant to  
5 management style, management scope at the Neely Nuclear  
6 facility.

7 MR. TURK: I don't know if Your Honors feel  
8 there's a need to respond.

9 CHAIRMAN BECHHOEFER: If you wish, yes.

10 MR. TURK: Well, my response would be that Mr.  
11 Downs was an employee of the reactor facility as well as  
12 some of his duties pertained to the hot cell and matters  
13 that may be beyond the scope of the reactor. However, the  
14 common thread there is that he was subject to management  
15 oversight by the facility director.

16 To the extent that the facility director may  
17 have been aware of this individual's negligent behavior,  
18 that may be relevant to the management of the facility.  
19 There's nothing relevant about the risk posed by cobalt 60.  
20 That's not a management issue, there is nothing in this  
21 part of the exhibit that relates to management, that is  
22 being excluded, there's no common thread with management of  
23 the reactor facility and therefore it's simply not  
24 relevant, apart from being beyond the jurisdiction of the  
25 Board.

1                   CHAIRMAN BECHHOEFER: The way Mr. Turk just  
2 expressed it is pretty much the way we feel. To the extent  
3 that questions may tangentially relate to management of the  
4 facility and perhaps the pool, I can't say in advance that  
5 they would all be allowed, but we would certainly tend to  
6 allow such questions. But the risks of cobalt 60 as such  
7 are basically what we've outlined to be not accepted into  
8 evidence and the Board will so rule that the portions that  
9 we've outlined, Mr. Evans outlined, and I guess we  
10 supplemented a little bit. Those portions will not be  
11 considered as part of the direct testimony.

12                   MR. EVANS: Thank you.

13                   CHAIRMAN BECHHOEFER: With those exceptions,  
14 the testimony of Dr. Tsoulfanidis will be accepted into the  
15 record and will be bound into the record as if read at  
16 whatever page we are at.

17                   MR. EVANS: And also, Georgia Tech Exhibits 1  
18 and 2, we've offered those into evidence and I think they  
19 were not objected to.

20                   CHAIRMAN BECHHOEFER: Yes, those exhibits will  
21 be admitted and I guess since they're attached, they'll  
22 just be found in like everything else. Normally we haven't  
23 been doing exhibits but since number 2 particularly is such  
24 an integral part of the testimony, I think the whole thing  
25 should be bound into the record.

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Charles Bechhoefer, Chairman  
Dr. Jerry R. Kline  
Dr. Peter S. Lam

_____	)	
In the Matter of:	)	
	)	
GEORGIA INSTITUTE	)	
OF TECHNOLOGY	)	Docket No. 50-160-Ren
	)	
Atlanta, Georgia	)	ASLBP NO. 95-710-01-Ren
	)	
Georgia Tech Research	)	
Reactor	)	
	)	
Renewal of License No. R-97	)	
_____	)	

TESTIMONY OF  
DR. NICHOLAS TSOULFANIDIS

1. Q. For the record, would you state your name and address?  
  
A. Nicholas Tsoulfanidis, 10310 Line Avenue, Rolla,  
Missouri 65401-5694.
2. Q. What is your current employment?

A. I am a professor of Nuclear Engineering at the University of Missouri-Rolla, where I also hold the position of Assistant Dean for Research in the School of Mines and Metallurgy. I am also Radiation Safety Officer for the Rolla Campus.

3. Q. How long have you been on the Nuclear Engineering faculty at the University of Missouri-Rolla?

A. Since 1968, when I started as an Assistant Professor of Nuclear Engineering. I was promoted to the rank of Associate Professor in 1972 and full Professor in 1980.

4. Q. How long have you served as Radiation Safety Officer for the Rolla Campus?

A. Since 1975, or approximately 21 years.

5. Q. How long have you been Assistant Dean for Research in the School of Mines and Metallurgy?

A. Since 1989.

6. Q. Is this an administrative position?

A. Yes.

7. Q. Have you held any other administrative positions at the University of Missouri?

A. I was Chairman of the Department of Nuclear Engineering from 1981 to 1985, and interim Vice Chancellor for Academic Affairs from 1985 to 1986.

8. Q. Given your administrative and radiation safety officer responsibilities, do you still engage in classroom teaching?

A. I do. About 50 percent of my time is budgeted to classroom teaching, with the other 50% divided between my administrative responsibilities and research.

9. Q. What sort of classes have you taught during the past five years?

A. Classes I have taught include Reactor Physics, Radiation Protection and Shielding, Nuclear Fuel Cycle, and Radioactive Waste Management.

10. Q. Does the University of Missouri have a Nuclear Reactor?

A. It does. Its a 200KW reactor.

11. Q. Do your responsibilities as the Radiation Safety Officer of the Campus cover the operations of this reactor?

A. They do.

12. Q. Would you tell us what academic degrees you hold?

A. (1) B.S. Physics, University of Athens, Greece (1960);  
(2) M.S. in Nuclear Engineering, University of Illinois, (1965);  
(3) Ph.D. Nuclear Engineering, University of Illinois (1968).

13. Q. Are you a member of any professional societies or organizations?

A. I am. They include the Health Physics Society, the American Nuclear Society, the National Society of Professional Engineers and the Missouri Society of Professional Engineers.

14. Q. Have you been actively involved in any particular sections, divisions, or committees of the American Nuclear Society?

A. I have. I have held the Chairmanship as well as served as Secretary of the Radiation Protection and Shielding Division of the Society. From 1987 to 1990 I was a member of the Society's special committee on the review of a reactor risk reference study. In 1991-92, I was Chairman of the Central Eastern Missouri Section of the American Nuclear Society. Other activities of this nature are listed at p. 3 of my *Vitae*.

15. Q. I show you what is being offered into evidence as GT-1. Is this your current *Vitae*?

A. It is. [Note: GT-1 is appended.]

16. Q. I note that at p. 3 of your *Vitae* you state that your research interests include Health Physics-Radiation Protection, Nuclear Fuel Cycle, Radiation Transport and Radioactive Waste Management. Does this relate to the courses which you have developed as set forth on p. 2 of your *Vitae* under "Course Development"?

A. It does.

17. Q. Are these interests, including Health Physics and Radiation Protection, matters you have written about in your 26 publications listed at pp. 4-6 of your *Vitae*?

A. They are.

18. Q. Have these interests, including Health Physics and Radiation Protection, been included in the 19 presentations you summarize as having been made at national meetings of the American Nuclear Society and other professional organizations at pp. 6-7 of your *Vitae*?

A. They are.

19. Q. Excluding the Neely Nuclear Research Center at the Georgia Institute of Technology, have you ever engaged in any professional evaluative work concerning nuclear programs?

A. I have. I was, for example, appointed by the government of Greece to serve on a committee to professionally evaluate the scientists of the Democritos Nuclear Research Center in Athens, Greece.

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20. BASED UPON HIS EDUCATION, TWENTY-EIGHT YEARS OF TEACHING, PUBLISHED RESEARCH AND PRACTICAL EXPERIENCE IN THE FIELD OF NUCLEAR ENGINEERING, SPECIFICALLY INCLUDING HEALTH PHYSICS AND RADIATION PROTECTION, THE GEORGIA INSTITUTE OF TECHNOLOGY OFFERS DR. NICHOLAS TSOUHFANIDIS AS AN EXPERT WITNESS IN THIS FIELD BOTH GENERALLY AND WITH SPECIFIC REFERENCE TO HEALTH PHYSICS AND RADIATION PROTECTION.

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21. Q. Dr. Tsoulfanidis, have you been requested to undertake an evaluative investigation relating to the managerial organization and functioning of the Neely Nuclear Research Center at the Georgia Institute of Technology?

A. I was asked to investigate the managerial structure of the Center, and how it was functioning, in particular with respect to concerns of Georgians' Against Nuclear Energy ("GANE") about the operational safety of the facility.

22. Q. Would you explain briefly how your involvement in the matter came about?

A. Early last November (i.e. 1995), I was contacted by a Ms. Pat Guilday of the Georgia Attorney General's Office to see

if I would be interested in evaluating the current management structure and organization of Georgia Tech's nuclear research facility. It was explained to me that this investigation and evaluation was in the context of a particular contention (i.e. Contention No. 9) made by Georgians' Against Nuclear Energy ("Gane") in connection with a license renewal proceeding pending before the United States Nuclear Regulatory Commission. Ms. Guilday forwarded me a copy of GANE's ninth contention. As a part of the request, I was also asked to make any recommendations I might have as to how management at the Center might be improved. I accepted the assignment.

23. Q. How did you go about making your evaluative investigation and evaluation of the Center's organizational structure and operation?

A. In December 1995, after having previously identified specific records that I wanted to review and persons I wanted to interview, I spent three days at the Center in Atlanta. I reviewed extensive documentary records including the following:

- (1) Minutes of the Nuclear Safeguards Committee since 1987.

- (2) Procedures (I did not check every individual procedure; instead I concentrated on the question: Is there an area not covered?)
- (3) Annual audits of the program.
- (4) NRC inspections.
- (5) GANE concerns and NRC and Georgia Tech's written responses to the same.
- (6) Safety Analysis Report for the Neely Nuclear Research Center.
- (7) Neely Research Center Emergency Preparedness Plan.
- (8) Radiation Safety Manual.

I also interviewed the following individuals, who were asked a number of questions in common in order to evaluate differences in their responses to the questions posed:

- (1) Dr. Ratib Karam, NNRC Director
- (2) Mr. Dixon Parker, Reactor Supervisor
- (3) Mr. Edgar Jawdeh, Health Physicist
- (4) Dr. Rodney Ice, Manager, Office of Radiation Safety (MORS)
- (5) Mr. Billy A. Statham, Sr., Reactor Operator
- (6) Dr. Gary Poehlein, Professor of Chemical Engineering, Former Vice President for Interdisciplinary Programs

- (7) Mr. E. C. Cobb, Chairman of the Nuclear Safeguards Committee (a telephone interview)

I also talked to the following of the Georgia Tech administration:

- (1) Dr. John White, Dean of Engineering,
- (2) Dr. J. Narl Davidson, Associate Dean of Engineering,
- (3) Dr. Jean-Lou A. Chameau, Vice Provost for Research.

In an exit interview, I talked with Mr. Randy Nordin, Mr. Gary Wolovick, and Ms. Pat Guilday.

24. Q. Directing your attention to GANE's specific contention that:

"Management problems at the GTRR are so great that safety for the public cannot be assured,"

Did you as a result of your investigation and evaluation of the Neely Nuclear Research Center's managerial organization and function, find any evidence which in your professional opinion substantiates this contention of GANE?

A. I did not. Quite to the contrary, I found the Director of the Center, Dr. Ratib Karam, to be very safety conscious. My review indicated to me that the

Nuclear Safeguards Committee was operating effectively with excellent membership, an outstanding feature of which is that some of the members are not Georgia Tech employees. Every year the Committee conducts an annual audit of the program, an audit which includes a review of all procedures--in my judgment an excellent practice. Based upon the structure of the radiation safety program at the Center, I found no evidence which would warrant concern on the part of the public about the safety of the Center's operation.

25. Q. Based upon your education and twenty-eight years of teaching, research and practical experience in nuclear engineering, specifically including the areas of Health Physics and Radiation Protection, have you formed any professional opinion, as a result of your investigation and evaluation, as to the safety of the Center's nuclear research operations under its current organizational structure and current Director?

A. I have.

26. Q. Would you state what your professional opinion is on the matter?

A. It is my professional opinion, based upon my education, experience and expertise in the area of nuclear engineering generally, and with specific reference to Health Physics and Radiation Protection, that the managerial organization and operation of the Georgia Institute of Technology's Neely Nuclear Research Center, as presently constituted and under its current director is not inimical to the reactor's safe operation or to public safety generally.

27. Q. Do you have any opinion as to whether the future use of the reactor offers any significant research possibilities which are of importance to the general public?

A. I do. In my opinion, the reactor offers significant research possibilities as a source of neutrons and gammas. Potential research would include the use of the medical room, for neutron irradiation, for brain tumor therapy, with some effort apparently being already under way in programs involving the Georgia Institute of Technology and Emory University.

28. Q. Did you prepare any written report in connection with your investigation and evaluation of the managerial organization and functioning of the Neely Nuclear Research Center?

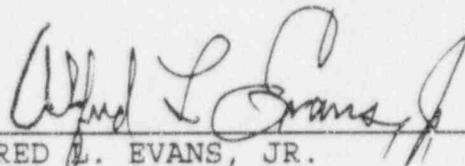
A. I did.

29. Q. I show you what is being offered into evidence as GT-2. It purports to be a report prepared by you on 3 January 1996, concerning "Management, Structure and Safety Issues Related to the Neely Nuclear Research Reactor and the Radiation Safety Program at Georgia Tech." Would you examine the report and tell us whether it is in fact the report you made and submitted to Ms. Pat Guilday?

A. It is. [Note: GT-2 is appended.]

END OF TESTIMONY OF DR. NICHOLAS TSOUFANIDIS  
ON DIRECT EXAMINATION BY ALFRED L. EVANS, JR.,  
SENIOR ASSISTANT ATTORNEY GENERAL,  
STATE OF GEORGIA

Submitted this 3rd day of May, 1996.



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April '96

**NICHOLAS TSOULFANIDIS**  
**PROFESSOR OF NUCLEAR ENGINEERING**  
**AND ASSISTANT DEAN FOR RESEARCH**  
**SCHOOL OF MINES AND METALLURGY**  
**UNIVERSITY OF MISSOURI-ROLLA**

**EDUCATION**

B.S., Physics, University of Athens, Greece, 1960  
M.S., Nuclear Engineering, University of Illinois, 1965  
Ph.D., Nuclear Engineering, University of Illinois, 1968

**ACADEMIC POSITIONS**

1989-present Assistant Dean for Research, School of Mines and Metallurgy  
1975-present, Radiation Safety Officer for the Campus  
1980-present, Professor Nuclear Engineering

1985-1986, Interim Vice Chancellor Academic Affairs  
1981-1985, Chairman Department of Nuclear Engineering  
1972-1980, Associate Professor Nuclear Engineering  
1968-1972, Assistant Professor Nuclear Engineering

**NON-ACADEMIC EXPERIENCE**

1986-1987, On leave, at the Nuclear Research Center CADARACHE, France.  
1976-1979 (Summer), Arkansas Power & Light Co, Nuclear Fuel Mgt. Group.  
1974-1975, On leave, Senior Engineer at General Atomic Company, Advanced  
Systems Division, Gas Cooled Fast Breeder Reactor.  
1961-1963 Nuclear Research Center DEMOKRITOS, Athens, Greece.

**LANGUAGES :** English, French, Greek

**PROFESSIONAL REGISTRATION**

Registered Professional Engineer in Missouri.

**PROFESSIONAL AFFILIATIONS**

Health Physics Society,  
American Nuclear Society,  
National Society of Professional Engineers,  
Missouri Society of Professional Engineers

## HONORS AND AWARDS

- \* Outstanding Teacher Nuclear Engineering Department, 1984-85, 1987-88, 1993-94.
- \* Outstanding Teacher Award, University of Missouri-Rolla, 1968-69, 1970-71, and 1989-90.
- \* Outstanding Faculty Advisor, Alumni Award, 1990-91.
- \* Who's Who in the Midwest, Who's Who in America, American Men and Women of Science, Who's Who in Frontier Technology Today, Men of Achievement, Who's Who in Engineering.
- \* Glenn Murphy Award, given by the NE Division of ASEE for outstanding contributions to the profession and teaching of Nuclear Engineering (1995)
- \* Distinguished Service Award, Radiation Protection & Shielding Division, American Nuclear Society (1995)

## COURSE DEVELOPMENT

- \* "Nuclear Radiation Measurements" (NE 204) One major outcome of this effort is a text entitled "Measurement and Detection of Radiation", published in 1984 by the Hemisphere (McGraw-Hill) Publishing Co; 2nd Edition, 1995.
- \* Reactor Physics course, for both Undergraduates and Graduates
- \* Radiation Shielding, Graduate Course
- \* Nuclear Fuel Management (NE 307) (a text on this topic, co-authored by Dr Robert Cochran, of Texas A&M, was published by the American Nuclear Society, 1990)
- \* "Health Physics" (NE 333).
- \* "Radiation Protection Engineering" (NE 335).
- \* "Radioactive Waste Management" (NE 345).

## SHORT COURSES - INSTITUTES

- \* "Radiation protection Engineering", organized by WOODSON Associates, offered in October 1993, in S. Francisco, CA.
- \* "Measurement and Detection of Radiation", organized by WOODSON Associates, offered in April 1993, in Las Vegas, NV; repeated in February 1994 in Orlando FL, and for Duke Power Eng., May 1995.
- \* Director of a short course on "Fusion Power" offered for McDonnell-Douglas engineers, in St. Louis MO, Fall 1981.
- \* "Radioactive Waste Management", short course offered in April 1986 in St. MO by Westinghouse; Lecturer.

## PROFESSIONAL SERVICE

### *American Nuclear Society*

- \* 1991-92, Chairman, Central-Eastern Missouri Section of the American Nuclear Society.
- \* 1987- 90, Member American Nuclear Society Special Committee on the review of the Reactor Risk Reference Study (NUREG -1150)
- \* 1987-1988, Chairman Radiation Protection & Shielding Division.
- \* 1984-1986, Secretary Radiation Protection & Shielding Division
- \* 1983- 1988, Member Program Committee Rad Prot. & Shielding Division.
- \* 1972-1973, Chairman Program Committee Education Division.
- \* Reviewer of Technical Papers for the Society's National meetings.
- \* Chairman of Technical Sessions at National meetings of the Society.
- \* Member Professional Development and Accreditation Committee, 1995-98.
- \* Chair, ANS Standards Committee 6.6.1 (Skyshine radiation) 1996

### *Missouri Society of Professional Engineers.0 (MSPE)*

- \* 1985-1986, President, Rolla Chapter, MSPE .
- \* 1993-96 , Chairman of the Energy Committee of the MSPE.

### *Other Professional Activities*

- \* Reviewer for Nuclear Technology, Nuclear Science & Engineering, and Health Physics.
- \* Reviewer of DOE-ORAIJ Fellowship Program for Nuclear Engineering and Radioactive Waste Management (1984-1985).
- \* Missouri Nuclear Emergency Team (MONET)-Member 1981-present
- \* Appointed by the Greek Government a member of the Committee that made a professional evaluation of all the scientists at the Nuclear Research Center DEMOCRITOS, Athens, Greece, 1987-88.

## RESEARCH INTERESTS

Radiation Transport (neutrons, gammas, charged particles). Health Physics- Radiation Protection. Nuclear Fuel Cycle. Radioactive Waste Management.

## RESEARCH GRANTS

- \* Sponsored by the Arkansas Power & Light Co to write a code for Nuclear Fuel Cost (APLCOST), \$10,000 (1978-79).

\* Sponsored by EPRI for the "Calculation of Neutron Energy Spectra in Pressurized Water Reactors", \$357,000 (1980-1984). The objective of this work was to establish a methodology for the best possible calculation of the neutron fluence at the position of the Pressure Vessel in order to obtain a more accurate estimate of the radiation damage to the vessel by fast neutrons. Knowing the damage, allows prediction of the long-term integrity of the Pressure vessel under normal and accident conditions.

The results of this research appear in three EPRI Reports (EPRI NP-3776, EPRI NP-4238, EPRI NP-5622).

## BOOKS

\* "Measurement and Detection of Radiation". McGraw-Hill-Hemisphere Publications, 1983. Has been translated in Japanese (1986) and in Farsi (Persian) (1993). Second edition of this book, published by Taylor-Francis in March 1995.

\* "Nuclear Fuel Cycle: Analysis and Management", with Dr. Robert Cochran of the Texas A&M University. Published by the American Nuclear Society Fall 1990. Second printing 1992.

## PUBLICATIONS

"Pulse Propagation Experiments with a Reactor Source", with G.H.Miley and P.K.Doshi, Proceedings of the Symposium on Neutron Noise, Waves, and Pulse Propagation, University of Florida, AEC Symposium series 8, p.117-134 (1967)

"The Use of an Analytical Response Function for Unfolding Beta Spectra, with B.W.Wehring and M.E.Wyman, Nucl.Instr.Meth.,73,98 (1969).

"Measurements of Time-Dependent Energy Spectra of Beta Rays from U-235 Fission Fragments", with B.W.Wehring and M.E.Wyman, Nucl.Sci.Eng.,43,42 (1971).

"Calculation of Gamma-Ray Buildup Factors Including the Contribution of Bremsstrahlung", with J.P.Kuspa, Nucl.Sci.Eng.,52,117 (1973).

"Two Fusion Reactor Blankets with Vanadium as Structural Material", with J.E.Struve, Nucl.Tech.,21,201 (1974).

"Gamma-Ray Attenuation Coefficients for Higher Green Plants", Health Phys., 145 (1974) (Tech. Note)

"A Radiation Damage Computer Simulation System", with J.P.Kuspa and D.R.Edwards, Proceedings of the International Conference on Computer

Simulation for Materials Application, NBS Gaithersburg, MD April 1976, p.337-364 (1976).

"Economic Performance of Liquid Metal Fast Breeder Reactor and Gas Cooled Fast Reactor Radial Blankets", with M.M.H. Jankhah, Nucl. Tech., 44, 162 (1979).

"Energy Analysis of Coal, Fission, and Fusion Power Plants", Nucl. Tech. Fusion, 1, 238 (1981).

"The Effects of Plant Reliability Improvement in the Cost of Generating Electricity", with S. Hejat and R.C. Sanders, Nucl. Tech., 56, 372 (1982).

"Neutron Energy Spectra Calculations in Three PWR's", with D.R. Edwards, C. Abou-Ghantous, K. Hock, and F. Yin, Proceedings 5th ASTM-EURATOM Symposium on Reactor Dosimetry, GKSS Research Center Geesthacht, FRG, Sept 1984, p. 693-701.

"Pressure Vessel Dosimetry at U.S. PWR Plants", with C.O. Cogburn and J.G. Williams, Invited Paper, Proceedings 5th ASTM-EURATOM Symposium on Reactor Dosimetry, GKSS Research Center, Geesthacht, FRG, Sept. 1984, p. 11-20.

"Neutron Dosimetry of PWR Pressure vessels", with C.O. Cogburn and J.G. Williams, Proceedings of ANS Topical on Theory and Practices in Radiation Protection and Shielding, Knoxville TN, April 1987.

"PWR Pressure Vessel Neutron Spectra at McGuire-1" EPRI NP-5622, Feb. 1988.

"Radioactive Waste Management" with R.G. Cochran; review article; Nucl. Tech., 93, 283-304 (1991).

"Hot Particle Self-absorption Factor", Health Phys., 60, 641, (1991) publication in Health Physics.

"Dose Rates for Several Organs in a Human from Contaminated Soil and Hot Particles Using the QAD Computer Code", with K. Phillips, Health Phys., 61, 653-663 (1991).

"Application of Conformal Mapping to Nodal Methods for Hexagonal Nodes", with Y.A. Chao. Presented at the Joint International Conference on Mathematical Methods and Supercomputing in Nuclear Engineering, April 1993, Karlsruhe, Germany.

"A Model Engineering Curriculum for the 21st Century", Proceedings of the ASEE Centennial Celebration Conference, Rolla, MO, April 1993.

"Cadmium cutoff energy for MCNP modeling of dosimetry reactions", Nucl. Sci. Eng., 118, 103 (1994).

"Gamma Dose Received by Internal Organs and the Fetus from External Sources, Calculated with the MCNP code", with B.J. Shrestha, Rad. Prot. Mgt., p. 21-40, Jan./Feb., 1995.

"Geometry factors used for the calculation of gamma dose received by various organs of a human phantom", with B.J. Shrestha, Rad. Prot. Mgt., p. 56-66, Jul/Aug., 1995.

"Conformal mapping and hexagonal nodal methods- I: Mathematical foundation", with Y. A. Chao, Nucl. Sci. Eng., 121, p. 202-209, 1995.

"Neutron fluence at the Pressure Vessel of a PWR determined with the MCNP code", with Pete Laky, Nucl. Sci. Eng. 121, 433-477 (1995).

"Exposure buildup factors of  $UO_2$  using the Monte Carlo Method," with A. Bozkurt, has been accepted for publication by Nuclear Tech., (1996).

#### PRESENTATIONS IN NATIONAL MEETINGS

"Monte Carlo Buildup Factor Calculations Including the Contribution of Bremsstrahlung", with J.P. Kusps, ANS Trans., 15, 553 (1972).

"Gamma-Ray Albedo Calculations Including the Contribution of Bremsstrahlung", with E. Aslani, ANS Trans., 17, 572 (1973).

"Infinite Medium Buildup Factors Including the Contribution of Bremsstrahlung", ANS Trans., 16, 394 (1974).

"The Role of Nuclear Engineering Students in Public Understanding of Nuclear Power", ANS Trans., 18, 33 (1974).

"Analysis of the GCFR Critical Experiments", with R.A. Moore, A.L. Hess, and R.J. Carbone, ANS Trans., 22, 694 (1975).

"Thorium Utilization in Gas-Cooled Fast Breeder Reactors", with R.J. Carbone, ANS Trans., 22, 703 (1975).

"Comparison of Nuclear and Coal Power Plants Using Net Energy Analysis" with G. Suwal, 4th Annual UMR-DNR Conference on Energy, Oct. 1977, Rolla MO.

"Comparison of Economic Performance of LMFBR and GCFR Radial Blankets", with M.H. Jankhah, ANS Trans., 26, 364 (1978).

"The Effect of Reliability Improvement in the Cost of Generating Electricity", with S. Nejat, ANS Trans., 34, 588 (1980).

"Public Information Activities of the ANS Student Branch at the University of Missouri-Rolla", ANS Trans., 34, 69 (1980).

"NRC-EPRI Studies of Pressure Vessel Cavity Neutron Field", with J. Grundl et al, NRC 9th Water Reactor Safety Information Meeting, Oct. 1981, NBS, Washington D.C.

"Calculation of Neutron Fluxes at the Pressure Vessel and Cavity of a PWR", with D.R. Edwards et al, 4th ASTM-EURATOM Symposium on Reactor Dosimetry, March 1982, NBS, Washington D.C.

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**Management Structure and Safety Issues Related to the  
Neely Nuclear Research Reactor and the  
Radiation Safety Program at Georgia Tech**

**Report Prepared by**

**Nicholas Tsoulfanidis, Ph. D., P.E.**

**3 January 1996**

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## Summary and Recommendations

1. There are no safety issues relative to the operation of the reactor at NNRC; the current Director is very safety conscious. With the nuclear fuel gone, the safety issue is non-existent.
2. With the new LEU fuel installed, a review of all components of the reactor for possible replacement or maintenance, should be performed.
3. The  $^{60}\text{Co}$  source creates a negligible risk to either the personnel at NNRC or any person outside the facility.
4. The Nuclear Safeguards Committee operates effectively and its membership is quite appropriate; minutes of the Committee should be expanded, somewhat, to include the major points of the discussion of every issue.
5. Minutes of the NSC should be circulated to the staff immediately after they are ready and should be discussed in a meeting. This discussion of the Committee actions is particularly important if new procedures or policies are instituted.
6. The Director of the NNRC and the Radiation Safety Officer should report to two different administrators; two different budgets should be established.

**Assignment:** The assignment was to investigate the management structure of the Neely Nuclear Research Center (NNRC), giving particular emphasis to safety matters.

I visited the GA Tech (GT) campus and spent three days ( Dec. 18-20, 95). I interviewed the following people:

Dr. Ratib Karam, NNRC Director  
Mr. Dixon Parker, Reactor Supervisor  
Mr. Edgar Jawdeh, Health Physicist  
Dr. Rodney Ice, Manager Office of Radiation Safety (MORS)  
Mr. Billy Statham, Sr. Reactor Operator  
Dr. Gary Poehlein, Professor of Chemical Engineering, Former VP for  
Interdisciplinary Programs  
Mr. E. Cobb, Chair of NSC; telephone interview.

From the GT administration, I talked to Dean John White and Associate Dean J. Narl Davidson, and to Dr. Jean-Lou A. Chameau, Vice Provost for Research; in an exit interview, I talked with Mr. Randy Nordin, Mr. Gary Wolovick, and Ms. Pat Guilday.

**Questions asked:** Before I asked any questions I made it clear to the person being interviewed that the conversation is confidential and is protected by a relationship similar to attorney-client. Common questions I asked individuals directly associated with NNRC are:

1. Are the minutes of the Nuclear Safeguards Committee (NSC) shared or discussed with you ?
2. Are NRC inspection reports discussed with you? with the NSC?
3. To your knowledge, are all incidents at NNRC reported to the NSC and recorded in the minutes?
4. The 1987 contamination incident seems to be the result of a combination of procedure-related events (procedures not well written, not well understood, not well followed etc). Has this situation improved since then? Could such an incident happen again?
5. You are about ready to ship out the fuel. Are the relevant procedures ready? Do you feel that you are ready for this operation?
6. Is there an established process for operating procedures addition, modification, or elimination?

The answers to these questions ( based also on the files and records I checked; see next section) are all yes . In question # 4, the answer to the question about the contamination incident happening again is: It is highly unlikely.

#### **Records checked:**

1. Minutes of the NSC since 1987
2. Procedures ( I did not check every individual procedure; instead, I concentrated on the question: is there an area not covered?)
3. Annual audits of the program
4. NRC inspections
5. GANE concerns and NRC and GT response.
6. Safety Analysis Report for NNRC
7. NNRC Emergency Preparedness Plan
8. Radiation Safety manual

#### **Safety Issues:**

The primary safety concern is potential unnecessary radiation exposure of (a) the NNRC personnel, and (b) the public that may result from activities and operations taking place at the NNRC. After completing all the interviews and checking all the documents, I found no evidence that the GT Administration and the public should be concerned about safety matters from the activities taking place at NNRC. This statement about safety is based on what I learned about the Director's attitude towards safety and the structure of the Radiation Safety Program. Here are specific comments.

1. I have found or heard no evidence against the safety consciousness of Dr. Karam; on the contrary there was one comment made that he is so safety-occupied that some activities may be hindered.

2. The NSC has excellent membership; it is an outstanding feature that some members are not GT employees (the present Chair is not a GT employee also). The NSC meets as frequently as required. Every year all the NSC members participate in the annual audit of the program, an audit that includes a review of all the procedures. Excellent practice!

If I have one criticism concerning the NSC is the minutes of the meetings. The minutes are so compact that it is difficult to understand the item discussed and impossible to see the logic behind a decision, since none of the discussion is included in the minutes. I realize that the minutes of any meeting should not include all that was said, but it is not right to include only titles of items discussed and the decision made.

3. NRC inspections resulted in violations, many times. This is unfortunate, but the important fact is that no violation had to do with overexposure or even exposure of any significance of staff or the public; also, none of the violations were the result of unsafe operation of the reactor. The most serious violation was the errors discovered in a report that recorded releases of radioactivity to the environment. This matter was discussed by the NSC and the response of the University satisfied the NRC. The discrepancies of release rates were the result of sloppy arithmetic; it was not an attempt to hide unlawful activities and the important piece of information for this matter is that the releases were far below the NRC allowed limits.

4. The reactor at NNRC is a safe machine with inherent safety features, i.e. safety features that depend on physical laws. It offers research possibilities as a source of neutrons and gammas. Potential research would include the use of the medical room, for neutron irradiation (some effort is already underway involving GT and Emory University), the use of the cobalt source, to study effects of gammas on sterilization of food, instruments etc and also effects on such reactor components as cables, seals, and other materials whose performance may be affected by high gamma doses over a long period of time.

In the nuclear industry, the effort to extend the life of existing nuclear power plants will increase; in order for the NRC to extend a license, all safety questions have to be answered; granted, the main concern is the integrity of the pressure vessel, but all components must operate reliably; if not, the capacity factor (which determines the electricity produced and sold) will decrease and will make the nuclear plant less economical. Thus, there is definitely going to be increased research activity in the area of neutron and gamma radiation effects and the NNRC has the capability to provide the required radiation source for such research.

Even when the fuel is in the core and the reactor is operating, the facility has been and will continue to present negligible risk to students, faculty, and staff of GT and, of course, to the public. When the fuel is removed, the risk is essentially zero. The only potential risk at NNRC after the HEU fuel is removed and before the new LEU fuel is installed in the core, is the  $^{60}\text{Co}$  source.

#### **Risk from $^{60}\text{Co}$ source.**

The NNRC has about 250,000 Ci of  $^{60}\text{Co}$  in a pool of water. The source is solid, encapsulated in metal, and cobalt, it should be mentioned, is insoluble in water. The only incident that one might think to happen, which is extremely unlikely, is the loss of water in the pool. If the water is lost, the question arises what is the dose rate at the outside wall of the building housing the source? The dose rate inside the building should not raise any concerns because that is an area controlled by the NNRC staff.

I performed a calculation, using very conservative assumptions, of the dose rate at the outside of the wall of the building, at a point where the highest dose rate would be expected (point A, see sketch). With the water gone, radiation shielding is provided by the wall of the pool, the soil between the pool and the wall, and the building wall itself. I made the following assumptions.

- (i) The source is located at the center at the bottom of the pool.
- (ii) I neglected any self-absorption in the source and attenuation by the air.
- (iii) I assumed all the shielding material to be soil (dirt) with density  $1.5 \text{ g/cm}^3$ , i.e. I considered the concrete walls to have that density as well (true concrete density is at least  $2.35 \text{ g/cm}^3$ ).
- (iv) I considered the gamma-ray buildup (from scattering of gammas in the attenuating medium).
- (v) I considered 'skyshine' radiation, i.e. gammas that hit the ceiling of the building and are scattered back towards the point of interest. I made the very conservative assumption that 3% of the gammas hitting the ceiling are reflected back towards the outside wall.

The result of the calculation is:

Direct dose rate is about  $3 \times 10^{-8}$  mrem/h

Dose rate from skyshine is about  $6 \times 10^{-5}$  mrem/h

It should be mentioned that the background radiation level should be about 0.01 to 0.03 mrem/h (excluding radon). Thus, even under the most conservative assumptions, with the loss of water in the pool, a person could standing close to the outside wall would receive less than 1% of the background radiation that exists everywhere and is received by every person anywhere.

Based on this calculation, I do not consider it necessary to have the already existing fence around the NNRC replaced or reinforced; a new fence would just attract attention and raise questions without increasing safety.

#### **Recommendations for changes.**

1. The NNRC Director does not discuss routinely the minutes of the NSC, with his staff, after each meeting (the MORS does it, however). As a result, procedures that have been modified or approved by the NSC may not be known to the Reactor staff immediately. A couple of violations found by the NRC occurred because of miscommunication or no communication of changes approved by the NSC and not known by the staff.

The minutes of every NSC meeting should be circulated among the staff, as soon as they become available, and should be discussed in a meeting; the discussion is particularly important if new procedures or policies are instituted.

2. The minutes of the NSC should be expanded somewhat to include part of the discussion taking place. I see two advantages if this change is implemented. One, the staff will understand better the operation and decision-making process of the NSC. Two, at later times it will be easier to remember why a decision was made. A minor advantage of such change may be a better understanding by NRC inspectors as to how the NSC operates. Of course, the proposed change requires better writing and editing by the secretary of the committee.

3. The safety analysis report for the LEU fuel has been approved by the NRC. However, I have not seen any report by the reactor staff or any report requested by the Administration about replacing or upgrading reactor components other than the fuel. It will be unfortunate if the LEU fuel is installed and the operation of the facility is limited by items like malfunctioning pumps, heat exchangers, instrumentation etc.

4. The reactor of the NNRC is under-utilized by the GT faculty. I had neither the time nor the assignment to find out why. I believe, however, that the administration should try to find the answer by asking the faculty what they think about the potential uses of the NNRC. The investigation should not be restricted to the Nuclear Engineering/ Health Physics professors. Other faculty in Chemistry, Physics, Biology etc may use the reactor or the  $^{60}\text{Co}$  source.

5. The present administrative structure of the Radiation Safety Program seems to work fine and there is no evidence of any kind that safety is compromised. Thus, there is no need to replace the current Director. However, the present reporting method has the potential for errors, omissions, and abuse, particularly if the current Director is replaced and the new one is not so safety-conscious.

To be specific, at present the NNRC Director is also the RSO for the campus. Everybody else reports to him, including the MORS. The Director controls the agenda of the NSC; the director controls all budgets, including that of Health Physics activities. There is no evidence that the current Director either made mistakes or abused the system. However, whenever a program or activity is controlled by a single person the possibility of error or omission of action is possible. For this reason I recommend that the institution change the administrative structure in the following way (see also diagram).

The NNRC Director should report to the Dean of Engineering or equivalent.

The Radiation Safety Officer (or MORS) should report to the Vice Provost for research or equivalent. It is important that the NNRC Director and RSO report to two different persons.

Separate budgets should be set up for the Director of the Reactor and for the RSO.

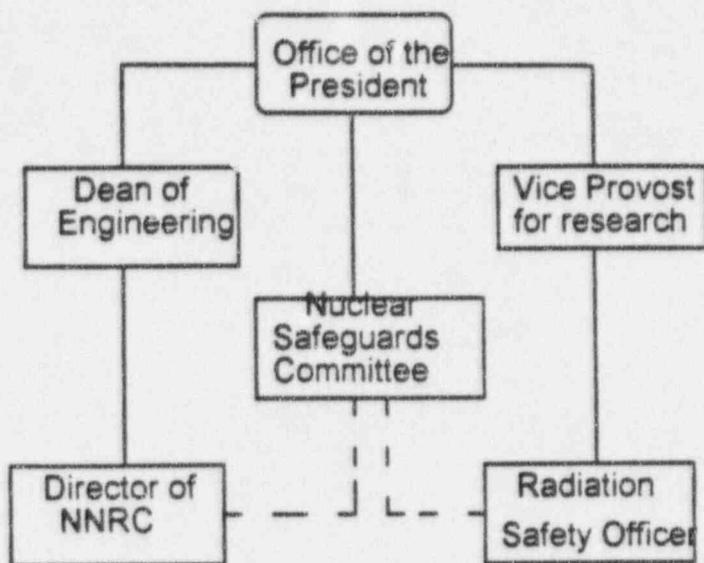
The RSO will be responsible for Health Physics coverage for the GT campus; the Director of NNRC will be responsible for the safe operation of NNRC and will get Health Physics coverage from the RSO. Both the Director and RSO,

- a. are non-voting members of the NSC; they should be allowed to send their designated representative to a meeting if they themselves cannot be present,
  - b. report to the NSC and both contribute to the agenda of the NSC meetings,
  - c. in case of differences of opinion between the Director and RSO, differences that are not covered by existing operating procedures, the NSC will resolve the issue.
6. The present structure and method of appointment of the NSC membership are excellent and should continue.

#### Acronyms used

GANE	Georgians Against Nuclear Energy
GT	Georgia Tech
HEU	Highly Enriched Uranium
LEU	Low Enriched Uranium
MORS	Manager Office of Radiation Safety
NNRC	Neely Nuclear Research Center
NRC	Nuclear Regulatory Commission
NSC	Nuclear Safeguards Committee
RSO	Radiation Safety Officer

### Proposed Administrative Structure



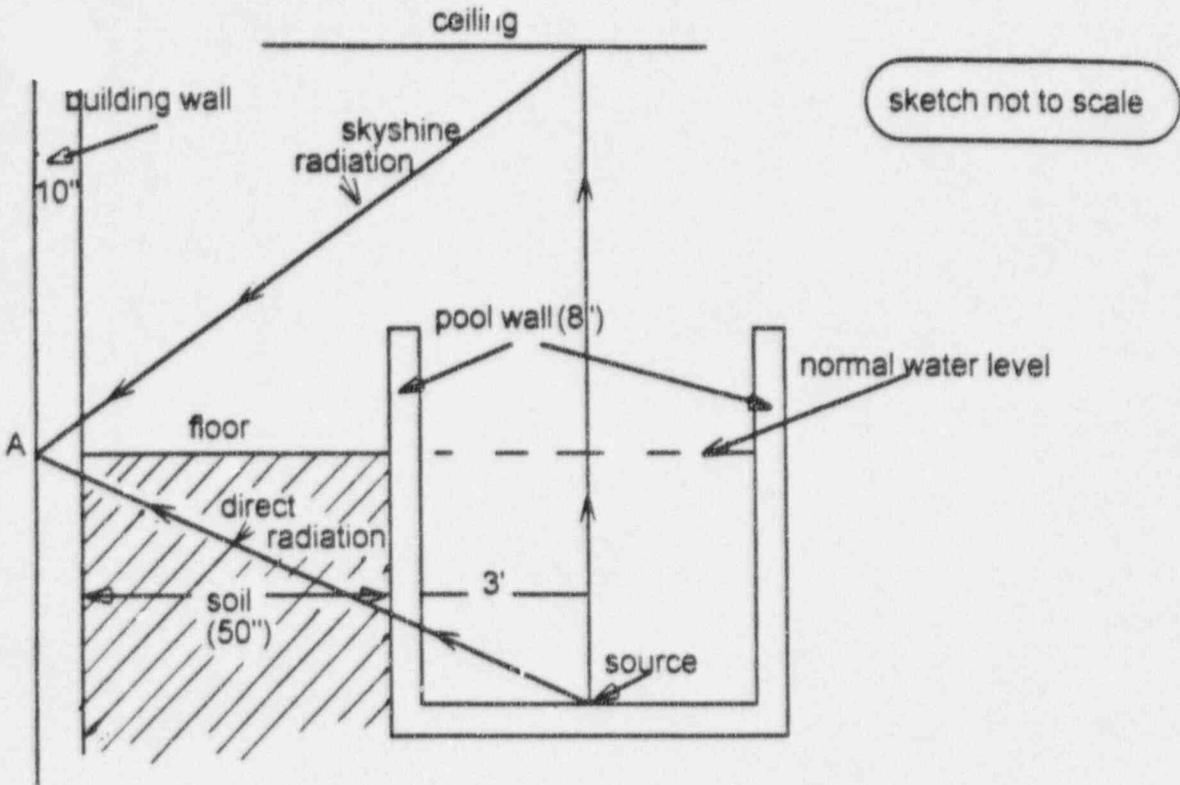


Diagram used in the calculation of the dose rate from the <sup>60</sup>Co source. Dose rate was obtained for point A.

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Charles Bechhoefer, Chairman  
Dr. Jerry R. Kline  
Dr. Peter S. Lam

\_\_\_\_\_  
In the Matter of )

GEORGIA INSTITUTE )  
OF TECHNOLOGY )

Atlanta, Georgia )

Georgia Tech Research )  
Reactor )

Renewal of License No. R-97 )  
\_\_\_\_\_

) Docket No. 50-160-Ren

) ASLBP NO. 95-710-01-Ren

CERTIFICATE OF SERVICE

I do hereby certify that copies of the foregoing Testimony of Dr. Nicholas Tsoulfanidis has been served upon the following persons by depositing a copy thereof in the United States Mail, postage prepaid:

Administrative Judge  
Charles Bechhoefer, Chairman  
Atomic Safety and Licensing  
Board  
U.S. Nuclear Regulatory  
Commission  
Washington, D.C. 20555

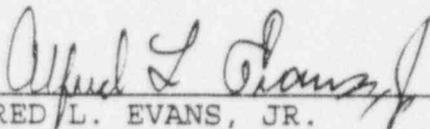
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This 3d day of May, 1996.

  
\_\_\_\_\_  
ALFRED L. EVANS, JR.  
Senior Assistant Attorney General

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(The documents, heretofore marked as Georgia Tech Exhibits Number 1 and 2, were received in evidence.)

CHAIRMAN BECHHOEFER: Do you have any further--

MR. EVANS: No, I have no further direct.

CHAIRMAN BECHHOEFER: -- direct, supplementary or whatever.

MR. EVANS: I would reserve the right obviously for redirect, depending --

CHAIRMAN BECHHOEFER: Oh, right.

MR. EVANS: -- on the scope of their questions.

CHAIRMAN BECHHOEFER: Right, but sometimes parties wish to supplement their prefiled direct.

I guess Mr. Tsoulfanidis is open for cross examination.

(Brief pause.)

CHAIRMAN BECHHOEFER: Are you ready to go?

MR. JOHNSON: Yes.

CROSS EXAMINATION

BY MR. JOHNSON:

Q Dr. Tsoulfanidis, we have -- on page 4, I wanted to ask you something about question number 10.

MR. EVANS: For the record, page 4 of the testimony or record?

MR. JOHNSON: Page 4 of the testimony.

1 Question 10 at the top of the page.

2 MR. EVANS: Thank you.

3 BY MR. JOHNSON:

4 Q Your testimony says that the reactor at the  
5 University of Missouri that you work at is a 200 kilowatt  
6 reactor. We had thought that there was a .0 megawatt  
7 reactor at this university, is that incorrect?

8 A No, the University of Missouri has four  
9 campuses; one in Columbia, one in Rolla, Kansas City and  
10 St. Louis. The big reactor is in Columbia, I am at Rolla.

11 Q Thank you. And then this 200 kilowatt reactor  
12 at Bolla (sic) then is a significantly smaller reactor than  
13 the one at the Neely Research Center, would it not be?  
14 That is a five megawatt reactor, as we understand it.

15 A That is correct.

16 Q Are there basic inherent differences between a  
17 reactor of this size and a reactor of the size at Georgia  
18 Tech?

19 A The differences will not come from the  
20 difference in power. There are differences because of the  
21 different arrangement of the fuel in the reactor and the  
22 other components that the two reactors have.

23 Q On page 5, we are looking at question number 14  
24 at the top of the page, saying that you have held the  
25 chairmanship as well as served as the secretary of the

1 Radiation Protection and Shielding Division of the American  
2 Nuclear Society. Dr. Karam, we understand is also active  
3 in the American Nuclear Society. Have you ever had any  
4 professional interaction with him through the American  
5 Nuclear Society?

6 A Yes. Not in committees though.

7 Q Just sort of general acquaintance?

8 A Seeing him at the meeting I feel confident.

9 Q We're going to skip ahead somewhat to page 10.  
10 This is again page 10 of the testimony. This is going to  
11 be question number 24 and specifically your answer to  
12 question number 24. You were asked if you found any  
13 evidence which in your professional opinion substantiates  
14 our contention and you answer: I did not. Quite to the  
15 contrary, I found the director of the center, Dr. Ratib  
16 Karam, to be very safety conscious.

17 I was going to ask what basis that statement  
18 was made from, what you would offer in defense of that  
19 statement, why did you characterize that?

20 A I based that statement on the records that I  
21 reviewed that includes minutes of the Nuclear Safeguards  
22 Committee, procedures and other documents and also the  
23 interviews that I had with various members of the staff and  
24 other people that I interviewed, and the list is there.

25 Q Did incidents such as the cadmium incident in

1 1987 -- did you consider those when you were making this  
2 evaluation?

3 A Yes.

4 Q I see. And even in light of some of the  
5 problems they've had at the facility, you felt comfortable  
6 saying that?

7 A Yes.

8 Q You mentioned in your testimony -- this is page  
9 11 -- further in the same answer basically: Every year the  
10 committee conducts an annual audit of the program, an audit  
11 which includes a review of all procedures, in my judgment  
12 an excellent practice.

13 We found from looking through the minutes, and  
14 I'm sure you may have noticed this too, that a lot of these  
15 audits which you find so valuable, were often submitted  
16 months late. Does that not to you reflect on the  
17 effectiveness of that as a tool and how much you can rely  
18 on those audits as a tool, if they're not performed  
19 promptly and on time?

20 A I do not recall the timing of the audit that  
21 you mentioned. However, it would be important if the audit  
22 discovered something that is not right, that is unsafe, et  
23 cetera. Otherwise, it's not important.

24 Q True. But obviously you conduct an audit in  
25 this case primarily to try and do troubleshooting and to

1 try and find things that may be wrong so you can respond to  
2 them promptly. Wouldn't that be the main reason for doing  
3 such an audit?

4 A Correct.

5 Q Actually at this point, I'd like to ask  
6 everyone to turn to Mr. Tsoulfanidis' report because that  
7 is part of his testimony as well, and there are some  
8 questions about that, although we do understand the parts  
9 that have been blocked out.

10 On page 2 of the testimony, this is the page  
11 directly after the summary and recommendations page --

12 A Of the testimony or the report?

13 Q Of the report. Sorry, my apologies.

14 You talk about various people you interviewed  
15 and various Georgia Tech officials that you interviewed.  
16 We see here a Dr. Jean-Lou Chameau, Vice Provost for  
17 Research. Is this person analogous to or have they  
18 replaced the Vice President for Inter-Disciplinary Programs  
19 that we had noticed on the structural charts and  
20 organizational charts that Georgia Tech has shown us  
21 concerning the organization a structure at Georgia Tech?  
22 Apparently there is a VP for Inter-Disciplinary Programs  
23 who is in the chain of command in terms of who is reporting  
24 to who. And I was wondering if Dr. Chameau has taken that  
25 position, or if not, did you also talk to the Vice

1 President for Inter-Disciplinary Programs?

2 A Well, with respect to the first question,  
3 someone from Georgia Tech ought to answer exactly what Dr.  
4 Chameau's role is. And the second one, I don't know who  
5 that person is, the second one that you mentioned.

6 Q We can perhaps clarify that. I was just  
7 wondering if you knew.

8 On page 3, there is a part marked Safety  
9 Issues. Number 1: I have found or heard no evidence  
10 against the safety consciousness of Dr. Karam. On the  
11 contrary, there is one comment made that he's so safety  
12 occupied that some activities may be hindered.

13 I know I've read a statement like that in Dr.  
14 Ice's testimony, I'm not sure where you read it. But if  
15 you have read the minutes back to 1987, as you say in your  
16 testimony, surely you're aware of allegations by former  
17 health physics personnel at Georgia Tech against the safety  
18 consciousness of Dr. Karam. There have been allegations,  
19 and again, you know, this hearing is not necessarily the  
20 place to adjudicate that and not necessarily relevant, but  
21 I just wanted to know whether you had heard about those  
22 allegations and whether you're aware.

23 A Yes, I have seen the record, I have been aware  
24 of those allegations, but based on the rest of the  
25 interview and the people I talked to and the documents I've

1 seen, it is my professional opinion that he is safety  
2 conscious.

3 Q Moving on to page 4, this is also in your  
4 report, at the bottom of paragraph or part number 3, a  
5 statement that discrepancies of the release rates were the  
6 result of sloppy arithmetic and was not an attempt to hide  
7 unlawful activities and the important piece of information  
8 for this matter is that the releases were far below the NRC  
9 allowed limits.

10 Would you not agree, Dr. Tsoulfanidis, that  
11 accurate reporting of these kind of statistics is crucial  
12 to the NRC being able to regulate these kind of facilities  
13 at all? If they don't have accurate figures, whether it be  
14 sloppy arithmetic, bad equipment, whatever the reasoning  
15 may be, doesn't this impair the NRC's ability to  
16 effectively regulate such a licensee?

17 A Yes, accurate reporting is important.

18 Q I would like to now tell everyone to follow  
19 along to page 6 also in Mr. Tsoulfanidis' report. This is  
20 number 5 at the head of this paragraph. Present  
21 administrative structure of the radiation safety program  
22 seems to work fine and there's no evidence of any kind that  
23 safety is compromised. Thus, there is no need to replace  
24 the current director. However, the present reporting  
25 method has the potential for errors, omissions and abuse,

1 particularly if the current director is replaced and the  
2 new one is not so safety conscious.

3           One of the areas we've explored during this  
4 trial is the fact that ultimate authority for the licensee  
5 cannot necessarily be seen to reside in one individual,  
6 that there is a management structure that needs to be sound  
7 in and of itself because of the simple fact that people do  
8 come and go. Dr. Karam may move on from Georgia Tech and  
9 there may be a new director come in. Do you not find that  
10 this potential for errors, omissions and abuse is of  
11 concern, considering the fact that Dr. Karam may not always  
12 be there and that these kind of management controls are  
13 crucial in order to assure a uniform level of safety  
14 regardless of personnel?

15           A       No, I don't find it a point of concern. It is  
16 my opinion though that the structure that I propose is an  
17 alternative that would work better.

18           Q       I see. Right below that are some other  
19 comments: To be specific, at present, the NNRC director is  
20 also the RSO for the campus. And then on the very next  
21 page, at the very top of page 7: It is important that the  
22 NNRC director and RSO report to two different persons.

23                   This is a very legitimate issue of confusion on  
24 the part of GANE as to the structure. Is the NNRC director  
25 the RSO or are there two different people? What is your

1 understanding of that question, Mr. Tsoulfanidis?

2 A Leaving out the names, under the present  
3 structure, the director of the reactor, Dr. Karam, is in  
4 charge also of health physics activities and the health  
5 physics people report to him. I did not, in my  
6 investigation, find anything of concern in this structure  
7 but I believe there is an alternative which I proposed.

8 Q I see. Another question, which is kind of  
9 unique to the structure at Georgia Tech, is the situation  
10 with the radiation safety officer or an RSO, and also  
11 management of the Office of Radiation Safety. In your  
12 recommendations -- again, this is also at the top of page 7  
13 -- you say: The radiation safety officer (or MORS).

14 As Georgia Tech has been operating, those two  
15 positions can and are -- can be and are different  
16 positions. What is your opinion on that? Do you feel that  
17 that is something that does need to be resolved into a  
18 single position in order to resolve with the structure that  
19 you're recommending or do you feel that having two separate  
20 entities that way and having the MORS not always be the  
21 radiation safety officer, do you feel that that's  
22 appropriate?

23 A The present management structure and the one I  
24 proposed are two different alternatives. If you look at  
25 the management of health physics in the 23 or so university

1 research reactors, you will find both of these and some  
2 variations of the two. It does not mean that one is unsafe  
3 versus another. Perhaps I was influenced by the structure  
4 that we have at my university where it is the reactor  
5 director and the radiation safety officer reporting to  
6 different people.

7 Q I see. The next question would be then I guess  
8 to draw from your personal experience at your facility at  
9 the University of Missouri, would you consider the  
10 radiation safety officer to be equivalent to the position  
11 that has been filled at Georgia Tech called Manager of the  
12 Office of Radiation Safety -- do you consider those to be  
13 equivalent positions?

14 A Yes.

15 Q Moving back to the bottom of page 6 again of  
16 the report, whenever a program or activity is controlled by  
17 a single person, the possibility of error or omission of  
18 action is possible. And you go on to say for this reason,  
19 I recommend that the institution change the administrative  
20 structure in the following way.

21 And again, even though you apparently have full  
22 faith in Dr. Karam's individual ability to protect safety  
23 concerns and so forth, do you not see an inherent safety  
24 concern with a structure that, as you put, leaves one  
25 person in control of the program and in the likelihood that

1 someone less safety conscious than Dr. Karam were to come  
2 in -- do you not feel that the possibility of omission of  
3 action, because of this structure, would cause a problem or  
4 would cause safety concerns?

5 A I didn't say it would cause a problem -- might  
6 cause a problem.

7 Q Well, don't you feel that the possibility that  
8 it might cause a problem is something that is a concern for  
9 safety matters?

10 A It is not a concern under the present structure  
11 and the present people who are there.

12 Q That's true, sir. And I'm asking do you feel  
13 that if Dr. Karam were to leave and someone less safety  
14 conscious were to come in and control the program by a  
15 single person --

16 MR. EVANS: I think I have to object to the  
17 question because it's really causing for speculation -- if  
18 Dr. Karam leaves and some unknown people come in. That  
19 would depend on who the people are who come in. This is  
20 purely speculative.

21 CHAIRMAN BECHHOEFER: We'll uphold the  
22 objection for that reason, it's too speculative.

23 MR. JOHNSON: Understood. Well, let me see if  
24 I can rephrase that.

25 BY MR. JOHNSON:

1           Q       So then, Dr. Tsoulfanidis, your understanding -  
2       - as I understand it, your testimony is that with Dr. Karam  
3       as the current director, that the current structure,  
4       although in your mind does have inherent flaws in it or a  
5       possibility of flaws, that with Dr. Karam as the director  
6       of the reactor, that safety is not compromised. Have you,  
7       during the course of your report or the course of your  
8       investigation, have you had any conversations with the  
9       president and vice presidents of Georgia Tech? As we have  
10      been discussing already in this hearing, a lot of the  
11      ultimate responsibility for the licensee's activities  
12      actually resides at a higher level than Dr. Karam, and the  
13      president and other people in the chain of command at  
14      Georgia Tech are also responsible. Did you talk with Mr.  
15      Wayne Clough, who is the president; have you talked with  
16      these people, and if so, is your faith in them as strong as  
17      your faith in Dr. Karam?

18           A       A list of the people I talked to is in my  
19      report. Obviously I did not talk to them -- to the people  
20      that you said.

21           Q       I see. Well, then perhaps to ask the question  
22      in a different way, during your research and investigation  
23      and composing this report and so forth, did you get a sense  
24      of the president's involvement in the facility, his  
25      contribution to safety, his contribution to the overall

1 management? What was your impression of that?

2 A I have no evidence one way or the other for  
3 what you're saying, for what the president does.

4 Q Dr. Tsoulfanidis, do you use -- I hope I'm  
5 pronouncing this correctly -- thermoluminescent dosimeters  
6 at your facility for tracking of -- environmental  
7 monitoring I suppose would be the correct phrase?

8 A Environmental monitoring?

9 Q Yes, these I believe are -- basically the  
10 incident that I'm referring to -- there was an incident in  
11 which these were registering extremely high levels and  
12 Georgia Tech and the NRC concluded that that was caused by  
13 exposure to sunshine and rain, so these are outside  
14 environmental monitoring devices, and I was just wondering  
15 what experience you might have with them -- you know, what  
16 your professional experience may be.

17 MR. TURK: I would object to the  
18 characterization. I don't recall sunshine being an element  
19 in the determination of what may cause the TLDs to pick up  
20 a --

21 MS. CARROLL: It was heat -- it was heat.

22 MR. JOHNSON: I apologize.

23 BY MR. JOHNSON:

24 Q The main question being do you use  
25 thermoluminescent dosimeters at your facility; you know,

1 what kind of parameters do they require for accurate  
2 operation, if you do use them.

3 A We use TLDs inside the facility.

4 Q I see.

5 A Not outside.

6 Q What would be the reason for having them  
7 outside in terms of environmental monitoring of the  
8 outside, in your professional opinion?

9 A Monitoring for radiation.

10 Q I'm sure that at your facility you also have  
11 outside monitoring equipment that you have to use. What do  
12 you use, I suppose in place of the TLDs at your facility?

13 A I don't recall.

14 Q I'm going to ask everyone to refer back to page  
15 12 of the testimony, the actual testimony itself. And this  
16 is going to be question number 27. Do you have any opinion  
17 as to whether the future use of the reactor offers any  
18 significant research possibilities which are of importance  
19 to the general public. I do, is the answer. In my  
20 opinion, the reactor offers significant research  
21 possibilities as a source of neutrons and gammas.

22 Potential research would include use of the medical room  
23 for neutron irradiation for brain tumor therapy with some  
24 effort being apparently already under way in programs  
25 involving the Georgia Institution of Technology and Emory

1 University.

2 We have heard testimony last week that this is  
3 an extremely rare form of tumor that this boron neutron  
4 capture therapy is used for. I hope I'm not reflected as  
5 being too callous in the record for asking this, but is  
6 this kind of research on such a rare ailment really of  
7 importance to the general public in your opinion?

8 A It is certainly to those who have the tumor.

9 Q Well, I would hope so and my grandfather died  
10 of a very similar tumor, so I am familiar with it. But  
11 again --

12 MR. TURK: May I just note in terms of numbers,  
13 the number that I'm familiar with is approximately 5000  
14 cases per year nationwide.

15 BY MR. JOHNSON:

16 Q So that would be less than 2000ths of a percent  
17 of the American population and --

18 MR. TURK: Assuming I'm right, and I can't  
19 testify to that, that's just a number that I'm familiar  
20 with. Ms. Woodhead is quick to point out that I'm beyond  
21 my proper scope here.

22 MR. JOHNSON: Okay, I feel that that's answered  
23 satisfactorily.

24 BY MR. JOHNSON:

25 Q In your opinion, as someone who works with

1 research reactors, this boron neutron capture therapy is  
2 not currently going on at Georgia Tech, they are still in  
3 the process of trying to develop it, how much money, in  
4 your professional opinion, do you think it would take to  
5 bring th. boron neutron capture therapy to full attainment  
6 at Georgia Tech? How much resources, how much financial  
7 investment, how much -- perhaps if there's any additional  
8 equipment that you think they might need, just whatever  
9 your opinion is.

10 A Additional equipment would not be expensive but  
11 the total expense of such an endeavor, I don't know.

12 Q Let me ask you another question, maybe this is  
13 a fairer way. How long do you feel it would take for  
14 Georgia Tech to bring their current facility up to what  
15 would be necessary to perform this kind of therapy?

16 A I cannot give you an answer in terms of time  
17 because there are many factors involved. It depends on how  
18 many people they are going to test, how much money they  
19 will get and what the general effort will be.

20 Q In the course of your investigation, Doctor,  
21 did you review NRC inspection reports over recent years --

22 A Yes.

23 Q -- concerning the Georgia Tech reactor?

24 A Yes.

25 Q Are you aware that they were cited for a

1 violation recently for the fact that their meteorological  
2 monitoring equipment has been inoperative or inaccurate for  
3 the past ten years?

4 A Yes.

5 Q And are you aware that Georgia Tech submitted  
6 the same what is known as a windrose diagram for the past  
7 several years without doing additional checking, just  
8 submitting the same diagram over and over again?

9 A I don't remember that detail; however, what I  
10 remember is that the matter has been resolved to the  
11 satisfaction of the NRC.

12 Q Would you not agree though that without  
13 sufficient monitoring equipment operating over the past ten  
14 years, that it is harder to find an accurate picture of how  
15 much damage is being done to the environment, how safe this  
16 facility is?

17 A There's no evidence --

18 MR. TURK: I was going to object in terms of  
19 the characterization, in the sense that without adequate --  
20 the question was if there was not adequate environmental  
21 monitoring in place. I don't know that that's been  
22 established, certainly not from the documents that you've  
23 just referred to.

24 BY MR. JOHNSON:

25 Q Would you not feel that having this

1 meteorological monitoring equipment inoperative or  
2 inaccurate for the past ten years makes it more difficult  
3 to paint an accurate picture of exactly how safe this  
4 facility is?

5 A There's no evidence that the equipment was  
6 inoperative or inaccurate for ten years.

7 Q I believe that there was a violation cited in  
8 '95. Perhaps we are off base on this and perhaps this is  
9 something that we need to revisit at a later point in the  
10 proceeding, but that was our understanding. And this would  
11 be, to our understanding, NRC inspection report 95-01. But  
12 again, that's not necessarily for you, Dr. Tsoulfanidis and  
13 we don't need to belabor that during your testimony.

14 We only one last question, Dr. Tsoulfanidis.  
15 Do you consider it appropriate or proper to move  
16 radioactive material from one location to another without  
17 the presence of a radiation safety officer involved in the  
18 proceeding?

19 MR. TURK: I would object to that line. Is  
20 there some connection that you propose to make?

21 MR. JOHNSON: Let me rephrase that. Let me go  
22 ahead and try and rephrase this in such a way that it might  
23 be more appropriate.

24 BY MR. JOHNSON:

25 Q As someone who works at one of these

1 facilities, I'm sure that you've been involved in the  
2 movement of radioactive materials before.

3 A Yes.

4 Q When this is undertaken, is it not common,  
5 proper procedure -- however one would wish to phrase it --  
6 to have a radiation safety officer present in order to make  
7 sure that movement of materials is done safely?

8 A No. It depends on what the material is, the  
9 activity, the isotope, where it goes, from where to where.

10 Q Would you agree that the radiation safety  
11 officer in such a situation should probably be consulted,  
12 even if they aren't actually present?

13 A If radioactive material is moved and the  
14 movement has to be recorded, an person from the health  
15 physics office should check and authorize that move.

16 MR. JOHNSON: We have no further questions.

17 CHAIRMAN BECHHOEFER: Mr. Turk, let's take a 15  
18 minute break.

19 (A short recess was taken.)

20 CHAIRMAN BECHHOEFER: Back on the record. Mr.  
21 Turk.

22 MR. TURK: Thank you.

23 FURTHER CROSS EXAMINATION

24 BY MR. TURK:

25 Q Dr. Tsoulfanidis, I have just a few questions

1 for you deriving from your testimony and then I'd like to  
2 focus more on your report.

3 But first, in terms of background, you  
4 testified earlier concerning the organizational structure  
5 at University of Missouri-Rolla, where you are employed. I  
6 do have a copy of an organizational chart from your  
7 facility. Am I correct that at Rolla, the health physics  
8 staff reports up to the radiation safety officer who then  
9 reports up to the vice chancellor for administrative  
10 services and then that office reports over to the  
11 chancellor?

12 A Correct.

13 Q And in turn, the reactor manager reports up to  
14 the director of the nuclear reactor, who reports to the  
15 School of Mines and that office then reports up to the  
16 chancellor's office?

17 A Correct.

18 Q So there, you do have two distinct lines of  
19 reporting responsibility, one for health physics and one  
20 for the reactor operation. That's correct?

21 A Correct.

22 Q Are you familiar as well with the structure in  
23 place at the University of Missouri -- is it Columbia?

24 A Columbia. I believe there was a recent change,  
25 I'm not sure I'm familiar with the most recent

1 administrative structure.

2 MR. TURK: Your Honor, may I approach the  
3 witness?

4 CHAIRMAN BECHHOEFER: Yes.

5 BY MR. TURK:

6 Q I have with me an organizational chart dated  
7 May 8, 1989, for the University of Missouri Research  
8 Reactor Facility and that is the facility at Columbia, am I  
9 correct?

10 A Oh, this is the research reactor, okay.

11 Q That's the Columbia facility?

12 A Yes.

13 Q Now I don't know if this reflects the recent  
14 change that you mentioned.

15 A Yes, the recent change, as far as I know, is  
16 that the director of the reactor reports to the dean of  
17 engineering.

18 Q Instead of the way this chart shows, the vice  
19 provost for research?

20 A Right.

21 Q May I call your attention, however, to two  
22 lines of authority below the reactor facility director. Is  
23 it correct that there are two lines on this organizational  
24 chart that report to the facility director?

25 A No, this part, the reactor manager reports to

1 the director and the health physics manager also reports to  
2 the director at that facility.

3 Q That facility, at least at Columbia, health  
4 physics reports to the reactor director.

5 A Correct.

6 Q Along with the operations staff and the reactor  
7 manager.

8 A Correct.

9 Q And I guess just to be complete, the  
10 organizational chart also shows a separate title of  
11 radiation safety officer. Do you know what role that  
12 person plays?

13 A This is the one that has changed after 1989.  
14 This person, the radiation safety officer, does not have  
15 authority to intervene as to what the reactor director  
16 decides. This radiation safety officer is now for the  
17 materials license for the campus only.

18 Q I see. So that in terms of radiation  
19 protection as it relates to the reactor, that staff, that  
20 health physics staff, does report to the facility director,  
21 reactor director.

22 A The reactor health physics staff, correct,  
23 reports to the director.

24 Q In your testimony, I believe in cross  
25 examination by GANE, you were asked whether you spoke to

1 the president of the university at Georgia Tech. And your  
2 answer, as I recall, was no, you had not.

3 A Correct.

4 Q Did you speak to the dean of engineering?

5 A Yes.

6 Q And that is Dr. White?

7 A Young White, yes.

8 Q And also your testimony indicates that you  
9 spoke to the associate dean of engineering, Dr. Davidson?

10 A Correct.

11 Q Is it correct that you spoke to those  
12 individuals because the director of the facility reports to  
13 the dean of engineering?

14 A Yes. When I was asked to do this, I requested  
15 that I should report -- excuse me -- I should talk to the  
16 person above the reactor director.

17 Q And under the organizational structure in place  
18 when you did your study -- that was in December of 1995?

19 A Correct.

20 Q -- it was the dean of engineering to whom Dr.  
21 Karam reported, correct?

22 A Yes.

23 Q I'd like to turn to your report and the report  
24 is dated January 3 of 1996.

25 A Yes.

1           Q       So this was prepared shortly after you were at  
2 the campus, shortly after you did your interviews and did  
3 your work at the campus?

4           A       Right, right.

5           Q       In conclusion number 6 in your summary, you  
6 state that the director of the NNRC and the radiation  
7 safety officer should report to two different  
8 administrators, two different budgets should be  
9 established.

10                   And I'm curious about that recommendation.  
11 Would it not be sufficient in your mind if the radiation  
12 safety officer reported to the same individual to which the  
13 director of the facility reports? Why wouldn't that be  
14 adequate, or would it be adequate?

15           A       That would be an alternative.

16           Q       That would be in your mind adequate?

17           A       Correct.

18           Q       And also in your summary, item 4, you indicate  
19 in your view that the minutes of the Nuclear Safeguards  
20 Committee should be expanded somewhat to include the major  
21 points of the discussion of every issue. Could you expand  
22 upon that conclusion? why did you reach that view?

23           A       This is just a personal opinion and some people  
24 may not agree. I noticed that the minutes were quite  
25 brief, indicating decisions made on items and nothing about

1 the discussion leading to that decision. I believe it  
2 would be beneficial if the minutes were expanded a little  
3 bit to indicate major points in the discussion. But that's  
4 my opinion.

5 Q Did you find that in reading the minutes it was  
6 difficult for you to understand the full discussion  
7 concerning the items that were reported?

8 A Most of the time the discussion was missing  
9 from the minutes.

10 Q On page 2 of your report, you indicate that the  
11 third question that you asked of the people that you  
12 interviewed was, quote, "To your knowledge are all  
13 incidents at NNRC reported to the NSC and recorded in the  
14 minutes."

15 Now is that a question that you posed to each  
16 of the individuals you spoke with?

17 A Yes.

18 Q And what answers were given to you to that  
19 question?

20 A That the incidents have been reported to the  
21 NSC.

22 Q And that was true in your interview of Dr.  
23 Karam?

24 A Yes.

25 Q And also Dr. Ice?

1 A Yes.

2 Q And also you spoke with the reactor supervisor,  
3 Mr. Dixon Parker?

4 A Correct.

5 Q Did he indicate the same to you?

6 A Yes.

7 Q Did anyone have a contrary statement?

8 A Not that I recall.

9 Q If they had made such a statement, do you think  
10 you would have recalled it?

11 A Yes, because I think that's important.

12 Q On page 7 of your report at the top of the page  
13 you state that the RSO or MORS should report to the vice  
14 president for research or equivalent, and you go on to say:  
15 It is important that the NNRC director and RSO report to  
16 two different persons.

17 That's the same matter that I inquired of a few  
18 minutes ago. Why did you feel it is so important that that  
19 reporting relationship be created?

20 A I think I said that perhaps I am influenced by  
21 our own organization that does that. It would be quite  
22 appropriate and safe to report to the same person.

23 Q And the Columbia reactor at the University of  
24 Missouri, in fact, health physics reports up to the  
25 director of the reactor.

1           A     The reactor health physicist?

2           Q     Yes.

3           A     Yes.

4           Q     Do you believe that the Columbia facility is  
5 being run unsafely?

6           A     No, facility is run safely.

7           Q     Do you believe there is a flaw in the structure  
8 of the organization at University of Missouri-Columbia?

9           A     I do not, no.

10          Q     Even though the health physics staff does  
11 report up to the director of the facility?

12          A     Yes. But I have not investigated the details  
13 of the operation. My response is based on general  
14 knowledge.

15          Q     You mentioned earlier that you're a member of  
16 the American Nuclear Society?

17          A     Correct.

18          Q     Have you ever seen the organizational charts  
19 which are proposed for use by ANS or by the ANSI -- are you  
20 familiar with the term ANSI?

21          A     Yes.

22          Q     Have you ever seen their proposed  
23 organizational charts?

24          A     No.

25          Q     Again on page 7 of your report, in item C you

1 state, quote, in case of differences of opinion between the  
2 director and RSO, differences that are not covered by  
3 existing operating procedures, the NSC will resolve the  
4 issue.

5 Is that also the case under the current  
6 structure to your knowledge?

7 A This is at Georgia Tech?

8 Q Yes, where the MORS disagrees with the facility  
9 director.

10 A Yes.

11 Q Then the difference could be resolved or would  
12 be resolved by the Nuclear Safeguard Committee?

13 A Right.

14 Q So you're not recommending a change in that  
15 regard, you're simply stating that that is a good system to  
16 have.

17 A Correct.

18 MR. TURK: May I have just a moment, Your  
19 Honor?

20 CHAIRMAN BECHHOEFER: Yes.

21 (Brief pause.)

22 CHAIRMAN BECHHOEFER: Back on the record.

23 MR. TURK: I have nothing further, Your Honor,  
24 and I thank Dr. Tsoulfanidis for his patience.

25 BOARD EXAMINATION

1 BY ADMINISTRATIVE JUDGE KLINE:

2 Q Dr. Tsoulfanidis, will you turn to your summary  
3 and recommendations in your report? Look at number 1. The  
4 conclusion relative to safety issues at NNRC, does that  
5 hold whether or not nuclear fuel is present?

6 A Correct.

7 Q It does. All right, direct your attention then  
8 to number 6, your recommendation for a change in the  
9 management structure, and I think that's also reflected on  
10 page 8 in the diagram. Does that recommendation refer to  
11 that diagram?

12 A It is consistent with that diagram.

13 Q Okay. What I really want to know is how  
14 strongly you feel about this and I'm going to attempt to  
15 gauge how strongly you feel. So if you had the authority  
16 to implement the change that's reflected on page 8; that  
17 is, you had the authority to implement it now or to order  
18 it now, knowing all you know and all you've told us about  
19 the management structure at the Georgia Tech reactor, would  
20 you implement it now? I mean would you reach into a  
21 functioning organization and change it?

22 A I would, but I would also explain to the people  
23 involved that this change is not the result of any  
24 indication of unsafe operation, it's simply a change in  
25 management structure.

1 ADMINISTRATIVE JUDGE KLINE: Thank you.

2 BY ADMINISTRATIVE JUDGE LAM:

3 Q Let me follow up with Judge Kline's question,  
4 Dr. Tsoulfanidis, if the system is not broke, why fix it?  
5 How would you answer that?

6 A It's not a matter of fixing it. Different  
7 management styles and administrators and in that case, your  
8 colleague gave me the power to do it, I would prefer that  
9 administrative structure.

10 Q And also let me ask you a few questions, Dr.  
11 Tsoulfanidis, who gave you the assignment to do the  
12 investigation on management structure at Georgia Tech  
13 reactor?

14 A I was called by Ms. Pat Gilday.

15 Q Yes, I understand your direct testimony, but  
16 who was ultimately responsible for giving you that  
17 assignment? Did you work for the state of Georgia or did  
18 you work for Georgia Tech?

19 A My contact, my main contact was Ms. Pat Gilday,  
20 she gave me the assignment and I discussed all the details  
21 of the assignment with her.

22 Q What were your responsibilities and authority  
23 for this assignment?

24 A The authority was to talk to any person that I  
25 wanted for as long as I wanted and the assignment was to

1 prepare a report or come to a decision as to what my  
2 impression was or what my conclusions were about the  
3 administrative structure at the reactor regarding safety  
4 matters.

5 Q Did you have unrestricted access to any records  
6 or any individual you considered essential to your  
7 investigation?

8 A I had unrestricted access to records and  
9 individuals.

10 ADMINISTRATIVE JUDGE LAM: Thank you.

11 CHAIRMAN BECHHOEFER: I would like to follow up  
12 first the question that was posed to you by GANE and it  
13 concerns certain deficiencies in the reporting of  
14 information, as I understand it. And it was derived from  
15 inspection report number 95-01.

16 BY CHAIRMAN BECHHOEFER:

17 Q Is this one of the reports that you reviewed?  
18 I can show you a copy if you'd like to look at it.

19 A Please show me because I do not recall by  
20 number.

21 MR. TURK: I have a copy also, Your Honor,  
22 shall I show it to him?

23 CHAIRMAN BECHHOEFER: Oh, I was going to say  
24 ignore the red marks, they're mine.

25 ADMINISTRATIVE JUDGE KLINE: Give him a clean

1 copy.

2 (A document was proffered to the witness.)

3 THE WITNESS: I am not 100 percent certain when  
4 I look at it. If it was on file, I did, because my NRC  
5 document inspection went all the way back to 1987.

6 BY CHAIRMAN BECHHOEFER:

7 Q And it went up as far as '95 or whatever?

8 A All the way to December '95.

9 Q Thank you. Well, if you look over the -- I  
10 guess it's item 1 of the violations -- maybe it's 1 or  
11 possibly 2 -- it starts and goes over to the next page, it  
12 defines precisely what the inaccuracies were. And what I'd  
13 like to know is how significant are those inaccuracies in  
14 terms of the information that should be available  
15 concerning the reactor and monitoring of it.

16 A I believe these inaccuracies still kept these  
17 numbers below the allowed NRC limits, and from that point  
18 of view, they did not pose any hazard.

19 Q And let me ask you also, as I read this report,  
20 and I'm not sure that's accurate, this indicates that not  
21 every item that was inaccurate was inaccurate throughout  
22 the entire range of years that this total report covers.

23 A Correct.

24 Q So that in some years, some information was  
25 inaccurate and in other years other, is that not correct?

1           A       Correct.

2           Q       Thank you. In terms of the structural  
3 organization that you were testifying about, and I guess  
4 your ideal one, which appears on page 8 of the report, if -  
5 - and I'm using titles just arbitrarily for the moment  
6 because I realize they could be changed -- but if reporting  
7 to the dean of engineering but in separate channels were  
8 the director and the radiation safety officer, whatever the  
9 title might be, with dotted lines between the two for  
10 communications purposes, would that, in your opinion, --  
11 and also dotted lines going, as they do, to the Nuclear  
12 Safeguards Committee -- would that, in your opinion, be an  
13 improvement over the situation where the radiation safety  
14 officer reported with a black line directly to the  
15 director? I hope you can follow my juggling of boxes and  
16 lines.

17           A       Well, obviously this is my statement and I  
18 would consider that an improvement.

19           Q       I see. So -- and would that alternate that I  
20 just described be, in your view, less desirable or possibly  
21 more desirable than as indicated in the chart on page 8?

22           A       Oh, I must have misunderstood. Which  
23 alternative did you propose?

24           Q       The alternative I was proposing would have the  
25 radiation safety officer and the director of the facility

1 each reporting with a black line to what's stated here as  
2 the dean of engineering.

3 A Oh, I see.

4 Q With a dotted line between those two for  
5 communications, almost mandatory communications between the  
6 two.

7 A I would consider this quite an equivalent  
8 managerial structure to what I indicate here.

9 Q I see. We had testimony earlier that that  
10 structure was used in certain research reactors, at least  
11 one, according to the record.

12 Now with respect to your recommendations  
13 concerning the minutes of the Nuclear Safeguards Committee,  
14 in their current form, can they be meaningfully reviewed,  
15 other than in terms of what topic was discussed and what  
16 decision was reached, absent any illuminating discussion of  
17 the differing points of view perhaps?

18 A Yes, they can be meaningfully reviewed, they  
19 are meaningful because one can see the items discussed and  
20 the decisions made, which is very important, what the NSC  
21 discusses.

22 Q And that you can determine from current  
23 minutes.

24 A Correct.

25 Q Not having seen minutes myself, I understand

1 we're going to be given a lot of them to look at but not  
2 yet, not thus far. Does the listing and the decision made  
3 currently indicate other decisions that could have been  
4 made and may have been discussed at all?

5 A No.

6 Q I see.

7 A Well, sometimes there may be items that say  
8 tabled for discussion later -- is this what you mean?

9 Q No, I was saying the committee discussed  
10 whatever the matter was, it reached this conclusion, it  
11 rejected whatever it might have rejected if there were  
12 alternates.

13 A That information sometimes is there, it depends  
14 on the item, yes.

15 Q I see, okay. Would you put a time frame or at  
16 the very least a target goal for when the minutes of  
17 meetings should be prepared and circulated -- 24 hours, 48  
18 hours, two months? I mean, would you --

19 A Under normal circumstances -- and what I mean  
20 normal is the committee discussed and decided certain items  
21 that are not earth-shaking, I would say a week to two  
22 weeks. If there is something that needs immediate  
23 attention, the circulation should be immediate, within 24  
24 hours.

25 Q I see. But you do not think that more than

1 about two weeks is reasonable for even the routine  
2 discussion?

3 A Correct, I don't see why that cannot be done in  
4 two weeks.

5 Q And who would you have the reports circulated  
6 to?

7 A The minutes you mean?

8 Q The minutes, sorry.

9 A Again, this should be decided by the people  
10 involved. I can only tell you my personal experience and  
11 personal opinion.

12 Q Right, well, that's what I want.

13 A It's one of many alternatives. Certainly all  
14 the members of the committee should receive it, the person  
15 to whom the committee reports should receive this and all  
16 the people involved, and this will include, for example, if  
17 the committee minutes involve a person who uses radioactive  
18 materials and a decision has been made relative to his or  
19 her activities, that person should receive a copy of the  
20 minutes. Otherwise there's no need. So the list of the  
21 people receiving changes with the base list.

22 Q Right. You testified, it appears on page 11 of  
23 your testimony, not the report, that an outstanding feature  
24 of the committee was that some of the members are not  
25 Georgia Tech employees. What does "some" refer to, one,

1 two?

2 A There are at least two, I forget the exact  
3 number.

4 Q And how large is the committee again? I think  
5 we've been told.

6 A I forget the number -- 12 people.

7 Q Okay. Is that organization having outside  
8 membership, is that not almost a pro forma situation?  
9 Wouldn't every nuclear safety committee have some outside  
10 representation?

11 A No. In our university, all the members of the  
12 committee are faculty members.

13 Q I see.

14 A Of that campus.

15 Q I see, okay. One further question. You stated  
16 it as item -- on page 3 of your report, you stated that the  
17 NSC meets as frequently as required. Would you require a  
18 minimum number of meetings, like once a month -- or at a  
19 minimum?

20 A Well, the minimum number of meetings is  
21 required by the NRC and this is quarterly I believe.

22 Q Do you think that's appropriate?

23 A Correct.

24 Q But you're saying the NSC meets more frequently  
25 when required.

1 A Yes.

2 Q For particular items.

3 A This is the practice and this is what we do  
4 also in our university. If a matter comes up, we call the  
5 committee and we discuss it.

6 CHAIRMAN BECHHOEFER: I see.

7 That's all the questions the Board has.

8 Mr. Evans.

9 MR. EVANS: I basically have one minor point on  
10 redirect.

11 REDIRECT EXAMINATION

12 BY MR. EVANS:

13 Q You were asked by the GANE counsel as to  
14 whether or not you had met with the president of Georgia  
15 Tech, Georgia Institute of Technology, and you said no.  
16 I'd like to ask you, sir -- oh, excuse me, laying  
17 foundation, you did say you talked to a Dr. -- let me get  
18 the name correctly -- Dr. Jean-Lou A. Chameau, if I'm  
19 pronouncing it correctly.

20 A Chameau.

21 Q Chameau, and you list that person as vice  
22 provost for research. Do you have any knowledge one way or  
23 the other as to whether Dr. Chameau is authorized to speak  
24 for the president in the area of research engineering?

25 A That is my understanding in general university

1 administrative structure, that person has that function.

2 MR. EVANS: I have no other questions.

3 MR. JOHNSON: We had one clarification question  
4 just on the administrative structure diagram on page 8.

5 RE CROSS EXAMINATION

6 BY MR. JOHNSON:

7 Q Not to belabor this point too much, but in this  
8 box here where it says radiation safety officer, in the  
9 case of Georgia Tech, could you replace that box with a box  
10 for the manager of the Office of Radiation Safety? You  
11 already testified you thought they were basically  
12 interchangeable.

13 A Yes, it depends on the name and the function  
14 you assign to the person, but essentially yes.

15 MR. JOHNSON: We can go off the record. Can we  
16 just have a moment to --

17 CHAIRMAN BECHHOEFER: Yes, off the record for a  
18 moment.

19 (Brief pause.)

20 CHAIRMAN BECHHOEFER: Back on the record.

21 BY MR. JOHNSON:

22 Q In recross, there was a question asked about  
23 the Nuclear Safeguards Committee and the structure. You  
24 had testified that the Nuclear Safeguards Committee would  
25 act as sort of a conflict resolution device if there was a

1 disagreement between the RSO and the director of the  
2 facility, and you also recently had testified that several  
3 of the people on the Nuclear Safeguards Committee are  
4 people who do not work at Georgia Tech. You know, we  
5 noticed that one of them as an Alabama address. In terms  
6 of the day-to-day running of the facility, is it really  
7 practically possible for the NRC -- not the NRC -- NSC to  
8 resolve all these disputes when they have to be called in  
9 from various corners and the RSO and the director of the  
10 facility are there every day having to make a wide variety  
11 of decisions ranging from small decisions up to larger  
12 decisions with more import. Is it really practically  
13 possible for the NSC to resolve all those kind of disputes  
14 on a day-to-day operational basis?

15 A It is not the role of the NSC to oversee day-  
16 to-day operations or resolve day-to-day disputes. It would  
17 resolve major ones.

18 Q And I guess my next question would be, to your  
19 knowledge either of the structures in general or Georgia  
20 Tech specifically, who would decide whether such a matter  
21 was of such importance that it was worthy of bringing the  
22 NSC in?

23 A My impression is that the director of the  
24 reactor will do it.

25 MR. JOHNSON: Thank you, I think that that's

1 sufficient.

2 MR. TURK: I have two limited areas for  
3 recross, Your Honor.

4 CHAIRMAN BECHHOEFER: Yes. Go ahead.

5 FURTHER RECROSS EXAMINATION

6 BY MR. TURK:

7 Q First of all, Dr. Tsoulfanidis, I'd like to  
8 show you the technical specification for the Nuclear  
9 Safeguard Committee. I don't know if this is something you  
10 reviewed while you were at the reactor or not.

11 May I approach, Your Honor?

12 CHAIRMAN BECHHOEFER: Yes.

13 Q What I am going to show you is technical  
14 specification 6.2 Nuclear Safeguards Committee and this was  
15 submitted as part of the license renewal application by  
16 Georgia Tech and I forwarded a copy of this to the Board  
17 and parties on December 9, 1994. It's enclosed in the  
18 letter from Dr. Karam to the NRC dated April 19, 1994. And  
19 that is the submission of the license renewal application.

20 And in technical specification 6.2.B, if you  
21 don't mind take a minute just to read that subparagraph.

22 (The witness reviews the document.)

23 A Yes.

24 Q Is this something that you had reviewed when  
25 you were at the reactor facility?

1           A        Yes, I looked at the license renewal  
2 application, so I must have seen this, yes.

3           Q        And do you see in there a statement which  
4 reads, quote, no more than a minority of the committee  
5 members shall be from the GTRR staff?

6           A        Yes.

7           Q        This would seem to indicate to me that although  
8 it is not necessary for a majority of committee members to  
9 come from outside the university, it is necessary for a  
10 majority to come from outside the research reactor staff.  
11 Is that your understanding of it as well?

12          A        That's the understanding of the statement.

13          Q        And also in subparagraph D, 6.2.D, if you would  
14 take a moment to read that.

15                   (The witness reviews the document.)

16          A        Yes.

17          Q        Perhaps I should just read that for the record.  
18 It states, quote, the quorum shall consist of not less than  
19 a majority of the committee membership and shall include  
20 the chairman or his designated alternate. The operating  
21 staff may not constitute a majority of those present.

22                   I read that correctly?

23          A        Yes.

24          Q        Would this also seem to indicate to you that  
25 although the operating staff may be present and is indeed

1 expected to be present at committee meetings, a majority of  
2 those present must come from outside the operating staff?

3 A That's correct.

4 Q Also in GANE's recross a moment ago, they asked  
5 your opinion as to who would bring a matter to the  
6 attention of the Nuclear Safeguards Committee, who would  
7 make the decision as to whether a matter was worthy of  
8 being raised to that level. And I believe your answer was  
9 that based on your impression, it would be the facility  
10 director. Did you mean to exclude the possibility of the  
11 manager of ORS, the Office of Radiation Safety, from being  
12 able to bring a matter to the NSC?

13 A No, no.

14 Q Do you understand whether that's also a  
15 possibility?

16 A That's also possible.

17 MR. TURK: I have nothing further, Your Honor.

18 MR. EVANS: Just a few redirect.

19 CHAIRMAN BECHHOEFER: Let me ask one follow-on  
20 question. This shouldn't cause anybody any problems, I  
21 don't think.

22 MR. EVANS: Yes, sir.

23 CHAIRMAN BECHHOEFER: Does the -- can the  
24 radiation safety committee meet via a telephone conference  
25 call, or have they -- either can they or have they?

1 THE WITNESS: I don't recall. You mean the  
2 Georgia Tech committee.

3 CHAIRMAN BECHHOEFER: Yes.

4 THE WITNESS: I don't recall whether they  
5 decide by telephone.

6 CHAIRMAN BECHHOEFER: Okay.

7 RE-REDIRECT EXAMINATION

8 BY MR. EVANS;

9 Q It's a variant of the question Mr. Turk asked  
10 you, but do you know of any impediment to Dr. Ice -- I'll  
11 name specific names -- as the MORS officer, calling the  
12 chairman of the committee to say there's a problem and get  
13 a meeting set up -- do you know of any impediment to that  
14 happening?

15 A No.

16 Q Are you aware as to whether or not the MORS --  
17 I'll say Dr. Ice, MORS officer -- do you know whether or  
18 not he has authority to close down an activity if he feels  
19 it's dangerous or there's a safety problem -- do you recall  
20 whether he has that authority?

21 A I believe he does.

22 Q And do you know whether or not, assuming he  
23 finds something that there's a problem and he closes it  
24 down, do you know whether or not it stays closed down until  
25 and unless the Nuclear Safeguards Committee resolves it and

1 changes his decision?

2 A That would be the case.

3 MR. EVANS: Thank you, I have no other  
4 questions.

5 CHAIRMAN BECHHOEFER: Any further questions  
6 anybody wishes to ask?

7 MS. CARROLL: I supposed we could go off the  
8 record while counsel confers.

9 (Discussion off the record.)

10 CHAIRMAN BECHHOEFER: Let's go back on the  
11 record. Any further questions?

12 MS. CARROLL: Would you be comfortable, Dr.  
13 Tsoulfanidis, if I asked one -- well, it's sort of a two-  
14 parter?

15 THE WITNESS: Yes.

16 RE-RE-CROSS EXAMINATION

17 BY MS. CARROLL:

18 Q Can the Nuclear Safeguards Committee set the  
19 agenda for their meetings also?

20 A Yes.

21 Q If there is a problem at the reactor, for  
22 instance, it seems normal to me that they would be briefed  
23 on it by reactor personnel. Do you think that they would  
24 be able to know more than what they're told about a  
25 situation that they've been asked to get their input on?

1           A        Could you please repeat the question?

2           Q        Maybe it would help -- I mean, would you like  
3 to just view the current makeup of the committee while you  
4 consider that? May I approach the witness?

5                    THE WITNESS: Sure.

6           Q        I'm a good copy cat, aren't I? I didn't know  
7 that we couldn't just stalk all over the hearing room.

8                    (A document was proffered to the witness.)

9           Q        Now my question is -- it's my understanding  
10 from testimony that if there's a problem at the reactor,  
11 they would be brought in to consider it at the discretion  
12 of the MORS and the director. If they've been asked to  
13 consider a problem at the reactor and they've been briefed  
14 about that problem by insiders, by the director and the  
15 MORS, anyone else, operators, personnel over there, would  
16 they, in your opinion, be able to bring more to it than  
17 what they've been told? Therefore adding to the body of  
18 knowledge making the decision.

19           A        You're asking me to speculate. I see the list  
20 of the people and they seem competent and from the minutes  
21 that I have seen, I feel that they act as a competent body  
22 discussing and deciding the issues involving radiation  
23 safety. But I don't think I can go beyond to answer your  
24 question, whether or not they will dig in further. All I  
25 can say is that these are competent individuals that take

1 their job seriously.

2 MS. CARROLL: Thank you.

3 (Brief pause.)

4 MS. CARROLL: These questions have prompted a  
5 question from Mr. Johnson. It might be cleanest if he asks  
6 it than to get me to understand and ask it, if you would be  
7 comfortable with that.

8 BY MR. JOHNSON:

9 Q I think what Glenn is trying to ask is do you  
10 feel that it is possible for there to be a conflict of  
11 interest in a situation where the NSC is resolving disputes  
12 between the MORS and the reactor director, but they are  
13 getting all of their input and information from usually  
14 either the MORS or the director.

15 MR. EVANS: I object to the foundation -- I  
16 mean, it is speculative, but you have no -- there's no  
17 foundation that the committee is prohibited from talking to  
18 anyone they want to talk to. They could call people in.  
19 There's no foundation that they're so limited.

20 ADMINISTRATIVE JUDGE KLINE: Mr. Evans, that  
21 was the question I was going to ask the witness, could they  
22 call in outside experts in case it was required?

23 THE WITNESS: They have the right to do so.

24 ADMINISTRATIVE JUDGE KLINE: Okay.

25 MS. CARROLL: That would be all, thank you, for

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us.

CHAIRMAN BECHHOEFER: Any follow up by any other party?

MR. TURK: No, Your Honor.

MR. EVANS: Absolutely not.

(Laughter.)

CHAIRMAN BECHHOEFER: Dr. Tsoulfanidis, we appreciate your appearing here as a witness, I hope you enjoyed your trip to Atlanta, and you're excused as a witness.

THE WITNESS: Thank you.

(Witness excused.)

CHAIRMAN BECHHOEFER: We'll take the normal one hour, 15 for lunch, about 1:40, 1:45 -- let's say 1:45 and let's resume promptly then with Dr. Ice.

(Whereupon, a luncheon recess was taken at 12:30 p.m., the hearing to resume at 1:45 p.m., the same day.)

AFTERNOON SESSION

1  
2 CHAIRMAN BECHHOEFER: Back on the record.

3 Mr. Evans.

4 MR. EVANS: Yes, sir, we would call Dr. Ice to  
5 the table I guess I would say, not stand. Habit dies hard.  
6 Whereupon,

7 RODNEY D. ICE

8 Appeared as a witness herein, and having been first duly  
9 sworn, was examined and testified as follows:

10 DIRECT TESTIMONY

11 BY MR. EVANS:

12 Q Dr. Ice, did you prepare written testimony to  
13 be introduced in this proceeding?

14 A Yes.

15 Q And do you have a copy of it before you?

16 A Yes, I do.

17 Q Is it entitled Testimony of Dr. Robert D. Ice?

18 A Rodney D. Ice.

19 Q Excuse me, Rodney D. Ice.

20 (Laughter.)

21 Q I'd better put my specs on. My apologies, sir.  
22 And on the final page before the attachment it  
23 says submitted this 3rd day of May, 1996, page 21.

24 A Yes.

25 Q Have you carefully reviewed this document?

1 A Yes.

2 Q Do you have at this point any corrections or  
3 changes you would like to make?

4 A No.

5 Q Is the statement of your professional  
6 qualifications attached to the back of the document marked  
7 as GT-3 -- is that your correct vitae?

8 A Yes.

9 (The document referred to was marked  
10 for identification as Georgia Tech's  
11 Exhibit Number 3.)

12 Q And is this the testimony that you are  
13 presenting as your direct examination in this case?

14 A Yes, it is.

15 MR. EVANS: We would tender into evidence the  
16 prefiled testimony of Dr. Rodney D. Lee -- correct that  
17 time -- and also GT-3, which is a documentary exhibit.  
18 It's the same as the one attached to the prefiled  
19 testimony. We would tender both into evidence at this  
20 time.

21 CHAIRMAN BECHHOEFER: Any objection?

22 MR. JOHNSON: No.

23 MR. TURK: Your Honor, I have just a few  
24 limited questions and this is not really so much voir dire  
25 as much as it is simply to make clear on the record some

1 handwritten changes to the vitae, which are difficult to  
2 read on my copy. Shall I proceed?

3 CHAIRMAN BECHHOEFER: Why don't you.

4 MR. TURK: Good morning, Dr. Ice, my name  
5 Sherwin Turk, I'm a lawyer with the NRC staff.

6 At page 5 of your curriculum vitae --

7 THE WITNESS: I don't have a copy with me.

8 MR. EVANS: It's attached to your testimony.

9 THE WITNESS: I don't have it attached.

10 (A document was proffered to the witness.)

11 MR. TURK: On page 5 of your vitae under item  
12 13(x), which is your listing in Oxford Who's Who. I see  
13 some handwritten notations of a Y and a Z. Can you tell us  
14 what that is -- if you can tell or if you recall.

15 MR. JOHNSON: This is on page 5?

16 MR. TURK: Page 5 of the vitae.

17 MR. EVANS: Immediately above paragraph  
18 numbered 14, on my copy and I assume Mr. Turk's too, it's  
19 quite illegible, but maybe you can explain what it is.

20 THE WITNESS: I cannot read it.

21 MR. TURK: No recollection of what those items  
22 are?

23 THE WITNESS: I'd have to go look at the  
24 original.

25 MR. TURK: And then again, on page 6, under

1 item 16(a), committee and administrative service, there's a  
2 handwritten notation of something for 1982 to '83. Can you  
3 read what follows that? It looks like nuclear something  
4 committee. Can you tell or do you recall?

5 THE WITNESS: Nuclear Pharmacy Committee -- I  
6 can't read it off of this copy that was faxed to the  
7 attorney.

8 MR. TURK: All right.

9 I thought maybe the witness would be able to  
10 clarify that, but it's not important for my purposes, Your  
11 Honor, I just wanted that clarification if it was possible.

12 CHAIRMAN BECHHOEFER: Right, we understand.

13 MR. TURK: And I have nothing further in the  
14 way of voir dire or clarification of the vitae and the  
15 staff does not oppose the proffer of testimony or the  
16 admission of GT-3.

17 CHAIRMAN BECHHOEFER: The Board will admit this  
18 testimony with the exception of the illegible items to  
19 which Mr. Turk was referring. If the applicant or witness  
20 at a later time can clarify what they say, we will admit  
21 those items. As long as nobody knows what they say or what  
22 they refer to, we will not admit those illegible portions  
23 at this point, but we will permit you to supplement if it  
24 becomes --

25 MR. EVANS: Well, are we saying that these two

1 illegible passages are deleted? We would agree with that.

2 CHAIRMAN BECHHOEFER: Yes, yes. But if you  
3 at -- well, at some reasonable time determine what they're  
4 supposed to say, we would admit them.

5 MR. EVANS: Thank you, sir.

6 MR. TURK: The danger is obvious, Your Honor,  
7 one of us in our findings might cite or make some  
8 nonsensical statement and then cite this illegibility as  
9 the basis for it.

10 (Laughter.)

11 CHAIRMAN BECHHOEFER: Right, right. I don't  
12 think there's any danger, but I think to be clear what's in  
13 and what's out, we should do that.

14 Okay, this testimony will be bound into the  
15 record as if read at whatever point in time this is.

16 (The document, heretofore marked as  
17 Georgia Tech Exhibit Number 3, was  
18 received in evidence.)

19 MR. EVANS: I have no further direct.

20 CHAIRMAN BECHHOEFER: GANE. Mr. Johnson.

21 MS. CARROLL: I'm curious before we start, how  
22 did the sequence get established that GANE goes first, not  
23 that I object to that, instead of the NRC counsel -- not  
24 that I mind.

25 CHAIRMAN BECHHOEFER: The principal controversy

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Charles Bechhoefer, Chairman  
Dr. Jerry R. Kline  
Dr. Peter S. Lam

\_\_\_\_\_  
In the Matter of: )

GEORGIA INSTITUTE )  
OF TECHNOLOGY )

Atlanta, Georgia )

Georgia Tech Research )  
Reactor )

Renewal of License No. R-97 )  
\_\_\_\_\_ )

) Docket No. 50-160-Ren

) ASLBP NO. 95-710-01-Ren

TESTIMONY OF  
DR. RODNEY D. ICE

1. Q. Dr. Ice, would you for the record, Sir, state your name and address?

A. Rodney D. Ice, 78 Beverly Road, N.E., Atlanta, Georgia 30309.

2. Q. What is your current employment?

A. I am Manager of the Office of Radiation Safety at the Georgia Institute of Technology. I am also an adjunct Professor in Health Physics at the Institute.

3. Q. How long have you been with Georgia Tech?

A. I was appointed to this managerial position by the Director of the Neely Nuclear Research Center of the Institute, Dr. R. A. Karam, in 1992.

4. Q. Do your managerial duties and responsibilities extend to the entire campus?

A. They do.

5. Q. Would you briefly outline what your duties and responsibilities are as to the Campus generally?

A. As Manager of the Office of Radiation Safety, often referred to as "MORS," I act in a supervisory/administrative capacity respecting all aspects of the Institute's activities involving radiation. This involves radiation measurement, monitoring and protection activities including safety surveys, personnel monitoring, radiological safety practices, removal of radiological waste, decontamination, the maintenance of inventory records on radioactive source materials, radiation exposure and various other matters relating to radiation safety.

6. Q. Aside from the Neely Nuclear Research Center, what types of radioactivity are you most commonly involved with on the campus-at-large?

A. Apart from the Research Center and reactor, there are two general categories of radioactivity on the campus. The first is x-ray producing devices which would include such things as electron microscopes and x-ray machines as, for example, at the health clinic. The second category, which consumes more time than the first, has to do with isotopes. Isotopes are used in research in areas as biology, chemistry, environmental science and physics. I work with the investigators who want to use isotopes for research, helping them to get their projects in order for submission to the Nuclear Safeguards Committee (whose approval is requisite to the commencement of a research project involving the use of isotopes). Decontamination and removal of radioactive waste are also part of our campus-wide activities.

7. Q. Do your responsibilities also cover activities at the Neely Nuclear Research Center?

A. They do.

8. Q. Does this include the operation of the nuclear reactor?

A. It does.

9. Q. Does your involvement at the Neely Nuclear Research Center involve the same sort of radiation measurements, monitoring and protection activities in which you are involved on the campus generally?

A. It does, although different means and procedures for measurement and monitoring may be involved.

10. Q. How would you describe your time allocation vis-a-vis the Research Center and the general campus activities outside of the Center?

A. It varies, but I would estimate that over a given year I would be spending about 45 percent of my time on administrative and related safety issues at the Neely Nuclear Research Center, 45 percent of my time on

these issues as to the campus outside of the Center, and 10 percent of my time on research.

11. Q. In what sort of research have you been involved?

A. In addition to being a Health Physicist, I am a pharmacist. I have long been interested in the biological effects of radiation, one important focus of which has been cancer research. I have been working on medical projects at the Center in conjunction with Emory University medical researchers, as well as with graduate students in this area. Radioisotope therapy is an abiding interest on my part.

12. Q. Do you engage in any teaching activities in the area of Health Physics?

A. I teach and advise on radiation safety to individuals at Georgia Tech who come into contact with and work with isotopes on the campus. I also give intermittent lectures in Health Physics at Georgia Tech.

13. Q. Would you tell us what college or university degrees you have?

- A. (1) B.S. in Pharmacy, University of Washington (1959)  
(2) M.S. in Health Physics, Purdue University (1965)  
(3) Ph.D. in Health Physics, Purdue University (1967)

14. Q. Are you a registered pharmacist?

A. I am.

15. Q. Do you hold any certification in Health Physics?

A. I do. I was certified as a Health Physicist by the American Board of Health Physics initially in 1972 and have been periodically recertified since that time.

16. Q. What was your first employment, if any, in Health Physics, following receipt of your Ph.D. in 1967?

A. I was, from 1967 to 1971, the Radiation Safety Officer, campus-wide, at Temple University. My responsibilities included activities involving radioactivity at Temple University's School of Medicine. While at Temple, I also taught classes in Health Physics, Nuclear Pharmacy, Radiochemistry and Radioisotope Methodology.

17. Q. What did you do when you left Temple University?

A. I went to the University of Michigan where I was an Associate Professor of Internal Medicine and of Pharmacy, and I also served as Director of Radiopharmaceutical Services at the University Hospital. I also taught classes in both Health Physics and Nuclear Pharmacy. This was from 1971 to 1976.

18. Q. What did you do when you left the University of Michigan in 1976?

A. I went to the University of Oklahoma, where I was Dean of Pharmacy and an Associate Professor of Radiology in the School of Medicine. This was from 1976 until 1983.

19. Q. And after that?

A. In 1983 I left academe in favor of a private firm. I was Vice President of Corporate Development of Benedict Nuclear Pharmaceuticals in Golden, Colorado, where I was responsible among other things, for the Research Department. I was there until 1985.

20. Q. And in 1985?

A. From 1985 to 1992, I was Vice President and Director of Research of Eagle-Picher Industries, Inc. I worked among other things with isotopes. I came to Georgia Tech from Eagle-Pitcher in 1992.

21. Q. Are you a member of any professional societies or organizations?

- A. (1) 1955 to present: American Pharmaceutical Association  
(2) 1965 to present: Health Physicist Society  
(3) 1967 to present: American Association for the Advancement of Science  
(4) 1971 to present: Society of Nuclear Medicine  
(5) 1991 to present: Internations Isotope Society

22. Q. I show you what is being offered into evidence as GT-3. Is this your *Vitae*?

A. It is. [Note: GT-3 is appended.]

23. Q. I note that at pp. 8 to 17 of your *Vitae* you list 83 publications, and at pp. 18-30 you list 120 abstracts and articles. Am I correct in surmising from the titles that some of these articles deal with Health Physics and Radiation Safety?

A. They do.

24. Q. Am I correct that others deal with the biological effects of radioactivity?

A. That is also correct.

25. Q. And do some of these writings and publications include nuclear medicine and radio therapy?

A. They do.

26. Q. Does this include cancer research?

A. It does.

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27. BASED UPON HIS EDUCATION, HIS TWENTY-NINE YEARS OF PRACTICAL EXPERIENCE AND PUBLISHED RESEARCH IN HEALTH PHYSICS AS WELL AS IN MEDICAL RESEARCH INVOLVING RADIATION THERAPY, WE AT THIS POINT OFFER DR. RODNEY ICE AS AN EXPERT IN HEALTH PHYSICS, AS WELL AS IN THE BIOLOGICAL EFFECTS OF RADIATION AND MEDICAL RESEARCH AND THERAPY INVOLVING RADIATION.

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28. Q. Dr. Ice, what is the size of your staff?

A. I have two full-time health physicists, both of whom have masters degrees in Health Physics. In addition, we have three student assistants who work on a part-time basis.

29. Q. Is there any difference in what your two Health Physicists do?

A. Fritz Stydom for the most part works on the campus outside the Neely Nuclear Research Center, while Edgar Jawdeh works primarily at the Center. Both back each other up and can function in either capacity.

30. Q. As Manager of the Office of Radiation Safety, do you exercise general supervision over the two Health Physicists you have identified?

A. I do.

31. Q. What is the reporting chain for the Health Physicists?

A. On routine matters, such as the completion of standard office survey forms, they report to me. Where the matter is not routine but appears to involve a significant safety problem or an emergency, they would report both to me and to the Director, Dr. Karam.

32. Q. Where they make a report to you, whether oral or in writing, as a survey, do you sometimes forward the matter to the Director?

A. I do.

33. Q. When you receive a report, for example, a survey form reflecting a problem and what action was taken respecting the same, how do you determine whether or not you will bring it to the attention of the Director, Dr. Karam?

A. I make this decision based upon my best professional judgment as to the significance of the matter.

34. Q. Is Dr. Karam aware that you routinely make judgments of this nature and as to whether or not something is of sufficient import to bring to his attention?

A. He is.

35. Q. Are you authorized to suspend an activity involving radiation if it is in your professional judgment unsafe to proceed?

A. I am.

36. Q. Does this apply to activities at the Research Center and Nuclear Reactor as well as to campus activities generally?

A. It does.

37. Q. Do you have to get permission from the Director, Dr. Karam, to suspend an activity?

A. I don't. I have this authority on my own.

38. Q. Does the Director have the authority to overrule you on a shutdown?

A. He doesn't. The suspension remains in effect until the matter is reviewed and resolved by the Nuclear Safeguards Committee.

39. Q. Do you attend meetings of the Nuclear Safeguards Committee?

A. I attend all meetings of the Nuclear Safeguards Committee.

40. Q. Do you make reports to the Committee?

A. I do.

41. Q. What sort of reports would you typically make to the Committee?

A. I would report about violations, safety problems or about an application for the Committee's approval of a research project, for example, an application to use isotopes in a particular research project, this being something which requires the Committee's approval before it can commence.

42. Q. Has Dr. Karam ever told you that you were not free to express your own professional judgment when making a report to the Nuclear Safeguards Committee?

A. He hasn't. Dr. Karam believes in academic freedom and in no ways stop me from giving my views on a matter to the Committee. This is true even where he disagrees with me as to my views, as is sometimes the case. He will, of course, exercise his own academic freedom when he disagrees with me and will tell the Committee where he thinks I am in error and why he disagrees with me.

43. Q. Do you also report safety issues and emergencies directly to Dr. Karam as the Center's Director?

A. I do.

44. Q. Is there any procedure he prefers for your advising him as to concerns and other matters occurring at the Center?

A. He has so indicated to me. Dr. Karam does micro-manage, and in general wants to know about everything that is going on at the Center and on the campus, at least where it is of some significance. If

a safety problem develops, my "Step One" is to take appropriate corrective action in the exercise of my own responsibilities. "Step Two" is to report the matter and discuss it orally with Dr. Karam. "Step Three" would be to prepare a draft report which I would then give to Director Karam for his review, comments and suggestions. If the report is going outside of the Center, Dr. Karam views it as a report of the Neely Nuclear Research Center and wants to review, and personally approve of the finalized version to be released.

45. Q. Do you view the Director's review of your reports, make such corrections as he thinks necessary or desirable prior to release, to be an attempt on his part to suppress your expression of your own views or opinions?

A. It doesn't have to do with suppressing or "covering up" anything. It is rather a part of his managerial style which is micro-management. He wants to know about everything going on which is of consequence, and have his personal imprint and approval on any report going out *as a report of the Center*. I have always interpreted his review of my work, along with his

comments and suggestions on drafts, as criticisms or suggestions of a constructive nature.

46. Q. Has Dr. Karam ever communicated to you that you are not to inform the NRC of a violation or a safety problem?

A. He has never done this or even remotely suggested that I not do so.

47. Q. Has he ever told you not to report a violation or safety problem to the Nuclear Safeguards Committee?

A. He has never done this either.

48. Q. Do you and Dr. Karam ever argue about the proper handling of a Health Physics matter?

A. Our arguing about such matters is not at all uncommon. Dr. Karam and I both accept that such disagreements are a normal part of academic life where it is normal for different individuals to assert differing opinions. Dr. Karam does this and so do I.

49. Q. When you disagree does he listen to you?

A. He does.

50. Q. Has he ever changed his mind on a safety issue because of what you have said to or argued to him?

A. He has.

51. Q. Do you disagree with the Director as to whether it would be better or worse, from an organizational viewpoint to have Health Physics separate and independent from the supervision of the Center's Director?

A. We disagree on this. I think that the alternative arrangement where the Manager of the Office of Radiation Safety and its Health Physicists are not subject to the supervisory control of the Director of the Center would be better.

52. Q. Do you think that the current organizational format makes the operation of the Neely Nuclear Research Center unsafe?

A. Not at all. It is a question of a difference of viewpoint as to which form of organization would be

better. This is not to say that the organization and operation which is now in place makes the Center and its functions unsafe.

53. Q. How would you rate Dr. Karam's leniency or strictness when it comes to following the Center's written procedures to the letter?

A. He insists upon strict compliance with the written technical specifications, rules and policies of the Center.

54. Q. How would you rate Dr. Karam as Director of the Neely Nuclear Research Center from the viewpoint of his safety consciousness?

A. He is very safety conscious.

55. Q. Have you ever viewed him as being overly conservative in his interpretation and application of written procedures designed to further radiation safety?

A. I have. In connection with the use of isotopes there are instances where he has quite possibly been even more conservative than I am--sometimes too much so to

my way of thinking, and sometimes to the point where he has inhibited research.

56. Q. Could you give us an example of this?

A. One instance involved moving a research project in biology simply from one room to another. It was my view that a simple indication of my written approval as Manager of the Office of Radiation Safety, in the form as an amendment to the written approval the Nuclear Safeguards Committee had already given, would be enough to get the job done. Dr. Karam said that we did not have the authority to do this and that it would consequently be necessary to go through the entire approval process once again, in other words, making another application to the Nuclear Safeguards Committee as though it were a new research project rather than simply the transfer of the work from one room to another.

In my opinion this overly conservative view of letter compliance with written policy had the impact of delaying and discouraging the isotope research in question. Although the procedure was doubtless designed to enhance radiation safety, in this

particular instance it seemed to me that what we really had but a simple administrative matter which in no way adversely affected radiation safety since the research project itself had already been approved.

57. Q. Based upon your education and twenty-nine years of experience in Health Physics and the biological effects of radiation, including nuclear pharmacology, and based upon your work experiences at the Neely Nuclear Research Center over the past, approximately four years, have you formed any professional opinion as to the safety of the Neely Nuclear Research Center under its current organizational structure and Director?

A. I have.

58. Q. Would you tell us what your opinion is?

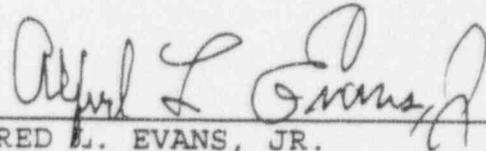
A. It is my professional opinion, based upon my education and experience, including my work at the Neely Nuclear Research Center from 1992 to date, that the managerial organization and operation of the Center as presently constituted and under its current very safety conscious director, are not inimical to the reactor's safe operation or to the public safety generally.

59. Q. Do you have any opinion as to whether the future use of the reactor offers significant research possibilities which are of significant benefit to the public?

A. In my opinion the reactor offers important research possibilities, particularly in the areas of medical research, including, quite definitely, cancer research, particularly where surgical intervention is for one reason or another not a viable option.

END OF TESTIMONY OF DR. RODNEY ICE ON  
DIRECT EXAMINATION BY ALFRED L. EVANS, JR.,  
SENIOR ASSISTANT ATTORNEY GENERAL  
STATE OF GEORGIA

Submitted this 3d day of May, 1996.



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CURRICULUM VITAE  
January 1994

I. PERSONAL RECORD

1. NAME: Rodney Dean Ice
2. SEX: Male
3. BORN: April 24, 1937, Fort Lewis, Washington
4. MARRIED: March 21, 1958, Olympia, Washington
5. WIFE'S MAIDEN NAME: Joan Elizabeth McCullough
6. CHILDREN: Randal Dean Ice, April 6, 1959  
Rex Daryl Ice, February 19, 1961  
Ronald Dale Ice, April 30, 1963
7. EDUCATION:
  - a. William Winlock Miller High School, Olympia, WA, 1955
  - b. University of Washington, Seattle, WA, B.S. Pharmacy, 1959
  - c. Purdue University, West Lafayette, IN, M.S., 1965
  - d. Purdue University, West Lafayette, IN, Ph.D., 1967
8. GRADUATE TRAINING
  - a. 1965, M.S.  
Major: Radiological Health  
Minor: Public Health (Sanitary Engineering)  
Minor: Analytical Chemistry
  - b. 1967, Ph.D.  
Major: Radiological Health  
Minor: Pharmaceuticals
9. ACADEMIC APPOINTMENTS and/or EXPERIENCE
  - a. 1992-present, Principal Research Scientist, Manager of Office of Radiation Safety, Georgia Institute of Technology, and Adjunct Professor, Health Physics Program, Georgia Institute of Technology.

- b. 1985-1992, Vice President and Director of Research, Eagle-Picher Industries (NYSE), Inc. (Self-Supporting Research Facility, \$10M budget, 55 person staff).
- c. 1983-1985, Vice President of Corporate Development, Benedict Nuclear Pharmaceuticals, Golden, CO. (Responsible for Research Department, Professional Affairs Department and University Liaison Office).
- d. 1976-1983, Dean and Professor of Pharmacy, College of Pharmacy, University of Oklahoma, Health Sciences Center, Oklahoma City, OK. (Responsible for \$2M budget, 25 full-time faculty, 40 adjunct faculty, and 400 students)
- e. 1976-1983, Assoc. Prof., Dept of Radiology, School of Medicine, University of Oklahoma, Oklahoma City, OK.
- f. May-September 1982, Visiting Scholar, University of Michigan, Ann Arbor, MI.
- g. 1976, Professor of Pharmacy, College of Pharmacy, University of Michigan, Ann Arbor, MI. (Taught Health Physics and Radioisotopes in Medicine).
- h. 1971-1976, Assistant and Associate Professor of Internal Medicine, University of Michigan, Ann Arbor, MI.
- i. 1971-1976, Associate Professor of Pharmacy, College of Pharmacy, University of Michigan, Ann Arbor, MI.
- j. 1971-1976, Director, Radiopharmaceutical Services, University Hospital, University of Michigan, Ann Arbor, MI.
- k. 1970-1971, Associate Professor of Radiochemistry, Temple University, Philadelphia, PA. (Taught graduate courses in Radioisotope Methodology, Health Physics and Nuclear Pharmacy).
- l. 1967-1970, Assistant Professor Radiochemistry, Temple University, Philadelphia, PA.
- m. 1967-1970, Radiation Safety Officer, Temple University, Philadelphia, PA.
- n. Health Physics Society Summer School
  - 1) Philadelphia, PA, July 2-6, 1980
  - 2) New Orleans, LA., May 28-June 1, 1984

- o. May 19-23, 1969, Course on "Non-Ionizing Radiation," U.S.P.H.S., Bethesda, MD.
- p. 1964-1967, Radiological Health Fellow, School of Pharmacy and Pharmacal Sciences, Purdue University, West Lafayette, IN.
- q. 1959-1965, Owned and Operated Rod's Tanglewilde Drugs, 6515 Martin Way, Olympia, WA.
- r. 1955-1959, Pharmacist and Intern, Freed's Pharmacies, Seattle, WA: Gillette and Guffey Drugs, Olympia, WA.

#### 10. CONSULTING POSITIONS

- a. National Assn. Boards of Pharmacy 1974-1986
- b. University of Tennessee, Memphis 1980
- c. Department of Health, City of Philadelphia, 1968-1976
- d. Veterans Administration Hospital, Ann Arbor, MI 1972-1976
- e. Veterans Administration Hospital, Allen Park, MI 1976
- f. Searle Laboratories, Chicago, Illinois, 1975
- g. Smith, Kline and French, Philadelphia, PA 1970
- h. Philadelphia Technical Institute, Philadelphia, PA 1968-1969

#### 11. CERTIFICATION AND LICENSURE

- a. Certified Health Physicist, American Board of Health Physics, 1972 (Recertified, 1980, 1985, 1990)
- b. Washington State Board of Pharmacy, 1959-Present
- c. California State Board of Pharmacy, 1959-Present
- d. Michigan State Board of Pharmacy, 1972-1988
- e. Oklahoma State Board of Pharmacy, 1977-Present

## 12. MILITARY SERVICE

- a. 1981-Present, COL., USAR, Medical Service Corps
- b. July, 1958, Commissioned Officer, Medical Service Corps
- c. 1957-1958, Graduate, Washington Military Academy  
(Infantry, Officers Candidate School)
- d. 1953-1963, Washington State National Guard

## 13. HONORS

- a. Rho Chi
- b. Sigma Xi
- c. Dean's List
- d. International Scholars Directory
- e. Who's Who in the Midwest, 15th and 16th Ed.
- f. American Men and Women of Science, 13th, 14th, 15th and 16th Ed.
- g. Dictionary of International Biography, Vol. 14 and 18
- h. Who's Who in Health Care, 1st & 2nd Ed.
- i. Community Leaders and Noteworthy Americans, Am. Biograph. Inst.
- j. Who's Who in the World, Vol. 6
- k. University of Oklahoma Alumni, Outstanding Pharmacist Award, 1979
- l. Personalities of the South, 10th & 11th Ed.
- m. American Biography of the Medical Sciences, 1978
- n. Who's Who in the South and Southwest, 17th, 20th, 23rd Ed., 24th Ed. and 25th Ed.
- o. Directory of Nuclear Medicine, Butterworth, 1981
- p. Who's Who in America, 42nd, 43rd & 44th Ed.

- q. American Pharmaceutical Association, Academy of Pharmacy Practice, Service Award, 1983
- r. Biographical Directory of Occupational and safety Specialists, 1st Ed.
- s. Purdue University "Old Master" Award, 1986
- t. Who's Who in Science and Engineering, 1st Ed., 1992-1993
- u. Who's Who in American Education, 3rd Ed.
- v. Ponca City, Oklahoma Service Recognition Award, 1991
- w. Who's Who, Environmental Registry, 1992
- x. Oxford's, Whose Who, 1992

#### 14. MEMBERSHIPS IN PROFESSIONAL SOCIETIES

- a. 1991-present Internations Isotope Society
- b. 1955-present American Pharmaceutical Association
- c. 1967-present American Association for the Advancement of Science
- d. 1965-present Health Physics Society
- e. 1970-present American Scientific Affiliation
- f. 1971-present Society of Nuclear Medicine
- g. 1968-present American Association of Colleges of Pharmacy
- h. 1976-1983 Oklahoma State Pharmaceutical Association
- i. 1973-1982 American Institute History of Pharmacy
- j. 1955-1976 Washington State Pharmaceutical Assn.
- k. 1955-1974 American Public Health Assn.
- l. 1968-1974 Conference of Radiological Health
- m. 1967-1971 Delaware Valley Radiation Protection Society
- n. 1959-1965 Southwest Washington Pharmaceutical Assn.
- o. 1962-1963 Puget Sound Pharmaceutical Assn.

#### 15. POSITION HELD IN ABOVE SOCIETIES

- a. American Association of Colleges of Pharmacy
  - 1) Delegate, 1975, 1976, 1977, 1978
  - 2) Academic Affairs Committee, 1976, 1977, 1978
- b. American Pharmaceutical Association
  - 1) Chairman, Nuclear Pharmacy Section, Academy of Pharmacy Practice, 1977-1978
  - 2) Nuclear Pharmacy Committee of Legislative Affairs, 1976
  - 3) Nominating Committee, 1979-1980
  - 4) Regulatory Affairs Committee 1980-1981, 1983-1984

- c. Delaware Valley Radiation Protection Society, President Elect, 1969; President, 1970
- d. Delegate to American Pharmaceutical Association Meeting, Washington State, 1964  
Academy of Pharmacy Practice, 1978  
Oklahoma State, 1981
- e. Southwest Washington Pharmaceutical Association  
Secretary, 1960-1961  
President Elect, 1962  
President, 1963

#### 16. COMMITTEE AND ADMINISTRATIVE SERVICE

- a. National 1982-1983 Nuclear Pharmacy Committee, National Association of Nuclear Pharmacy
  - 1. 1980-1990, Revision Committee, United States Pharmacopeia
  - 2. 1977-1984, Board of Pharmaceutical Specialties, Specialty Council of Nuclear Pharmacy.
  - 3. 1968-1985, Representative of the American Pharmaceutical Association to the United States Standards Institute Committee, N-44, "Equipment and Materials for Medical Radiation Applications."
  - 4. 1976-1978, Trustee, Radiopharmaceutical Science Council, Society of Nuclear Medicine
  - 5. 1976-1979, Editorial Advisory Board, U.S. Pharmacist New York, NY
  - 6. 1974-1977, American Association of Colleges of Pharmacy, Subcommittee of Nuclear Pharmacy, (Chairman, 1976)
- b. State
  - 1. 1980-81, Membership Committee, Oklahoma Pharmaceutical Assn., State of Oklahoma
  - 2. 1975-1976, Chairman, Radiopharmaceutical Advisory Committee, Michigan Board of Pharmacy, Department of Licensing and Regulation, State of Michigan
  - 3. 1973-1976, Chairman, Governor's Radiation Advisory Committee, State of Michigan.

- c. University of Oklahoma
1. 1981-1982, HSC LRP, and Affirmative Action
  2. 1979-1982, OK Teaching Hospitals P & T Committee
  3. 1976-1983, Radiation Safety Committee
  4. 1976-1983, Dean's Council
  5. 1976-1983, V.A. Administration Dean's Committee
- d. University of Michigan
1. 1975-1976, Chairman, Graduate Affairs Committee
  2. 1973-1976, Educational Resources Committee
  3. 1972-1976, Executive Committee, College of Pharmacy
  4. 1972-1973, Faculty Senate
  5. 1974-1975, Alumni Lecture Committee
  6. 1972-1976, Graduate Research Support Committee
- e. Temple University
1. 1970-1971, Head, Bionucleonics Division (Radiological Health, Nuclear Pharmacy, Radiation Safety Office, 4 Faculty, 7 Staff)
  2. April 18-19, 1969, Chairman Workshop on Thermoluminescent dosimetry, Jefferson Medical Center, Jefferson University, Philadelphia, PA
  3. 1967-1971, Radiation Protection Committee
    - a. University Policy Committee (Chairman 70-71)
    - b. Health Sciences (Chairman 1967-1971)
  4. 1969-1971, Human Use Committee
  5. 1968-1971, School of Pharmacy
    - a. 1968-1970, Equipment Committee (Chairman 69-70)
    - b. 1968-1969, Admissions Committee
    - c. 1968-1969, Graduate Committee
    - d. 1968-1971, Student Activities Committee
  6. 1968-1971, Faculty Advisor, Phi Delta Chi Pharmacy Fraternity
  7. 1967-1970, Administered Radiation Safety Office (6 staff)
- f. Reviewer (Current)
1. The Journal of Nuclear Medicine
  2. Am. J. Hospital Pharmacy
  3. Journal of Medicinal Chemistry
  4. Encyclopedia of Chemical Technology

## 17. COMMUNITY SERVICE

- a. 1991-present, Board of Trustees, Bacone College, Muskogee, OK.
- b. 1991 Technical Advisory Committee, City of Miami, OK
- c. 1989 - present, Member, Management Advisory Board, Center for Space Power, Texas A&M University
- d. 1975, Executive Chairman for Billy Graham Assn., Washtenaw Co., "The Hiding Place" film.
- e. 1974, Executive Chairman for Billy Graham Assn., Washtenaw Co., "Time to Run" film.
- f. 1971-1980, Board of Trustees, Philadelphia College of Bible, Philadelphia, PA.
- g. Church Membership
  1. 1987-present, First Baptist Church, Miami, OK (Adult Sunday School Teacher, Choir)
  2. 1977-1981, Metropolitan Baptist Church, Oklahoma City, OK
  3. 1971-1977, Packard Road Baptist Church (Adult Sunday School Teacher, Deacon, Choir)
  4. 1968-1971, Wharton Baptist Church, Philadelphia, PA (Sr. High Sunday School Teacher, Choir, Deacon)
  5. 1964-1968, First Baptist Church, Lafayette, IN (Substitute Sunday School Teacher)
  6. 1953-1964, First Baptist Church, Olympia, WA (Sunday School Teacher, Sunday School Superintendent, Choir, Junior High Youth Leader)
- h. 1970-present, Gideons International (President, Ann Arbor Camp-1973)
- i. 1961-1964, Christian Business Men's Club, Olympia, WA

## II. BIBLIOGRAPHY

## A. Publications

1. Ice, R.D., Master's Thesis: A Study of the Retention, Excretion, and Distribution of 2,3,5-Triiodobenzoic Acid and Its Metabolites in the Rat, Graduate School, Purdue University, Lafayette, IN., August, 1965.
2. Ice, R.D., Breckinridge, C.E., Jr., and Christian J.E.: Retention, Excretion and Distribution of 2,3,5-Triiodobenzoic Acid and Its metabolites in the Rat, J. Pharm. Sci., 55: 497-500, 1966.
3. Ice, R.D., Doctoral Dissertation: The Metabolic Fate of Orally Administered 2,3,5-Triiodobenzoic Acid and Its Metabolites in Lactating Animals, Graduate School, Purdue University, Lafayette, IN., June, 1967.

4. Ice, R.D., Christian, J.E., and Plumlee, M.P.: Metabolic Fate of Orally Administered 2,3,5-Triodobenzoic Acid in Lactating Animals, *J. Pharm. Sci.*, 57: 399-404, 1968.
5. Dugan, M.A., and Ice, R.D.: Beta Emitter Identification by Quench Analysis, *Organic Scintillators and Liquid Scintillation Counting*, Horrocks, D.L. and Peng, C.T., Ed., 1055-1062, Academic Press, 1971.
6. Ice, R.D.: Establishment of a University Radiation Safety Office, *Health Physics*, 20: 444-446, 1971.
7. Ice, R.D. and Dugan, M.A.: Beta Radiopharmaceutical Identification by Quench Analysis, *J. Nucl. Med.*, 12: 552-554, 1971.
8. Ice, R.D., Updegrave, W.J. and Bogucki, E.I.: Influence of Dental Radiographic Cones on Radiation Exposure, *J.A.D.A.*, 83: 1297-1302, 1971.
9. Bercz, C.V. and Ice, R.D.: Synthesis of 1-Carbethoxy-4-cyano-4-phenylpiperidine, *J. Pharm. Sci.*, 61: 1316-1317, 1972.
10. Lieberman, J.E., Ice, R.D., Green, M. and McGratten, R.: Summary of Environmental Monitoring at Philadelphia, 1958-1971, *Radiological Health Data and Reports*, 14: 333-350, 1973.
11. Kirschner, A.S., Ice, R.D., and Beierwaltes, W.H.: Radiation Dosimetry of I-19-Iodocholesterol, *J. Nucl. Med.* 14: 713-717, 1973.
12. Kelly, W.N. and Ice, R.D.: Pharmaceutical Quality of Technetium-99m Sulfur Colloid, *Am. J. Hosp. Pharm.*, 30: 817-820, 1973.
13. Ice, R.D. and Hetzel, K.R.: Radiation Protection in a Nuclear Pharmacy, *Proceedings of the Third International Congress of the International Radiation Protection Association*, Sept. 9-14, 1973, Washington, D.C., 1197-1202. Conf. 730907, USAEC, Oak Ridge, TN.
14. Motte, C. and Ice, R.D.: Thermal and Radiolytic Decomposition of 131-I-19-Iodocholesterol, *J. Nucl. Med.*, 15: 38-41, Jan., 1974.

15. Clayton, B.D., Ice, R.D. and Beierwaltes, W.H.: Preparation, Quality Control and Clinical Acceptance of labelled Macrotec, Radiology, 116: 223-225, July, 1975.
16. Anderson, B.G., Beierwaltes, W.H., Harrison, T.S., Ansari, A.N., Buswink, A.A. and Ice, R.D.: Labelled Dopamine Concentration in Pheochromocytomas, J. Nucl. Med., 14: 781-784, Nov., 1973.
17. Ice, R.D., Shaw, S.M., Born, G.S. and George, R.E.: Nuclear Pharmacy Education., American Journal of Pharmacy Education, 38: 420-425, Aug., 1974.
18. Sturman, M.F., Beierwaltes, W.H., Prakash, S., Ryo, U.Y., Ice, R.D. and Gitomer, W.: Uptake of Radiolabeled Testosterone, 5-Dihydrotestosterone, Estradiol and Pregnenolone by Canine Prostate., J. Nucl. Med., 15: 94-97, February, 1974.
19. Beierwaltes, W.H., Sturman, M.F., Ryo, U.Y. and Ice, R.D.: Imaging Functional Nodules of the Adrenal Glands with I-19-Iodocholesterol., J. Nucl. med., 15: 246-251, April, 1974.
20. Ryo, U.Y., Beierwaltes, W.H. and Ice, R.D.: Enhancement of Uptake with Estradiol Treatment of A Radiolabeled Irreversible Competitive Enzyme Inhibitor in the Adrenal Cortices and Ovaries of Rats with Endocrine Autonomous Breast Carcinoma., J. Nucl. Med., 15: 187-189, March, 1974.
21. Ryo, U.Y., Beierwaltes, W.H., Freehan, P. and Ice, R.D.: Distribution of 14-C and 3-H-Streptozotocin in Dogs and Toadfish, J. Nucl. Med., 15: 572-576, July, 1974.
22. Sturman, M.F., Moses, D.C., Beierwaltes, W.H., Harrison, T.S., Ice, R.D. and Dorr, R.P.: Radiocholesterol Adrenal Images for the Localization of Pheochromocytoma, Surg., Gyn., and Obst., 138: 177-180, February, 1974.
23. MacAuley, R.J., Ice, R.D. and Curtis, E.G.: The Limulus Test for In Vitro Pyrogen Detection, Am. J. Hosp. Pharm., 31: 688-691, July, 1974.

24. Ryo, U.Y., Shaw, M.J., Beierwaltes, W.H., and Ice, R.D.: Distribution of 14-C-Diphenylhydantoin in Pancrease Islet Cell and Other Tissue of Toadfish., J. Nucl. Med., 15: 685-687, August 1974.
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26. Hetzel, K.R. and Ice, R.D.; Clinical Nuclear Pharmacy, "Selected Papers of Nuclear Pharmacy", American Pharmaceutical Association, Washington, DC, January, 1976, pp. 31-38.
27. Shen, V., Hetzel, K.R. and Ice, R.D.: Radiochemical Purity of Radiopharmaceuticals Using Gelman Sephrachrome (ITLC) Chromatography, Gelman Technical Bulletin, No. 32, Gelman Instrument Co., Ann Arbor, Michigan, October, 1974.
28. Moses, D.C., Schteingart, D.E., Sturman, M.F., Beierwaltes, W.H. and Ice, R.D.: Efficacy of Radiocholesterol Imaging on the Adrenal Glands in Cushing's Syndrome., Surg., Gyn., and Obst., 139: 201-205, August, 1974.
29. Sturman, M.F., Beierwaltes, W.H., Ice, R.D. and Prakash, S.: Uptake of Radiolabeled Estradiol by the Canine Adrenal, J. Nucl. Med., 16: 77-79, January, 1975.
30. Ryo, U.Y., Ice, R.D., Jones, J.D. and Beierwaltes, W.H.: Relative Tissue Distribution of Radioactivity in Rats with Endocrine "Autonomous" Breast Carinomas After 3-H-, 99m-Tc-, and 64-Cu-Bleomycin, J. Nucl. Med., 16: 127-131, February, 1975.
31. Lamson, M.L., Kirschner, A.S., Hotte, C.E., Lipsitz, E.L. and Ice, R.D.: Generator Produced 99m-Tc04: Carrier Free?, J. Nucl. Med., 16: 639-641, July, 1975.
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3. Ice, R.D.: "University Radiation Safety Practices, 2nd National Conference of University Radiation Safety Officers, Rensselaer Polytechnic Institute, Troy, NY, August, 1969.
4. Ice, R.D.: "Radiopharmaceuticals," Delaware Valley Society of Hospital Pharmacists, Philadelphia, PA., May, 1970.
5. Ice, R.D.: Visiting Professor, Radiological Health, Rutgers University, New Brunswick, New Jersey, November, 1970.
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11. Ice, R.D.: "A Christian View of Energy and Ecology", University of Oklahoma, Christian Medical Society, April 6, 1980.
12. Ice, R.D.: Visiting Professor, College of Pharmacy, N.E. Louisiana State University, March 19, 1981.

## III. GRADUATE STUDENT GUIDANCE

A. Master of Science

## Topic

1. Bogucki, E.I.	1967	Dental X-Ray Dosimetry
2. Cassara, R.D.	1968	Philadelphia Radiation Safety
3. Clemons, P.E.	1969	TLD of Panographic X-Rays
4. Kaufer, G.	1969	Radionuclide Chelation Therapy
5. Pettingill, H.J.	1971	Tc Labeled Fibrinogen
6. Troetel, W.	1969	Synthesis of C-14 Meperidine
7. Bartlett, J.M.	1970	Tc Labeled Fibrinogen
8. Bicehouse, H.	1970	Binding of Organic Tritium
9. Bercz, C.V.	1970	Synthesis of Meperdine Precursor
10. Briden, D.	1970	Neutron DosimetryIII.
11. Jenckes, T.	1970	TLD in a University R.C.O.
12. Monte, J.	1970	Radioassay of Environmental PBI
13. Hetzel, K.R.	1971	TcO Colloid
14. Kirschner, A.	1971	11-C-Dopamine
15. McAuley, R.	1973	Pyrogen Detection by "Limulus"
16. Ihlenfield, W.	1974	Species Specificity of Radiopharmaceuticals
17. Shen, Victoria	1975	Xenon-133 Waste Disposal
18. Wetherill, Roger	1975	Dosimetry and Decomposition of Para RIBA.
19. Lamson, Myles	1977	Technetium Chemistry
20. Behm, Harriet	1977	Nuclear Pharmacy Practice

B. Doctor of Pharmacy

1. Kelly, W.	1972	Evaluation of TcS Colloid for Human Use
2. Hotte, C.	1972	Radiodecomposition of Iodocholesterol
3. Nelson, S.	1972	I-131 Labeled Fibrinogen
4. DeSpigno, V.	1972	Technetium Medicinal Chemistry
5. Clayton, B.	1973	Clinical Evaluation of Technetium Macro-aggregated Albumin
6. Scheife, R.	1973	Labeled Oleic Acid for Myocardial Scanning
7. Porter, W.	1974	Establishment of a Nuclear Pharmacy

B. Doctor of Pharmacy (con't)

- |                  |      |   |
|------------------|------|---|
| 8. Vellucci, A.  | 1974 | Tc-99m Dithizone for<br>Pancreas Scanning             |
| 9. Robertson, J. | 1975 | Dosimetry and Decomposi-<br>tion of Selenocholesterol |
| 10. Merryman, R. | 1975 | Thioglucoase Labeling                                 |
| 11. Vivian, A.   | 1976 | Radiochemical Purity<br>Evaluation                    |

C. Doctor of Philosophy

- |                        |      |  |
|------------------------|------|--|
| 1. Dugan, (Leeper) M.  | 1971 | Gonadal Dosimetry of<br>Tritiated Thymidine  |
| 2. Monte, (Piccone) J. | 1973 | Tumor Detection by<br>Ultrasound             |
| 3. Kerschner, A.       | 1975 | Pharmacokinetics of<br>Tissue Specific Drugs |
| 4. Hotte, C.           | 1976 | Radiopharmaceutical<br>Stability             |
| 5. Mills, S.           | 1980 | Tellurium Labeled Fatty<br>Acids             |

D. Post Doctoral

- |                        |      |
|------------------------|------|
| 1. Wieland, D.         | 1973 |
| 2. Basmadjian, G.      | 1974 |
| 3. El Masry, A.H.      | 1975 |
| 4. Yu, Terry           | 1976 |
| 5. Mukadopating, Sunil | 1976 |
| 6. Parker, G.          | 1978 |
| 7. Sadek, S.           | 1981 |

## IV. RESEARCH

## A. Areas of Interest

1. New Products Design and Development
2. Radiopharmaceuticals

## B. Current Projects

1. Boron Neutron Capture Therapy
2. Theoretical Considerations of Radiopharmaceutical  
Stability
3. Membrane Receptor Biosensors
4. Isotopic lithium chemistry and physics

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Charles Bechhoefer, Chairman  
Dr. Jerry R. Kline  
Dr. Peter S. Lam

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In the Matter of )  
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 )

GEORGIA INSTITUTE )  
OF TECHNOLOGY )

Atlanta, Georgia )

Georgia Tech Research )  
Reactor )

Renewal of License No. R-97 )  
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Docket No. 50-160-Ren

ASLBP NO. 95-710-01-Ren

CERTIFICATE OF SERVICE

I do hereby certify that copies of the foregoing Testimony of Dr. Rodney Ice has been served upon the following persons by depositing a copy thereof in the United States Mail, postage prepaid:

Administrative Judge  
Charles Bechhoefer, Chairman  
Atomic Safety and Licensing  
Board  
U.S. Nuclear Regulatory  
Commission  
Washington, D.C. 20555

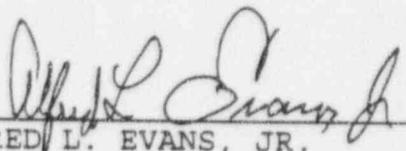
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Glenn Carroll  
Georgians Against Nuclear  
Energy  
Post Office Box 8574  
Atlanta, Georgia 30306

This 3d day of May, 1996.

  
\_\_\_\_\_  
ALFRED L. EVANS, JR.  
Senior Assistant Attorney General

1 is between GANE and Georgia Tech and normally you would go  
2 first, although it's not an iron-clad rule. We could  
3 change it if necessary or if sought, if you think it's  
4 reasonable.

5 MS. CARROLL: Thank you.

6 CROSS EXAMINATION

7 BY MR. JOHNSON:

8 Q I'd like to ask everyone to turn to page 3 of  
9 Dr. Ice's testimony, question 6. It's asking, aside from  
10 Neely Nuclear Research Facility, what types of  
11 radioactivity are you commonly involved with on the campus  
12 at large. Apart from the research center reactor, there  
13 are two general categories of radioactivity on campus. The  
14 first is x-ray producing devices, which would include such  
15 things as electron microscopes and x-ray machines.

16 My question to Dr. Ice is, are these the same  
17 x-ray machines which the minutes of the Nuclear Safety  
18 Committee shows were being operated even after there was  
19 leakage and I guess -- you know, they were not up to full  
20 technical compliance but they were being used anyway?

21 A No.

22 Q Okay. Where would these x-ray producing  
23 devices be located and whose purview would they come under?

24 A Which x-ray machines are you specifically  
25 referring to?

1           Q       This is from February 9, 1995, Nuclear  
2 Safeguards Committee minutes. The Committee discussed a  
3 report by S. Stock on the causes of the accident (See  
4 minutes of December 9, 1994) concerning the radiation  
5 exposure of a student by faulty x-ray equipment. ' means  
6 taken to prevent its reoccurrence. And then it goes on to  
7 discuss the Form A request by Mr. Stock or Ms. Stock, I'm  
8 not sure which one.

9                       Does that refresh your memory?

10          A        At Georgia Tech, we have about 50 x-ray  
11 producing devices on campus. One of Dr. Stock's is an x-  
12 ray diffractometer, it has no relationship to the health  
13 clinics.

14          Q        Okay. Well then I guess my question then would  
15 be, whose purview does those x-ray machines fall under, if  
16 not yours?

17          A        They fall under my purview.

18          Q        And just for further clarification on this  
19 issue since there's been some confusion, we also have a  
20 memo from Mr. Cobb, Chairman of the Nuclear Safeguards  
21 Committee, from more recently, in fact October of '95,  
22 recommending that outdated, unsafe x-ray units be removed  
23 from service.

24                       Have you read that memo, are you familiar with  
25 the document I'm speaking of?

1 A Do you have a copy of the document?

2 Q I believe we do, yes.

3 (A document was proffered to the witness.)

4 MS. CARROLL: These are, by the way, attached  
5 to our discovery, attachment 9.

6 Q This is a memo to the Nuclear Safeguards  
7 Committee dated October 13, 1995 from Mr. Cobb, who is the  
8 chairman of the committee, and the subject is (Old) x-ray  
9 producing devices. Feel free to read it for yourself, but  
10 the basic content is that Mr. Cobb is concerned that some  
11 of the older devices they're using for these purposes may  
12 be unsafe and may not have sufficient safety standards.

13 A And what is your question?

14 Q My question would be -- I guess you have  
15 already answered that these devices are under your purview  
16 and I was just wondering if this memo was of concern to you  
17 and what action you took to remedy the situation.

18 A Well, first of all, this memorandum is not  
19 addressed to the Safeguards Committee meeting, this is  
20 addressed to a number of users of radioactive -- x-ray  
21 producing devices on campus. This letter was drafted by  
22 myself and presented to the committee and the committee  
23 reviewed it and it went out over the signature of the  
24 chairman, so I was the primary author of the memo.

25 Q I see. So then you were actively involved in

1 identifying this as a problem and trying to push a solution  
2 forward to it.

3 A That's correct.

4 Q Okay, thank you. I would ask everyone to move  
5 ahead to page 12, this is also in the main testimony body  
6 of Dr. Ice's testimony. At the bottom of page 37 you have  
7 a question, Do you have to get permission from the  
8 director, Dr. Karam, to suspend an activity. The answer  
9 is: I don't, I have this authority on my own.

10 I would ask you, by means of clarification, do  
11 you have to get permission or approval from Dr. Karam in  
12 order to investigate an activity which may be possible  
13 wrongdoing?

14 A No.

15 Q This is also something from the minutes of the  
16 Nuclear Safeguards Committee meeting from October 8, 1994,  
17 item number 4. R. Karam discussed the failure of an older  
18 x-ray diffraction equipment where the shutter malfunctioned  
19 and the student may have been exposed on December 6, 1994.  
20 Although the dosage was well below permissible limit, R.  
21 Ice and S. Stock asked and received an authorization to  
22 research the issue further.

23 And my question to you, Dr. Ice, is why did you  
24 ask and why did you need to receive an authorization to  
25 research this issue further?

1           A       I don't remember the exact date of the  
2 incident, but we responded to the incident immediately when  
3 it happened. I shut down the operation directly without  
4 Dr. Karam's approval, the instrument was shut down. We  
5 could not bring it back up to evaluate the cause of the  
6 accident without the approval of the committee. We went to  
7 the committee with it, it was discussed before the  
8 committee, the committee authorized us to bring the  
9 instrument back up to power so we could validate and figure  
10 out just exactly what went wrong with it.

11           Q       On page 14, question 44 is, is there any  
12 procedure he prefers -- speaking of Dr. Karam, to get the  
13 context -- for your advising him as to concerns and other  
14 matters occurring at the center. And your answer is he has  
15 so indicated to me. Dr. Karam does micromanage and in  
16 general wants to know about everything that is going on at  
17 the center or on the campus, at least where it is of some  
18 significance.

19                   My question is about the first part of that  
20 statement. Are you aware, Dr. Ice, of the -- I think it's  
21 safe to say commonly known and referred to negative  
22 connotation of the term micromanage and did you mean to  
23 associate a negative connotation to that and if not, how do  
24 you mean to use that term in that context.

25           A       I am not using the term in terms of a negative

1 way. It means that he's a detailed manager, he's involved  
2 with all the operational decisions.

3 Q Okay. Actually, further on in that same answer  
4 to question number 44, you say if a safety problem  
5 develops, my step one is to take appropriate corrective  
6 action in the exercise of my responsibilities. Step two is  
7 to report the matter and discuss it orally with Dr. Karam.  
8 Step three would be to prepare a draft report which I would  
9 then give to Director Karam for his review, comments and  
10 suggestions. If the report is going outside of the center,  
11 Dr. Karam views it as a report of the Neely Nuclear  
12 Research Center and wants to review and personally approve  
13 the finalized version to be released.

14 My question concerning that, Dr. Ice is, we  
15 have already heard testimony that it is not required for  
16 facility personnel to consult with Dr. Karam first before  
17 going to the NRC about a matter that they feel is of  
18 consequence to the NRC. Are there special circumstances or  
19 special incidents that would cause you to go to the NRC and  
20 to deviate from the procedure that we have seen you outline  
21 in this answer?

22 A I feel like I have the opportunity to discuss  
23 any matter I want with the NRC at any time.

24 Q Do you feel that -- I guess my question then  
25 would be where would that fit in -- would that be between

1 step one and step two, would that be between step two and  
2 step three, if such an occasion were to present itself?

3 A I'd like you to be a little more specific on  
4 what type of occasion you're talking about.

5 Q Well, obviously you're much more expert on what  
6 issues might concern the NRC and what might not, Dr. Ice.  
7 In a hypothetical situation where there was an incident --  
8 you say you feel free to report anything to the NRC. If  
9 you were going to report something to the NRC, where in  
10 this process would you do that?

11 A It would depend upon the nature of the hazard  
12 involved. If I felt there was a major hazard involved and  
13 there was no action by Dr. Karam and it involved his  
14 operations, I would immediately go to the NRC, probably  
15 also insert in there a call to the chairman of the Nuclear  
16 Safeguards Committee.

17 Q And just for clarification purposes, in such an  
18 instance where you were to convey something to the NRC,  
19 would you necessarily need to do it as a report of the  
20 Neely Nuclear Research Center or could you do it in, I  
21 guess I'm looking for a word like a more informal way? Is  
22 there a way for you to communicate these concerns to the  
23 NRC where it is not an official report of the center and  
24 therefore it does not necessarily violate the guidelines  
25 that Dr. Karam apparently likes to set down?

1           A        I have felt no inhibits by the NRC from anybody  
2 there from my not being able to pick up the phone and call  
3 them and tell them what's going on.

4           Q        Okay.

5           A        So it could be informal, it could be formal,  
6 either way.

7           Q        Thank you. Moving forward to page 17, which is  
8 question 51 in the middle of the page. Do you disagree  
9 with the director as to whether it would be better or  
10 worse, from an organizational viewpoint, to have health  
11 physics separated and independent from the supervision of  
12 the center's director. The answer: We disagree on this.  
13 I think that the alternative arrangement where the manager  
14 of the Office of Radiation Safety and its health physicists  
15 are not subject to the supervisor control of the director  
16 of the center would be better.

17                    Since we already pursued this in some detail  
18 really with Mr. Tsoulfanidis earlier, I would just ask you  
19 roughly what kind of structure would you prefer and what  
20 kind of organization would you propose, and if you wish to  
21 draw a chart or something for us, as Mr. Tsoulfanidis did,  
22 I'll be happy to give you some paper and enable you to do  
23 so.

24           A        I think in an effective organization for  
25 radiation safety, executive management should be involved

1 in the oversight in the scenario, so I think there should  
2 be a clear path between the radiation safety officer and  
3 executive management. So that is not a clear path at this  
4 point in time.

5 Q Thank you, Dr. Ice.

6 I guess a follow-up question along those lines  
7 would be how involved do you feel that upper management at  
8 Georgia Tech is with the reactor program and do you feel  
9 that it is sufficient and what changes in that general  
10 relationship would you prefer, in your opinion?

11 A There has been a dramatic change in upper  
12 management's concern about the reactor operations with the  
13 present management, President Clough. I now have the  
14 privilege of meeting with President Clough on a quarterly  
15 basis and discussing radiation safety matters with him.  
16 That's an active involvement and it's a very effective  
17 involvement in my consideration. I would like to see it  
18 formalized more probably through a line item description  
19 organizationally, probably not to President Clough but  
20 probably somebody who is subordinate to President Clough,  
21 because he's a hard man to get ahold of. But  
22 organizationally and from an operational standpoint, I  
23 would love to see a cleaner relationship between safety and  
24 operations, a pure distinction between the two.

25 CHAIRMAN BECHHOEFER: Dr. Ice, are those

1 meetings with the president you alone or are they meeting  
2 with you and other members of the staff, including the  
3 director?

4 THE WITNESS: Generally, they are between the  
5 president and myself alone.

6 CHAIRMAN BECHHOEFER: Thank you.

7 THE WITNESS: I don't believe the director has  
8 been in on any of the meetings in fact.

9 BY MR. JOHNSON:

10 Q And these are -- these meetings have basically  
11 been a fairly recent development with Mr. Clough, with him  
12 being the president of the university?

13 A He's only been the president I believe for  
14 about a year, maybe a little more than a year, so that's  
15 when the onset of these meetings started.

16 Q Dr. Ice, we heard some testimony earlier from  
17 Dr. Tsoulfanidis about this and I'd just like to ask you  
18 your opinion as MORS and as someone who is familiar with a  
19 lot of these procedures. Would you agree with Mr.  
20 Tsoulfanidis' statement that any time a source of radiation  
21 is to be moved from one place to another, that health  
22 physics personnel should be consulted and should be  
23 involved with that process?

24 MR. TURK: Objection to the characterization.

25 MR. JOHNSON: Which part?

1 MR. EVANS: I believe his testimony was that it  
2 wasn't necessary.

3 MR. TURK: The answer that I recall was that it  
4 would depend on the nature of the material involved and  
5 where it was being moved from and to.

6 CHAIRMAN BECHHOEFER: I think you should  
7 rephrase the question.

8 BY MR. JOHNSON:

9 Q Dr. Tsoulfanidis had said that he did not feel  
10 that an RSO or for that matter even health physics  
11 personnel had to be actually present at moving of such  
12 radioactive material, but -- and I suppose I could have  
13 heard wrong, but I do believe that he testified that at  
14 least their input or consultation on the matter was  
15 something that he felt was wise and something that he felt  
16 should be done. Would you agree with that?

17 MR. TURK: No objection except that he's asking  
18 for the agreement to a hypothetical.

19 MR. JOHNSON: A second opinion.

20 A The movement of radioactive material depends  
21 upon the quantity of material, the physical form of the  
22 material, the half-life of the material. There's a number  
23 of factors involved. Maybe taking a radioactive watch  
24 across campus. Basically quantities that are above a  
25 certain level, it's my policy that there's a form involved

1 that -- exact transfer operations, so that radiation safety  
2 knows what's going on, but that does not necessarily mean  
3 that radiation safety has to make the physical transfer.

4 BY MR. JOHNSON:

5 Q Okay, but in your view, they should know what's  
6 going on and they should at least be informed of such  
7 activities?

8 A Yes.

9 Q That's actually a good point. Would it be safe  
10 to say that in terms of all these variables that you were  
11 speaking of that can change the equation so much in  
12 something like this, that one of those would be regulatory  
13 compliance; you know, regulations that would concern that  
14 particular kind of radiation being moved in that particular  
15 way -- that would be one of the factors involved in  
16 considering how to dispose of it.

17 A Depending on what's involved in the move, yes,  
18 regulatory affairs could be concerned.

19 MR. JOHNSON: Could we go off the record for  
20 just a moment?

21 CHAIRMAN BECHHOEFER: Yes, off the record.

22 (Brief pause.)

23 MS. CARROLL: The Judge has to order that.

24 MR. JOHNSON: That's true. I'm not the judge.

25 BY MR. JOHNSON:

1 Q As the acting MORS at Georgia Tech obviously  
2 you have a lot of experience with nuclear safety. I'm sure  
3 you are familiar with the cadmium incident that we've been  
4 talking about. What need, if any, would you have perceived  
5 following that incident to notify the people at MARTA where  
6 the bus was possibly contaminated by Mr. Downs?

7 A Number one, I'm not the acting MORS. I am the  
8 MORS.

9 Q Well, I forget that there are those titles.  
10 That's true, you are the MORS.

11 A That incident was before my time.

12 Q True.

13 A I have not reviewed the particular details of  
14 the incident.

15 Q I see. Then we won't ask you to speculate.  
16 One other question, since you do have a good amount of  
17 firsthand familiarity with the facility, is -- and  
18 especially since you do have the pharmaceutical background  
19 and a background in medicine and medical related fields,  
20 what is your -- what is your opinion of what kind of  
21 resources and time would be necessary to get boron neutron  
22 capture therapy up and running at Georgia Tech?

23 A I believe the reactor at Georgia Tech is a  
24 unique, special device specially modified with special  
25 capabilities for boron neutron capture therapy. It's not

1 limited to just brain tumors. It can be open for a variety  
2 of tumors. I believe the limiting factor now is not the  
3 reactor but the delivery vehicle, that is, the drug that is  
4 inquired -- any drug that needs to be synthesized. There  
5 are two available drugs being used at this point in time.  
6 Boronphenylalanine and borocaptate. Neither one of those to  
7 I consider to be optimum agents. There is a number of  
8 research developments that have to take place in the  
9 pharmaceutical area prior to the BNCT being an effective  
10 neutron therapy. I think it is in the trial phase right  
11 now and I think that's where it should be.

12 Q Well, then let me ask one more follow-up  
13 question. This will probably be sufficient for us. Do you  
14 see the need for any facility modifications, any further  
15 facility modifications before the BNCT therapy could become  
16 functional at Neely or are you saying that it is the drugs  
17 in the pharmaceutical side of the equation that is lacking  
18 and that Neely is ready to go tomorrow?

19 A No, there would be modifications necessary on  
20 the reactor to optimize it for patient therapy.

21 Q And specifically what would those modifications  
22 be?

23 A They would be necessarily a new filter. There  
24 would be an upgrade of the systems. There would have to be  
25 an application submitted to the Food and Drug

1 Administration for approval as a device.

2 Q What systems specifically would need to be  
3 upgraded and to what level would they need to be upgraded  
4 to, I suppose?

5 A The instrument was designed as a patient  
6 therapy reactor facility, but it was designed 30 years ago.  
7 That facility needs to be updated to current medical use.

8 Q If we understood Dr. Copcutt's testimony  
9 correctly, there would be actual surgical procedures taking  
10 place within the reactor facility itself. Wouldn't it be  
11 true that an additional thing that may have to be done  
12 would be to make whatever areas were being used in that way  
13 sterile?

14 A It would depend upon the process that's being  
15 used, but for instance, the boronophenylalanine that I told  
16 you about is actually used for melanomas, or skin cancers.  
17 Those could be used without a surgical -- sterile area.

18 Q Is it foreseen that there will be surgical  
19 procedures undertaken at the Neely facility as part of the  
20 BNCT therapy if and when that time does arrive?

21 A It would depend upon the physician involved,  
22 the location of the tumor, the thickness of the -- depth of  
23 the tumor. You'd have to ask a physician that particular  
24 question, I think.

25 Q Let me rephrase the question. If Georgia Tech

1 were to undertake the BNCT therapy as an ongoing concern,  
2 wouldn't it be likely that there would have to be at least  
3 some surgical procedures done at the facility in order for  
4 it to really function fully as a BNCT therapy center.

5 MR. TURK: And you're asking would the surgical  
6 procedure have to be done right there at the reactor --

7 MR. JOHNSON: Yes.

8 MR. TURK: -- at the reactor as opposed to some  
9 other location?

10 THE WITNESS: I think that's a question you'd  
11 have to ask a physician.

12 MR. JOHNSON: No further questions.

13 CHAIRMAN BECHHOEFER: Mr. Turk.

14 MR. TURK: Dr. Ice, I have some questions that  
15 may actually be in the nature of asking you to expand upon  
16 some statements that you made in your direct testimony as  
17 well as in your responses to cross examination.

18 FURTHER CROSS EXAMINATION

19 BY MR. TURK:

20 Q First, I'm looking at page 12 of your direct  
21 testimony, question 35, and the question asks whether you  
22 are authorized to extend an activity involving radiation  
23 if, in your professional judgment it is unsafe to proceed,  
24 and you state that you are so authorized. Has that  
25 situation ever arisen during the time that you have been at

1 the facility?

2 A Yes.

3 Q And can you give us some of the details? Did  
4 it happen on one occasion or more than one occasion?

5 A More than one occasion. It happened with a  
6 contamination incident and I shut down the laboratory.  
7 It's happened with the x-ray unit that was discussed  
8 earlier.

9 Q Those are the two occasions which it occurred?

10 A There may be others.

11 Q What was the contamination incident in which  
12 you shut down the laboratory?

13 A It was a Sulphur 35 contamination. A graduate  
14 student using a pipettic (ph) from the stock solution of  
15 the vial, and evidently contaminated the bench top and down  
16 the front of the bench and some on the floor.

17 Q Which building did that occur in?

18 A Biology.

19 Q Not at the Neely Research Center then?

20 A Not at the Neely Research Center.

21 Q And the x-ray unit, that also is not at the  
22 Neely Nuclear Research Center?

23 A That is correct.

24 Q Has there been an event at the Neely Nuclear  
25 Research Center in which you've had to shutdown operations

1 or --

2 A No.

3 Q -- not at this time, correct?

4 A Not at this time.

5 Q Also, question 37 on the same page, you were  
6 asked whether you have to get permission from the director,  
7 Dr. Karam, to suspend an activity, and you state that you  
8 do not have to get his permission, that you have authority  
9 on your own. Has this situation ever arisen in which you  
10 wanted to suspend an activity at the Neely Nuclear Research  
11 Center?

12 A No.

13 Q On page 13 of your direct testimony, question  
14 39, asks whether you attend the meetings of the Nuclear  
15 Safeguards Committee and you state that you attend all  
16 their meetings. Are you a voting member or a non-voting  
17 member?

18 A I'm a non-voting ex-officio member.

19 Q Is Dr. Karam also a non-voting member?

20 A Yes.

21 Q Do you believe it is important to be a voting  
22 member of the NSC?

23 A I believe the -- Yes, for myself. I can't speak  
24 for the director.

25 Q You would want to be a voting member?

1           A       I think radiation safety should be a voting  
2 member.

3           Q       And why do you say that?

4           A       Because I think the radiation safety officer or  
5 the MORS brings a significant contribution to the committee  
6 and that should be reflected in the vote that takes place  
7 at the end of the discussion.

8           Q       Hypothetically, let's assume that you made a  
9 report to the committee and the committee would then have  
10 to vote on what action to take. I that a situation in  
11 which you believe you should have the right to vote with  
12 the committee?

13          A       Yes.

14          Q       And why would you think it's not adequate for  
15 the committee to hear your views expressed and then to make  
16 a decision independently of your vote?

17          A       I think it is a matter of personal opinion. I  
18 think it is not unsafe the way things are going at the  
19 moment, but I just think that the person who is making the  
20 recommendation ought to be able to vote.

21          Q       Assuming that you and Dr. Karam, or whoever the  
22 facility director was at the time, disagreed on a matter,  
23 would you think it would be equally important for the  
24 facility director to have a vote to counter your own?

25          A       I think it would be -- I would have no

1 objection to the director voting.

2 Q I guess I'm still left with some uncertainty in  
3 my mind as to why you believe it is not adequate to be  
4 present and to argue for your position, why that is not  
5 adequate and why you feel a further step is needed where  
6 you would also have the right to vote on a report in which  
7 you, yourself, were making.

8 A I don't think it is a matter of inadequacy or  
9 adequacy. I'm just saying I would like to be counted for  
10 my statement that I made at the committee.

11 Q Has a situation ever arisen in which the fact  
12 that you have not had the right to vote altered the outcome  
13 of the committee meeting decision?

14 A Offhand I can't think of one.

15 Q Do you recall any incidence in which your  
16 feeling was that if you had only been allowed to vote the  
17 outcome might be different?

18 A No.

19 Q Also on page 13 of your testimony, question  
20 14 -- I'm sorry -- question 40. You are asked whether you  
21 make reports to the committee, and you state that you do.  
22 Is this a regular part of your function as the MORS?

23 A Yes.

24 Q It is.

25 A It is not an operational report. I basically

1 report if there's been any problems or any incidents or  
2 anything that I think should be called to the attention of  
3 the committee as a point of information. It may not be for  
4 an action item, but it may be just a point of information  
5 for the committee.

6 Q Do you regularly make reports to the committee  
7 at every meeting?

8 A Not formally, but I am at every committee  
9 meeting and there is always the opportunity to present any  
10 comments that I have.

11 Q If anything of significance was to happen that  
12 might affect radiation safety at the center, would you  
13 report that matter to the committee?

14 A Yes.

15 Q During the time that you've been the manager of  
16 the Office of Radiation Safety, have you ever had occasion  
17 to report significant or serious radiation safety problems  
18 to the director? And, by the way, I'm looking at question  
19 43. Maybe it is the phrasing of that question and answer  
20 that has me curious. The question was, do you also report  
21 safety issues and emergencies directly to Dr. Karam, and  
22 you say you do. My question is, have you ever had occasion  
23 to report serious or significant radiation safety matters  
24 or problems to the director?

25 A Sure.

1 Q Any incidents come to mind?

2 A Again, it goes back to the ones we spoke about  
3 earlier. There was one in the biology building. When that  
4 happens, I respond to it and I refer it to the director.

5 Q What about events involving the reactor or use  
6 of the materials at the Neely Nuclear Research Center?

7 A I either speak to the action directly, to the  
8 operator, or if there's a problem I would go directly to  
9 the director.

10 Q Has that happened?

11 A Yes.

12 Q Can you relate to us the circumstances under  
13 which that has happened? Do you recall?

14 A Well, when I had a concern about the movement  
15 of the elements, cut elements from the moving -- they were  
16 moving nuclear fuel. We had to cut the elements, the  
17 headings and tails off the elements. The question is what  
18 to do with those headings and tails while we were  
19 continuing operations. I went to the director about it. I  
20 expressed my concerns. He acted upon it.

21 Q Did he act in a manner to your satisfaction?

22 A Yes.

23 Q In question and answer 44 you discuss the steps  
24 which would be involved in your making reports and you  
25 indicate that step one is to take appropriate corrective

1 action, step two, report the matter and discuss it orally  
2 with Dr. Karam and step three would then to be prepare a  
3 draft written report, which you would give to Dr. Karam for  
4 his review and comments. Have you ever found reason to  
5 believe that your reporting arrangement is inadequate?

6 A Not from a safety standpoint.

7 Q Is there something about this system that  
8 troubles you?

9 A In terms of professional judgment as to how you  
10 want to manage it. It's Dr. Karam's operation at Neely  
11 Nuclear Research Center and he operates it the best way he  
12 thinks he knows how to operate it, and I work for Dr.  
13 Karam. I may would like to manage it in a different style,  
14 but that's strictly a style question, it's not a safety  
15 question.

16 Q Have you ever wanted to prepare a report and  
17 found that you were dissuaded from doing so?

18 A I have not been dissuaded from making a report.  
19 I have been asked to come to Dr. Karam and discuss it  
20 orally first, may save the need for a report.

21 Q And at the end of your discussions with Dr.  
22 Karam, has there ever been a time in which you felt you  
23 would have liked to prepare a report and felt that you were  
24 prevented from doing so?

25 A No.

1 Q And when I say prepare a report, I mean a  
2 written report.

3 A That's what I understood you said.

4 Q You do not feel there has ever been a time in  
5 which you would have liked to have prepared a report and  
6 you were prevented from doing so?

7 A I have not been prevented from providing any  
8 written report at all.

9 Q In question 48 you were asked if you and Dr.  
10 Karam ever argue about the proper handling of the health  
11 physics panel and your response is that your arguing about  
12 such matters is, "Not at all uncommon." What does that  
13 signify? You routinely have discussions with Dr. Karam and  
14 you routinely have disagreements about the proper handling  
15 of health physics matters?

16 A I think the matters that are discussed are  
17 matters of judgment calls. They are often academic related  
18 issues. We basically argue our points from one side, one  
19 viewpoint, one from another viewpoint. I think it is good  
20 that we do.

21 Q Do you find those arguments to be in any way  
22 discouraging you from raising your own views subsequent to  
23 those arguments?

24 A Not from a discouragement standpoint. I think  
25 Dr. Karam allows me total academic freedom to express my

1 views without any inhibitions. It doesn't mean I agree  
2 with him, but I do have the opportunity to express my  
3 views.

4 Q Do you find that the process is discouraging in  
5 the sense that you subsequently may feel, do I really want  
6 to bring this matter up?

7 A Not in the process per se. I think the time  
8 element is sometimes discouraging.

9 Q And what do you mean by that?

10 A Well, we get into an argument and we may argue  
11 for an hour.

12 (Laughter)

13 Q The fact that there may be an ensuing argument  
14 for a hour, or whatever the time may be, has that in any  
15 way inhibited you from raising concerns with Dr. Karam?

16 A Not at all.

17 Q The next page, on page 17, question 49 asks,  
18 when you disagree does he listen to you, and you say that  
19 he does. How do you understand the use of the word "listen"  
20 in that sentence?

21 A Well, he puts together a very effective  
22 argument against me.

23 (Laughter)

24 Q Have you ever been able to persuade Dr. Karam  
25 to accept your point of view over his own?

1 A Yes.

2 Q And when you have not been able to persuade him  
3 to accept your view over his own -- has that happened?

4 A Yes.

5 Q What happens next with your view? Do you then  
6 tend to agree with him?

7 A He's the boss. It's his decision. He's the  
8 man in charge. I work for him.

9 Q Has there ever been an instance in which Dr.  
10 Karam's position has went over your own in a discussion  
11 with you and you have then felt it necessary to raise the  
12 matter with the NSC or the NRC?

13 A Never with the NRC. I'm trying to think --  
14 Usually it ends up in a continuation of the same discussion  
15 that he and I have before the Nuclear Safeguards Committee.

16 Q In your discussions with Dr. Karam is Dr. Karam  
17 more likely to prevail in the discussion as opposed to your  
18 prevailing?

19 A Yes.

20 Q And when that happens is there a -- has there  
21 ever been a safety issue which you believe has not been  
22 resolved satisfactorily?

23 A No, in my opinion they are mostly judgment  
24 calls.

25 Q What do you mean by that?

1           A       Dr. Karam is very safety conscious. We have  
2 the same objective. It may be how we are going to get  
3 there.

4           Q       Has there ever been an occasion that you  
5 believe that safety has not been adequately assured?

6           A       No.

7           Q       And let me expand upon that a little bit. In  
8 using the term safety that would include both reactor  
9 operations as well as the protection of the health and  
10 safety of workers and the public. Has there ever been a  
11 situation that safety in that sense has not been adequately  
12 assured?

13          A       I always look at safety from the standpoint of  
14 all the occupational workers and the public.

15          Q       And what is your answer?

16          A       I look at the whole picture in making a safety  
17 decision. I don't limit it to safety of one group versus  
18 safety of another group.

19                THE REPORTER: Excuse me, you're going to have  
20 speak up. I'm having trouble hearing you. Your last  
21 answer was?

22                THE WITNESS: Could you repeat the question  
23 again?

24 BY MR. TURK:

25          Q       Looking at instances, and this is vague because

1 I haven't asked you to identify specific instances, but  
2 looking at the various situations in which you and Dr.  
3 Karam have disagreed, has there ever been a situation where  
4 at the end of your discussions with Dr. Karam you believe  
5 that safety is not adequately assured? And I am including  
6 in the term safety both the health and safety of workers as  
7 well as the health and safety of the public as well as  
8 operations at the reactor.

9 A No, I don't believe safety has been abrogated  
10 in any which way.

11 Q In question and answer 51 you present your view  
12 that the MORS should be, at least in your point of view,  
13 separate from the supervisory control of the director of  
14 the center. I'd like to ask you why have you reached that  
15 conclusion?

16 A MORS is basically a staff relationship to the  
17 director. It is not an independent operating arm, like a  
18 radiation safety officer would be. I consider myself to be  
19 someone who advises Dr. Karam on safety matters. I am not  
20 the decision maker, other than on the authority to suspend  
21 an operation.

22 Q Other than your authority to suspend  
23 operations?

24 A That is correct.

25 Q What would change if you had an independent

1 chain of reporting responsibility outside of the director?  
2 You would still have the authority to suspend operations.  
3 Would you have any additional authority?

4 A I would hope so, that the authority would go  
5 along with my responsibility in terms of hiring practices,  
6 vacation schedules, administrative schedules. That would  
7 be, decisions made by the radiation safety officer in this  
8 case is made by the director.

9 Q The three areas that you just mentioned,  
10 hiring, vacations and schedules seem to be personnel  
11 issues. Are those kinds of issues, personnel issues, the  
12 reason why you would like to see the MORS separated out  
13 from under the director?

14 A Those are some of the issues. I think that the  
15 -- in terms of radiation safety, the radiation safety  
16 officer, not MORS, but the radiation safety officer should  
17 be a program officer, program director, with the authority  
18 to go along with the responsibility. A radiation safety  
19 officer would not answer to a principal investigator. In  
20 terms of MORS, I'm only a staff officer. I respond to Dr.  
21 Karam for safety. Dr. Karam is the responsible person. He  
22 makes the decisions.

23 Q What other decisions would you envision being  
24 able to make if you were separated out from under the  
25 director's authority beyond what you can do now?

1           A        I'm not sure it's the scope of the decision,  
2 but I don't think radiation safety should have to compete  
3 with operations for the same budget.

4           Q        Have there ever been situations in which there  
5 has been a limitation on the Office of Radiation Safety  
6 either in terms of personnel or budget which caused you  
7 concern?

8           A        The concerns I've had about personnel  
9 operations, I've met with Dr. Karam and he has met those  
10 concerns. Concerns with budget, I feel that there should  
11 be more money available for training. We're competing for  
12 dollars with the operations people. I think we have to  
13 compete for safety equipment with operations equipment. I  
14 think there should be a separate authority, responsibility,  
15 that goes along with the radiation safety officer in terms  
16 of those types of operations.

17          Q        Accepting your preference to have independent  
18 responsibility, looking at what has occurred over the last  
19 four years at which you've been at the center, has there  
20 been a limitation on either your procurement ability or  
21 your hiring ability that you believe has adversely impacted  
22 the safety of the facility?

23          A        In terms of personnel, no. In terms of  
24 equipment, there are limitations on the amount of equipment  
25 that we have.

1 Q Have you discussed your concerns about  
2 limitations with Dr. Karam?

3 A Yes.

4 Q And what has been the nature of those  
5 discussions and what has been the outcome?

6 A He tries very hard to fulfill my requests, but  
7 on some things we've just not had the finances to make the  
8 purchases.

9 Q Has the lack of financial resources to acquire  
10 the additional equipment caused a safety concern?

11 A Generally because additional time involvement  
12 and measurements. That is, we're slowed down by the lack  
13 of modern capable instrumentation.

14 Q Has that adversely affected safety?

15 A No.

16 Q -- or -- It has not?

17 A It just takes us longer.

18 Q Do you have a feeling one way or the other that  
19 the MORS, if it was independent from the director, should  
20 report to the same level of organizational -- Strike that.  
21 Let me try it a little differently. Do you have a  
22 preference of whether the MORS should report to the same  
23 office to which the director of the facility reports or  
24 whether the MORS should report to a different  
25 organizational head?

1           A        It would make no difference to me.

2           Q        What is the additional equipment that you would  
3 have liked to have had that you don't have?

4           A        I would like to see the radiation safety office  
5 updated in terms of modern computers, computer  
6 capabilities, databases, handling of data.

7           Q        Anything else?

8           A        I believe our equipment is aging. I think  
9 there should be a regular program involving replacement of  
10 equipment for radiation monitoring on campus.

11          Q        Now, when you speak about aging equipment, is  
12 any of that equipment capable of performing the duties  
13 which you need to perform with the equipment?

14          A        No, we are very fortunate to have on hand an  
15 electronics technician who keeps us operational.

16          Q        And for background, how many health physicists  
17 and how many health physicist technicians report to you?

18          A        I have two health physicists, both with masters  
19 degrees. I have three health physic technicians which are  
20 graduate students, two of which are in the health physics  
21 program, one of which has been accepted into the health  
22 physics program starting this fall.

23          Q        Before President Clough -- C-l-o-u-g-h?

24          A        Yes.

25          Q        Before he took over as president do you recall

1 who was the president?

2 A President Crecine.

3 Q Did you used to have meetings with President  
4 Crecine?

5 A No.

6 Q Who initiated the policy of having meetings  
7 between yourself and the president's office?

8 A I believe it was Vice president Chameau.

9 Q Did he propose that?

10 A I believe so.

11 Q And he is the vice president for research? Was  
12 he provost?

13 A He was vice president. I'm not sure of the  
14 adjectives that go along with that.

15 Q And what is his role in the organization as it  
16 pertains to GTRR?

17 A He speaks and operates for the president of the  
18 university, I believe, in the graduate program and the  
19 research area.

20 Q Is he part of the chain of command as you  
21 understand it for the GTRR?

22 A I have no idea.

23 Q In your meetings with President Clough, have  
24 you found him to be receptive to your reports?

25 A Yes.

1 Q Has there ever been an occasion in which you  
2 felt a need to report a safety problem to him?

3 A No, it's been basically operational in status.

4 Q Would you feel any inhibition to raising a  
5 safety matter with President Clough if you at some point  
6 deemed that to be necessary?

7 A I have no inhibitions whatsoever.

8 (Laughter)

9 MR. EVANS: Does the witness want to limit that  
10 statement?

11 (Laughter)

12 BY MR. TURK:

13 Q Also you stated that you believe the Georgia  
14 Tech research reactor is a, "unique device". Why did you  
15 say that? This was in regard to the boron neutron capture  
16 therapy possibilities.

17 A Yes, and I believe it is a very unique device  
18 because it is a heavy water moderated reactor and with the  
19 supplementation with a new filter it would produce a very  
20 ideal spectrum of neutrons for the boron neutron capture  
21 therapy. I think all the research reactors in the United  
22 States were evaluated by the Department of Energy about  
23 three years ago and I think the Georgia Tech Research  
24 Reactor came out number one as the most appropriate device,  
25 and I echo that.

1           Q       Do you know what work is being done at Georgia  
2 Tech to evaluate the possible use of the research reactor  
3 there for this therapy?

4           A       There are basically two people involved. Dr.  
5 Karam looking at it from the nuclear engineering  
6 standpoint. Myself looking at it from the boron  
7 pharmaceutical delivery aspect of it. So we complement  
8 each other on our research efforts.

9           Q       Are you doing anything actively to develop the  
10 idea of using the reactor for this purpose?

11          A       No, there's no fuel in the reactor right now.

12          Q       Okay. My question really has to do with what  
13 steps are being taken in order to propose and promote and  
14 implement the use of the GTRR for this purpose?

15          A       Well, it's really on two fronts. There's a  
16 nuclear engineering front that Dr. Karam heads up in terms  
17 of development of the new filter design. I'm working  
18 closely with Emory University on the development of new  
19 molecular probes that contain boron that could serve as  
20 delivery vehicles that would tag specific DNA and  
21 fundamental basic research involving delivery of a  
22 chlorinated pharmaceutical to the reactor. I need a  
23 neutron beam to do it -- to test it.

24          Q       And in order to have a neutron beam the reactor  
25 has to go back into operation?

1           A       That is correct.

2           Q       If it does go back into operation it then would  
3 have a neutron beam?

4           A       That is correct.

5           Q       Do you have a program under development or any  
6 sort of a step-by-step proposal for use of the reactor in  
7 this type of therapy?

8           A       I have several proposed research projects in my  
9 own area of chlorinated compound delivery.

10          Q       Those are proposals that you've developed  
11 already?

12          A       Yes.

13          Q       And is the university actively considering the  
14 use of the reactor in this respect?

15          A       I have a proposal right now before them --  
16 before the university hoping for funding on research  
17 involving the chlorinated pharmaceuticals as potential BNCT  
18 agents.

19          Q       And this is a proposal in which if the  
20 university approves it you would then use for research at  
21 the reactor?

22          A       That is correct.

23          Q       Would you need to do research with animals  
24 before proceeding to humans?

25          A       Yes.

1 Q Is that part of your proposal?

2 A The research projects I devised do not involve  
3 animals at this time. The animals are a further step after  
4 we develop the molecular probe. We would hope that they  
5 would prove themselves. We would establish a model system  
6 for use in the reactor and then at that point in time then  
7 go onto animal use.

8 Q So this is more or less an in vitro type of  
9 study that you are proposing initially?

10 A It's an in vitro testing of a new chlorinated  
11 pharmaceuticals. So we don't have to go through individual  
12 testing of the animal models all along. We can do it on a  
13 molecular probe level. We screen compounds effectively  
14 before they even go into animals so we don't have to use as  
15 many animals in research.

16 Q Just by way of background, I'd like to ask you  
17 to educate me. What would the process consist of? Would  
18 you take cancer cells, put them in vitro and then inject  
19 the pharmaceutical to see what effect it has?

20 A Basically we're looking at particular maligno  
21 nucleotides which are characteristic fragments of DNA and  
22 we're taking that and we're going to label those particular  
23 fragments. So if we can characterize a tumor, we can  
24 actually specifically make a molecule design for an  
25 individual tumor and tag that particular tumor without the

1 molecule going somewhere else in the body. This is done in  
2 vitro and based upon the use of the neutron beam, you can  
3 determine the effectiveness of the tag.

4 MR. TURK: I have nothing further at this time,  
5 Your Honor.

6 ADMINISTRATIVE LAW JUDGE LAM: Dr. Ice, I hear  
7 in your testimony today and also in the written testimony  
8 that you have complete authority to shut down any operation  
9 you deem unsafe. Is that true?

10 THE WITNESS: That's true.

11 ADMINISTRATIVE LAW JUDGE LAM: And furthermore  
12 you had opportunity to meet with the president of Georgia  
13 Tech in the past year.

14 THE WITNESS: That is true.

15 ADMINISTRATIVE LAW JUDGE LAM: And then you  
16 have the communication channel available to you to talk to  
17 the safeguards committee at any time you wish?

18 THE WITNESS: That is true.

19 ADMINISTRATIVE LAW JUDGE LAM: And you can, of  
20 course, talk to this agency any time you wish?

21 THE WITNESS: That is true.

22 ADMINISTRATIVE LAW JUDGE LAM: Now, that being  
23 so, Dr. Ice, do you consider that adequate and sufficient  
24 independence to ensure safety in doing your official  
25 duties?

1 THE WITNESS: Yes.

2 ADMINISTRATIVE LAW JUDGE LAM: Thank you.

3 ADMINISTRATIVE LAW JUDGE KLINE: Dr. Ice, were  
4 you present last Friday when the staff panel testified?

5 THE WITNESS: No, I was not.

6 ADMINISTRATIVE LAW JUDGE KLINE: Let me attempt  
7 to characterize something they said, and I questioned them  
8 a little about it. It has to do with the cadmium incident  
9 of 1987 and '88, but I'm not going to ask any questions  
10 about that. It's their characterization I want to contrast  
11 with today. They mentioned in a somewhat critical tone  
12 that the health physics staff of the time, back in '87,  
13 '88, used liquid scintillation counting improperly, for  
14 example, and not effectively. And also that they -- in  
15 monitoring human beings for internal contamination they  
16 monitored the wrong body fluid, i.e, urine instead of some  
17 other source. What I would like you to do is contrast your  
18 present capabilities with that sort of summary  
19 characterization. Are you confident that you now have the  
20 capabilities, for example, to use liquid scintillation  
21 counting properly if you had to in some incident like the  
22 Cadmium 115 spill?

23 THE WITNESS: One of the areas where Dr. Karam  
24 and I do agree is on the quality of people that we hired.  
25 For instance, I think just in hindsight, my looking over

1 what's happened in the past and compare it to myself right  
2 at the moment --

3 ADMINISTRATIVE LAW JUDGE KLINE: I want today's  
4 assessment, yes.

5 THE WITNESS: I have a Ph.D in health physics.  
6 I have taught isotope methodology. I teach people how to  
7 use liquid scintillation counting for research purposes.  
8 One of the areas that we argued over and Dr. Karam deferred  
9 to my judgment was when we had a recent replacement we  
10 didn't replace somebody with a B.S. degree, we replaced him  
11 with a M.S. degree, and I think -- I convinced him and he  
12 agreed with me that we needed the professional level, and I  
13 think with that professional level -- I'm not aware of what  
14 happened with the cadmium situation, but just in  
15 generalities, I don't believe it could happen again with  
16 the quality of people we've got on board at this time.

17 ADMINISTRATIVE LAW JUDGE KLINE: Are you also  
18 confident that if the question arose as to internal  
19 contamination of any person that you or your people would  
20 know where to monitor? What body fluids, for example, to  
21 measure?

22 THE WITNESS: I am missing my class right now  
23 and my class title is bioassays and how to do them.

24 (Laughter)

25 ADMINISTRATIVE LAW JUDGE KLINE: That's exactly

1 what I want to know about your present status. So, I don't  
2 want to focus too much on the Cadmium 115, but more on the  
3 question of how the staff copes with, you know, a range of  
4 unforeseen events. Are you confident that you or your  
5 staff know how to operate a significant range of health  
6 physics-type instruments or radiation type instruments?

7 THE WITNESS: Most assuredly.

8 ADMINISTRATIVE LAW JUDGE KLINE: Okay. That's  
9 all I need to know on that one. Now, in your meetings with  
10 the president of the university, have you ever urged upon  
11 the president or recommended to him that he adopt or order  
12 the alternative management scheme that you seem to prefer?

13 THE WITNESS: No, I have not.

14 ADMINISTRATIVE LAW JUDGE KLINE: Thank you. I  
15 have nothing further.

16 CHAIRMAN BECHHOEFER: Would you feel free to  
17 make such a recommendation?

18 THE WITNESS: I would feel free to make the  
19 recommendation, but I also believe strongly that he who is  
20 in the position of leadership should determine his own  
21 management style. I don't think you are going to manage  
22 everybody the same way, and Dr. Karam has his way of  
23 managing. It appears to be effective to me. It's his  
24 style. I go with it.

25 CHAIRMAN BECHHOEFER: In your response to

1 question 44 on pages 14 and 15, you mentioned if a report  
2 is going outside of the center it would have to be reviewed  
3 and the final version personally approved by Dr. Karam. Do  
4 you view a report to the NRC as a report outside of the  
5 center?

6 THE WITNESS: Yes, I do.

7 CHAIRMAN BECHHOEFER: So if you were filing a  
8 report with NRC, that report would have to be approved by  
9 the director?

10 THE WITNESS: Yes.

11 CHAIRMAN BECHHOEFER: Or if the Center was  
12 filing a report it would have to be --

13 THE WITNESS: Our technical specifications  
14 spell out that Dr. Karam is the director and responsible  
15 for radiation safety. I advise him on that. He makes the  
16 final decision and the report goes out under his signature.

17  
18 CHAIRMAN BECHHOEFER: Could a report to NRC,  
19 for example, go out under your signature as the Manager of  
20 the Operation of Radiation Safety, I wish to report such  
21 and such a problem to you directly.

22 THE WITNESS: I probably would say if there was  
23 a case that I had to report to the NRC, I would be  
24 reporting it as an individual, not as a staff member for  
25 Dr. Karam.

1 ADMINISTRATIVE LAW JUDGE KLINE: Would you  
2 clarify that because there are lots of situations in your  
3 text specs, are there not, where certain things require  
4 reporting. Say, a spill in excess of Part 20 limits.

5 THE WITNESS: Oh, well, I don't consider that a  
6 document or an official report, something -- it's a policy  
7 statement going out from us or a reply to a NRC, written  
8 response. There's a number of things in the federal  
9 regulations where it calls for 24 hour, 48 hours, that I  
10 pick up and call on the telephone. No problems.

11 ADMINISTRATIVE LAW JUDGE KLINE: But in your  
12 official capacity, right?

13 THE WITNESS: That's right.

14 CHAIRMAN BECHHOEFER: Would you feel it  
15 necessary to get clearance first from Dr. Karam?

16 THE WITNESS: No, but I think if he was there I  
17 would sure discuss it with him.

18 CHAIRMAN BECHHOEFER: But if he weren't there  
19 you could still --

20 THE WITNESS: Absolutely, and that's the way  
21 the operation is set up.

22 CHAIRMAN BECHHOEFER: What about a report to  
23 the Nuclear Safety Committee? Is that a report outside of  
24 the center?

25 THE WITNESS: No. At the Nuclear Safety

1 Committee meetings we are all on a first name basis and  
2 when it comes around -- If I have something to say at the  
3 meeting, no inhibitions, again, I make a report and say  
4 here is what happened on campus the last quarter or the  
5 last two months, or if there's anybody that's got any  
6 questions, I respond to those questions directly.

7 CHAIRMAN BECHHOEFER: But for you to -- Do you  
8 ever make written reports to that committee?

9 THE WITNESS: Yes.

10 CHAIRMAN BECHHOEFER: Or a statement such as, I  
11 wish such-and-such matter to be looked into by the  
12 committee?

13 THE WITNESS: For instance, I will write up a -  
14 - Where I've shutdown operations, which I have done in  
15 response to Mr. Turk's question, I have written up a report  
16 of what actually happened and all the steps that I have  
17 taken along the way. A copy goes to Dr. Karam, a copy goes  
18 to the committee.

19 CHAIRMAN BECHHOEFER: But that report, I take  
20 it does not have to be approved by Dr. Karam?

21 THE WITNESS: That is correct. That's  
22 internal.

23 CHAIRMAN BECHHOEFER: Okay. Under the  
24 alternate structure or structures which you seem to prefer,  
25 would matters such as that likely to be handled any differently?

1 THE WITNESS: Not from a safety operation in  
2 terms of end results, but I think it'd be more expeditious.

3 CHAIRMAN BECHHOEFER: You will agree with Dr.  
4 Tsoulfanidis that the Nuclear Safety Committee ought to  
5 make its -- either its minutes or its directions available  
6 more promptly than maybe the case is currently?

7 THE WITNESS: I believe it is an ideal  
8 objective, but you are dealing with a faculty committee,  
9 sir, and tell faculty and how quickly after they turn  
10 around things, it doesn't always work that way.

11 CHAIRMAN BECHHOEFER: Do you agree with Dr.  
12 Tsoulfanidis that the minutes of the Nuclear Safety  
13 Committee ought to be set forth in somewhat greater detail  
14 than they currently are, in terms of opposing arguments of  
15 various matters, that type of thing?

16 THE WITNESS: I think it would be more helpful  
17 from an audit standpoint, but at the same time, whoever's  
18 secretary or committee rotates the secretary, and again,  
19 you're dealing with individual faculty person who is taking  
20 minutes and I would not be the one to tell a secretary of a  
21 committee how to take minutes, sir.

22 CHAIRMAN BECHHOEFER: Do you think the NRC  
23 should?

24 THE WITNESS: No, I think that's being much too  
25 prescriptive.

1 CHAIRMAN BECHHOEFER: That's all the questions  
2 the Board has at the moment.

3 MR. EVANS: I have one point on redirect.

4 REDIRECT EXAMINATION

5 BY MR. EVANS:

6 Q You were asked by Mr. Turk about that you  
7 sometimes have disagreements with the director and that --  
8 I think it was, more often than not the director may  
9 prevail as to when you have an argument that may last an  
10 hour. I would like to ask you, if you are directing your  
11 attention to pages 18 to 20 of your direct testimony and in  
12 particular -- Well -- and on those pages paragraphs 55 and  
13 56, do these have to do with -- Is this an example of a  
14 disagreement with Dr. Karam where Dr. Karam prevailed?

15 A Yes.

16 Q And in that particular case where Dr. Karam  
17 prevailed was his view stricter than your own from a  
18 viewpoint of following procedures?

19 A That is correct.

20 MR. EVANS: I have no other questions.

21 CHAIRMAN BECHHOEFER: One follow-up. Do you  
22 remember any circumstances where the director's views may  
23 not have been stricter than your own or more safety prone  
24 than your own?

25 THE WITNESS: I can't think of a specific

1 instance right offhand, but overall I think we do due  
2 diligence on the question and I probably win as many from a  
3 safety standpoint in terms of actual safety as he does. He  
4 probably wins more on the administrative aspects of it.

5 CHAIRMAN BECHHOEFER: Anything further?

6 MR. EVANS: No, sir.

7 CHAIRMAN BECHHOEFER: Mr. Johnson?

8 MR. JOHNSON: We have a few recross questions.

9 RECROSS EXAMINATION

10 BY MR. JOHNSON:

11 Q Among the things that you said in redirect and  
12 cross by Mr. Turk that I found interesting was you were  
13 stating that the MORS does not act as an independent -- I  
14 may not have written the wording down exactly right -- but  
15 does not act as an independent agent in the same way as an  
16 RSO does. Is that an accurate reflection of what you just  
17 testified to? And you said that they are two different  
18 kinds of positions.

19 A MORS is not an RSO.

20 Q Earlier today Dr. Tsoulfanidis testified, you  
21 know, he submitted his proposed chart for structure and  
22 when I asked him if it would be appropriate to strike the  
23 RSO from the one box and replace that with a MORS, he  
24 seemed to feel that that was an equivalent replacement. Am  
25 I correct in assuming you disagree with that assessment?

1           A        I'm not sure if he differentiated between MORS  
2 and an RSO. I do make the differentiation. So I would  
3 disagree with that.

4           Q        As a clarification question then, it is  
5 necessary that Georgia Tech have someone designated as a  
6 radiation safety officer?

7           MR. EVANS: Objection. There's no foundation  
8 for any requirement that you have someone designated or  
9 labeled RSO as opposed to MORS. There's no foundation for  
10 the testimony that there is a requirement.

11 BY MR. JOHNSON:

12           Q        Did Georgia Tech at some point change their  
13 specifications so that they were no longer required to have  
14 a radiation safety officer to your knowledge?

15           A        Could you repeat that question again?

16           Q        We're genuinely confused about a lot of these  
17 issues --

18           MS. CARROLL: And it may not matter, but we  
19 just want to understand.

20           THE WITNESS: Let me try my hand at it.  
21 Basically, I'm not sure when Georgia Tech differentiated  
22 between an RSO and a MORS. That was all before my time. I  
23 was hired as an MORS, not RSO.

24 BY MR. JOHNSON:

25           Q        Is there a current technical specification

1 requirement for an RSO at Georgia Tech in addition to your  
2 position?

3 A Not that I am aware of.

4 Q Would it be accurate to say that Dr. Karam is,  
5 if nothing else, the acting RSO of the Georgia Tech  
6 facility or does he have any vested authority in that way?

7 MR. EVANS: I think I have to object because it  
8 seems to me we are speculating about designations or  
9 titles. If he wants to talk about functions, or what  
10 someone is doing, I have no problem with it.

11 CHAIRMAN BECHHOEFER: Why don't you re-ask it,  
12 at least in terms of function rather than title?

13 MR. JOHNSON: I guess I can see that  
14 distinction.

15 CHAIRMAN BECHHOEFER: Let's go off the record.  
16 (Off the record.)

17 CHAIRMAN BECHHOEFER: Back on the record.

18 MR. JOHNSON: We consulted Mr. Tsoulfanidis'  
19 testimony from this morning. I suppose I should approach  
20 the witness, if it's okay with the court, so he can see  
21 what I am reading from.

22 CHAIRMAN BECHHOEFER: That's --

23 MR. JOHNSON: I don't believe he has a copy of  
24 Mr. Tsoulfanidis' testimony otherwise I won't.

25 MR. JOHNSON: (Handing document)

1 BY MR. JOHNSON:

2 Q Here at the bottom of page 6 of Mr.  
3 Tsoulfanidis' report, not his initial testimony, but the  
4 report at the end, he states in the last full paragraph on  
5 the page, "To be specific, at present the NNRC director is  
6 also the RSO for the campus." I would ask you, Dr. Ice, if  
7 you agree with that statement and, you know, if not, why  
8 not, and to elaborate on your understanding of the  
9 situation as compared to Dr. Tsoulfanidis of the situation.

10 A The text specs require that Dr. Karam be the  
11 director of operations and responsible for radiation safety  
12 at the GTRR. He does not use the title RSO, but he is the  
13 responsible person. I answer to him.

14 Q I see. Do you have any professional opinions  
15 or judgments as to why Mr. Tsoulfanidis may have used that  
16 term in that context?

17 A You'd have to ask Mr. Tsoulfanidis.

18 Q Just a few more. Dr. Ice, do you feel you can  
19 perform your functions, responsibilities that you current  
20 have as MORS better if you were also the radiation safety  
21 officer?

22 MR. TURK: Objection. If he were also the  
23 radiation safety officer?

24 MR. JOHNSON: If he were the radiation safety  
25 officer, I suppose, as opposed to the Office of Manager of

1 Office of Radiation Safety which apparently seems to be a  
2 somewhat parallel position, but which there are some  
3 differences.

4 MR. TURK: There is no current slot in the  
5 organizational chart for a radiation safety officer. So I  
6 think before we just bandy about the terms, you should get  
7 an understanding of the witness's meaning when he uses the  
8 phrase radiation safety officer and then ask him what he  
9 feels the duties that would go along with that.

10 MR. JOHNSON: I see.

11 MS. CARROLL: Would you answer Mr. Turk's  
12 question.

13 (Laughter)

14 MR. TURK: Well, I was going to ask that  
15 question, frankly, when we came to it, but I think if you  
16 are going to ask the question you should at least get the  
17 predicate down so we don't just have words tossed around  
18 without any understanding of how the witness is using the  
19 words.

20 BY MR. JOHNSON:

21 Q Dr. Ice, would you for all our mutual benefit  
22 please give us a more detailed summary of what you feel the  
23 basic differences are between the radiation safety officer  
24 and the manager of the Office of Radiation Safety as your  
25 understanding of the two positions.

1           A       As the manager of the Office of Radiation  
2 Safety, my understanding is I basically manage the office.  
3 I advise the person who is responsible for radiation  
4 safety. I am not the responsible person. In contrast, the  
5 radiation safety officer is the responsible person for the  
6 operational aspects. He calls the shots, takes the  
7 authority, takes the heat. In my case I'm a staff person  
8 as the MORS, and that's the basic difference between the  
9 two.

10           Q       Do you feel that it is more conducive to safety  
11 at a reactor like Georgia Tech to have a position such as  
12 radiation safety officer where someone does have more  
13 independence and more ability to take the heat and all the  
14 things that you just elucidated so nicely for us than to  
15 have a manager of the Office of Radiation Safety who merely  
16 serves as an advisor to the director?

17           MR. TURK: I would object to the  
18 characterization. The answer was not that somebody who has  
19 the ability to take the heat, but somebody who takes the  
20 heat.

21           CHAIRMAN BECHHOEFER: Are you going to restate  
22 your question?

23           MR. JOHNSON: I was going to try and rephrase.

24           MS. CARROLL: We think that maybe the tag  
25 teaming, which actually may take less time, might be asking

1 too much indulgence, and I would just like to ask you, you  
2 know, we're spending a lot of time me making him understand  
3 what I want to know and why and -- It's a burden both ways.

4 CHAIRMAN BECHHOEFER: There's no rule against  
5 that, and an isolated question is certainly not going to  
6 upset things too much. We will permit you to do that.

7 MS. CARROLL: For me to ask some questions  
8 rather than spend a long time in consultation.

9 CHAIRMAN BECHHOEFER: Right.

10 MS. CARROLL: Okay.

11 BY MS. CARROLL:

12 Q My question is, Dr. Ice, given your experience  
13 and expertise, would you feel you could bring more to the  
14 safety program in the role of RSO than in your limited role  
15 as MORS?

16 A In my judgment it's not a question of more or  
17 less safety. It's a question of administrative management  
18 and I think that goes with the style of the management. I  
19 think a manager should be able to come in and dictate his  
20 own style in his own organization. I can see that Dr.  
21 Karam -- He has a style, a way of doing things. I work for  
22 Dr. Karam. If I was doing it, I would be doing it somewhat  
23 differently administratively. In either case, I don't  
24 think safety would be compromised.

25 Q Do you feel then a MORS, a safety officer in

1 MORS is more effective in conjunction with Dr. Karam's  
2 style than an RSO is?

3 A I think a MORS has worked very effectively with  
4 Dr. Karam's style.

5 Q Could you tell us the half life of Cadmium 115?

6 A Not right offhand.

7 MS. CARROLL: I'm sorry?

8

9 ADMINISTRATIVE LAW JUDGE KLINE: That was on  
10 the record.

11 MS. CARROLL: I know, but I don't have a  
12 transcript. I think it was 56 and a half days.

13 ADMINISTRATIVE LAW JUDGE KLINE: Not days.

14 MS. WOODHEAD: Hours. 53.5

15 MS. CARROLL: Thank you. I knew somebody in  
16 this room knew off the top of their head.

17 BY MS. CARROLL:

18 Q Bill Downs was the operator there during your  
19 time and predating that, and he left over a situation that  
20 Dickson Parker reported. Were you involved with that in  
21 any way?

22 A Not with the operations, but I chaired the  
23 committee that reviewed the situation.

24 Q What was your role on that committee? I mean,  
25 what would your input have been into the discussion of the

1 committee?

2 A I was chairman of the committee. I coordinated  
3 the discussion and asked for the people to come and testify  
4 regarding Mr. Downs capabilities and led the discussion  
5 that led to the conclusion.

6 Q Was your role as MORS needed to establish what  
7 action was needed?

8 A No, that was not related to my role as MORS.  
9 That was -- I was appointed by Dr. Karam as an ad hoc  
10 committee member to head up an evaluation of Mr. Downs.

11 Q There was safety significance to his error  
12 though, wasn't there?

13 MR. TURK: Now, just for clarity --

14 CHAIRMAN BECHHOEFER: Which error?

15 MR. TURK: -- which error.

16 MS. CARROLL: Oh, sorry. Boy, am I limited in  
17 what I can understand about this, but...

18 BY MS. CARROLL:

19 Q Some jumpers were left in place and some SCRAMS  
20 became inoperative and as a lay person it seems that  
21 there's safety significance to the SCRAMS not being  
22 operative and do you know if I am right or not?

23 A There were procedural violations and Mr.  
24 Parker, who was reactor supervisor attested to those  
25 violations.

1 Q Was there a safety significance in those  
2 violations?

3 A Yes.

4 Q That's a given, right?

5 A Yes.

6 Q Do you believe your relationship with Dr. Karam  
7 will be affected at all by your candor in this proceeding?

8 A Not at all. Dr. Karam and I don't always see  
9 eye to eye but we always give and take fairly.

10 Q We've seen a lot of discussion in the minutes  
11 over an extended time frame about the bismuth block leak.  
12 Is this of any significance in your mind?

13 A Yes, it is.

14 Q What would be the significance?

15 A We have made a commitment to the Nuclear  
16 Safeguard Committee that it would be fixed when we put the  
17 new filter in. I've accepted that as a satisfactory answer  
18 to get it done.

19 Q And this is the filter that will be required  
20 for the BNCT?

21 A That is correct.

22 Q Is this an expensive repair, which I suppose is  
23 a relative judgment. Do you know how much the repair  
24 will -- this will cost?

25 A I have not looked at it from a financial

1 consideration.

2 Q All things being relative is it considered a  
3 large expenditure on the equipment at --

4 A I don't deal with administrative aspects of it.  
5 Strictly from the safety.

6 Q You just fight for your money, right?

7 (No response)

8 Q You talked about your meeting with Clough,  
9 which let me say that GANE finds that delightful. Did you  
10 meet with Clough or with a representative?

11 A I meet with President Clough.

12 Q Could the reactor be moved to another location?

13 A No.

14 Q Why?

15 A It's humongous.

16 Q So you built these things in situ.

17 A That is correct.

18 MR. JOHNSON: What in layman -- These words  
19 like humongous have several meanings. If we could get a  
20 clarification.

21 (Laughter)

22 MS. CARROLL: By the way, does inhibition mean  
23 that you would shake your booty for us?

24 BY MS. CARROLL:

25 Q Does the boron neutron capture therapy -- you

1 said that the reactor is unique -- a unique device for it.  
2 Does the power, the 5 megawatt aspect, is that part of what  
3 makes it a candidate for BNCT?

4 A That's part of it. More importantly is the  
5 spectrum of neutrons produced.

6 Q And is that affected at all by the power it's  
7 being run at?

8 A The power will affect the number of neutrons.  
9 The design of the reactor affects the energy in the  
10 neutrons.

11 Q So it is irrelevant whether you are operating  
12 above one megawatt or not to get the --

13 A No, it would affect the amount of time a  
14 patient would undergo therapy though.

15 Q So is it desirable that you will be able to run  
16 it above one megawatt to perform the therapy?

17 A Yes.

18 Q We read these state audits about -- or it's an  
19 annual report, I believe, that you filed. Probably the  
20 director is responsible for that, but it's filed by the  
21 facility saying that the reactor's averaged around 150  
22 hours a year of operating time and that the bulk of those  
23 hours are at one megawatt or lower. Does this have any  
24 significance at all? Should we take from that that there  
25 is any reason why the reactor isn't being run above one

1 megawatt more frequently?

2 A No, I think you might be confusing terminology  
3 in the fact that we report things in megawatt hours, which  
4 is per megawatt hours, but you can operate at much less  
5 than a megawatt hour or you can operate at a higher power  
6 as well, but we are not doing boron neutron capture therapy  
7 at this point in time. We are basically doing fundamental  
8 research which may only be at 50 kilowatts or 250  
9 kilowatts. So the preponderance of our activities are less  
10 than a megawatt at this time.

11 Q But that's driven by what you are using the  
12 reactor for and not --

13 A That is correct.

14 Q -- how the reactor operates? Now, we've  
15 understood that there was a cooling system added or the  
16 cooling system had to be dealt with when the reactor was  
17 rated to operate at higher level, that cooling towers were  
18 built, for instance. This would have, I believe, been  
19 probably before your time. I heard from other employees  
20 there and operator types that when you run the reactor  
21 above one megawatt that there is an extended cool down  
22 period that extends into the evening hours to where people  
23 might work overtime in order to attend the reactor during  
24 the cool down period. Is that right?

25 MR. TURK: Your Honor, I don't mean to cutoff

1 the question, but it is way beyond the scope of the direct  
2 testimony and it is certainly beyond the scope of the cross  
3 that's taken place until now.

4 MS. CARROLL: There was extensive cross on the  
5 boron neutron capture therapy and to us this is boron  
6 neutron capture therapy information.

7 MR. EVANS: Technically you should be limited  
8 to my redirect, but we've been way beyond that.

9 MR. TURK: I don't see the connection to the  
10 boron neutron capture therapy, and that was a matter that  
11 was covered in the direct testimony as well as in the  
12 subsequent questions.

13 MS. CARROLL: But not in this area. I mean, we  
14 wouldn't ask redundant questions. That's why we are asking  
15 questions about boron neutron capture therapy that haven't  
16 been asked.

17 MR. EVANS: For the record, my redirect was  
18 limited to one point. It had to do with the disagreements  
19 or arguments between Dr. Karam and I asked whether  
20 paragraphs 55 and 56 on pages 18 through 20 were an example  
21 of the sort of disagreement he was talking about. Actually  
22 if you want to be very technical, this recross should be  
23 limited to my direct. I don't know how far we are going to  
24 go abroad, but...

25 CHAIRMAN BECHHOEFER: I think we will sustain

1 that objection. It's over the scope of what we're into  
2 now.

3 BY MS. CARROLL:

4 Q One of the functions of the Nuclear Safeguards  
5 Committee that's required by the NRC is to perform audits.  
6 Are these audits for internal use or for external reporting  
7 only or both or --

8 A The state requirements, as well as, I believe,  
9 the federal requirements now call for an annual audit of  
10 your radiation safety program. I think that's a new law  
11 effective January 1, 1994. They've been doing it for years  
12 at Georgia Tech. It's been done internally by the  
13 committee. Very effectively, I might add. It's something  
14 new that I came across -- I had not seen it done this way  
15 any place else where I've been, and I thought it very  
16 effective because it gets the Nuclear Safeguards Committee  
17 actually involved in the operations and get an  
18 understanding of what's going on and causes all to shape up  
19 and make sure -- hey, the auditors are coming and its our  
20 own committee so we want to look good.

21 Q So then you do use them internally?

22 A Yes.

23 Q There's comments throughout the committee  
24 minutes where, for instance, Dr. Karam is urging them to  
25 get them finalized and submitted, which implies that they

1 are always meeting their deadlines. Has this ever affected  
2 you? Have you ever noticed if they've been late and has it  
3 had any detrimental effect on you?

4 A Whenever you deal with faculty there is a time  
5 sequence involved in terms of turnaround time, and  
6 basically you have to push, and I think that's just being a  
7 good administrator to push to get things out.

8 MS. CARROLL: We're finished with questioning  
9 you. Thank you, Dr. Ice.

10 MR. TURK: I have some very limited following,  
11 Your Honor.

12 CHAIRMAN BECHHOEFER: Okay.

13 FURTHER RECROSS EXAMINATION

14 BY MR. TURK:

15 Q Dr. Ice, there is one part of your testimony in  
16 questioning by GANE that leaves me puzzled, and that has to  
17 do with the difference in your mind between the manager of  
18 the Office of Radiation Safety and a radiation safety  
19 officer. And let me begin first of all by asking you, in  
20 the Georgia State License on those materials other than  
21 those materials that you are licensed by NRC, is there a  
22 designated radiation safety officer? Do you know?

23 A Yes.

24 Q Who is designated as the RSO under the state  
25 license?

1           A       I am.

2           Q       In your mind what distinction do you see  
3 between your role as RSO under the state license and your  
4 role as MORS under the NRC license?

5           A       It's a very confusing role because in the terms  
6 of directed to safety -- I answer to Dr. Karam in term of  
7 directory. We just recently applied for a renewal of our  
8 state license and I indicated to Dr. Karam that I did not  
9 recommend my name being put on the state license as RSO  
10 from the standpoint that I was only manager of the Office  
11 of Radiation Safety. It was submitted under his signature  
12 with him putting my name in as RSO. His call.

13                   ADMINISTRATIVE LAW JUDGE LAM: Did you say you  
14 did not recommend that Dr. Karam put your name in as RSO.

15                   THE WITNESS: That is correct.

16 BY MR. TURK:

17           Q       What is the difference in your mind -- and let  
18 me give you the reason for my asking the question. You  
19 have indicated that you have the authority as MORS to  
20 suspend reactor operations. You can shut the place down if  
21 you determine that's appropriate. In my mind that's a  
22 function that the RSO would normally perform. Am I right?  
23 That's an RSO function?

24           A       That is correct.

25           Q       You have the authority to go to the NSC, that

1 is, to go above Dr. Karam's head with safety problems. To  
2 my mind that is also a function that an RSO would probably  
3 be able to perform. Do you agree?

4 A Yes.

5 Q And as I understand it, those are really the  
6 two principal capabilities of an RSO, shutdown operations  
7 and go above operations to some other authority when you  
8 consider it necessary.

9 A In my mind an RSO is in charge of a program of  
10 radiation safety. I am not in charge of the radiation  
11 safety program. It is not my program. I implement somebody  
12 else's program. I am a staff officer. I report and give  
13 recommendations to the safety directory who makes the  
14 decisions. It is not my program.

15 Q As I understand what you are saying then,  
16 you're looking at it administratively and you are  
17 essentially saying that you would like to have independent  
18 authority for defining the scope of your program?

19 A If it is in the title of radiation safety  
20 officer, yes.

21 Q Do you feel that you have the authority to  
22 define the scope of your program as MORS?

23 A No.

24 Q And why do you say that?

25 A I do not hire or fire my health physicists. I

1 don't set their vacation times. I don't set their  
2 salaries. I have no programmatic control.

3 Q In terms of the substantive work of the RSO and  
4 the substantive work of the MORS, do you see any  
5 distinction?

6 A From a safety standpoint, no.

7 Q Also you indicated that you believe the fact  
8 that Mr. Downs left jumpers in place and I believe began  
9 operations with two disabled SCRAM functions, if I am not  
10 mistaken, you believe there was some safety significance to  
11 those matters. Is that correct?

12 A It was a procedural violation and that would be  
13 a safety consideration.

14 Q Okay. And that's my question. What is the  
15 safety consideration? Isn't that the procedures were  
16 violated?

17 A Yes.

18 Q Were you making a statement as to whether the  
19 reactor safety was adversely affected?

20 A No.

21 Q You were not?

22 A I was not.

23 Q Earlier I believe I testified --

24 MR. EVANS: You?

25 (Laughter)

1 MR. TURK: -- improperly. Yes, as counsel, not  
2 as witness.

3 BY MR. TURK:

4 Q -- to my belief that there was something like  
5 5000 cases of this particular type of brain tumor which  
6 boron neutron capture therapy may be effective. Do you  
7 know the number of cases per year of that type of brain  
8 tumor?

9 A When you mentioned it, the number that ran  
10 through my head was 7000. So I think you were in the  
11 ballpark.

12 Q And do you recall offhand the name of that  
13 tumor?

14 A Glioblastoma

15 Q And how do you spell that? Is it G-l----

16 A G-l-i-o-b-l-a-s-t-o-m-a -- I guess that's it.

17 (Laughter)

18 MS. CARROLL: Isn't there a hyphen between Glio  
19 and balstoma?

20 THE WITNESS: No, there isn't.

21 BY MR. TURK:

22 Q And am I also correct in my belief that there  
23 is no other known therapy that may be effective against  
24 that tumor?

25 A It is very resistant to all other therapies.

1 Q And is part of the problem the fact that it is  
2 not easily excised surgically?

3 A It is a tumor that has a number of fingers that  
4 stick out from it. Therefore it is surgically very  
5 difficult to remove the tumor and get all of the tumor.  
6 With all other radiation therapies or chemotherapies, you  
7 damage the normal brain cells as well as the tumor in  
8 trying to destroy the tumor. The hypothesis of boron  
9 neutron capture therapy is that the boronated compound will  
10 localize only in the tumor, very little in the brain cells.  
11 Therefore, the neutron irradiation would only impact the  
12 tumor. Therefore, you can give a much higher radiation  
13 dose and kill the tumor without effecting the brain itself.

14 Q Is this a treatment that Georgia Tech is  
15 actively interested in pursuing?

16 A Yes.

17 Q Is it possible that one of the reasons you were  
18 hired at Georgia Tech had to do with your background as a  
19 pharmacist and your background using radio-pharmaceuticals?

20 A I think you would have to ask the director the  
21 reasons why I was hired, but I would say that one of the  
22 reasons I came here was the opportunity to be involved with  
23 Dr. Karam and having this reactor available to me.

24 MR. TURK: I have no further questions for this  
25 round, Your Honor.

1 (Laughter)

2 CHAIRMAN BECHHOEFER: Rerredirect?

3 MR. EVANS: No rerredirect.

4 ADMINISTRATIVE LAW JUDGE KLINE: I'm sorry, I  
5 have one question of Dr. Ice. We've had testimony here  
6 previously relating to the fact that at some time in the  
7 past there was a state of disharmony, working disharmony,  
8 between the health physics staff and the operations staff,  
9 and I would like you to characterize the present day's  
10 state of working relationship between those two staffs. Is  
11 it harmonious or disharmonious in your view?

12 THE WITNESS: I would say it is a good  
13 relationship between the two and harmony means you're --  
14 total harmony, I'm not sure they're in total harmony, but -  
15 -

16 ADMINISTRATIVE LAW JUDGE KLINE: Characterize  
17 it as you see fit.

18 THE WITNESS: We're very close. In fact I  
19 think one of the philosophies that I have as a health  
20 physicists is that I'm not there just as a regulator, but  
21 I'm there as a promoter of good radiological research  
22 practices. So we encourage radiological research and try  
23 not to be an inhibitor of it from a safety standpoint. We  
24 try to do -- I work very closely with the investigators.  
25 They put their proposal to me on the table and say, this is

1 what I want to do. Then I sit down and say, all right, but  
2 here's how you do it safely and work with them and put the  
3 draft together.

4 ADMINISTRATIVE LAW JUDGE KLINE: And they  
5 accept that?

6 THE WITNESS: And they accept that, very much  
7 so.

8 ADMINISTRATIVE LAW JUDGE KLINE: If in fact  
9 some form of disharmony should make an appearance would you  
10 have sufficient authority to order it to cease?

11 THE WITNESS: Yes. My authority right now is  
12 to suspend operations. It's either an all or none  
13 situation with my authority.

14 ADMINISTRATIVE LAW JUDGE KLINE: Okay. Do you  
15 see actual examples of, say, horseplay in the control room  
16 or in the hot cell area now?

17 THE WITNESS: No.

18 ADMINISTRATIVE LAW JUDGE KLINE: Thank you.

19 CHAIRMAN BECHHOEFER: Dr. Ice, going back to  
20 testimony concerning Mr. Downs, I'm reading from a document  
21 that reports to NRC that Mr. Downs, "resigned". And then  
22 it adds that Mr. Downs' SRO status has been on hold for a  
23 six month period. Did Mr. Downs in fact resign of his own  
24 volition or was he forced out or don't you know? I can  
25 show this letter, but I repeated most of the -- This is a

1 report, by the way, from Dr. Karam to NRC.

2 THE WITNESS: I don't know the status  
3 administratively of his resignation. I do say that I  
4 chaired the committee that reviewed his performance. Mr.  
5 Downs appeared before the committee after we had heard the  
6 testimony of other individuals, other reactor operators.  
7 He admitted to the incidents voluntarily and we made a  
8 recommendation to the director.

9 CHAIRMAN BECHHOEFER: But you don't know  
10 whether the director said, you're fired, or whether -- you  
11 will be permitted to resign within X days?

12 THE WITNESS: No, that's a personnel matter and  
13 it would be between the director and the person involved.

14 CHAIRMAN BECHHOEFER: Do you know anything  
15 about the -- It says Mr. Downs' SRO status has been on hold  
16 for a period of time, since February 16, 1994. Did your  
17 committee have anything to do with, say, a suspension of  
18 his activities or the restriction of his activities.

19 THE WITNESS: If my memory is correct, Dr.  
20 Karam suspended operations immediately and it went into a  
21 hold status while we held the review hearings of  
22 performance. So it was on hold so we could have an  
23 adequate performance review and the hold was not based upon  
24 the performance review. It was a hold because of the  
25 incident being brought to the forefront by another reactor

1 operator.

2 CHAIRMAN BECHHOEFER: Was the entire operation  
3 of the reactor suspended or just Mr. Downs?

4 THE WITNESS: Just Mr. Downs.

5 CHAIRMAN BECHHOEFER: I see. Thank you.

6 ADMINISTRATIVE LAW JUDGE LAM: Dr. Ice, in this  
7 testimony you repeatedly refer to Dr. Karam as your boss,  
8 quote and unquote, or you said that you worked for Dr.  
9 Karam, quote and unquote. Now, in safety matters, since  
10 you have complete authority to suspend any operation and go  
11 above your immediate supervisor, which was Dr. Karam, do  
12 you feel that in terms of safety that you are not really  
13 working for Dr. Karam, that you have a higher degree of  
14 independence? Do you feel that way?

15 THE WITNESS: No.

16 ADMINISTRATIVE LAW JUDGE LAM: Why not?

17 THE WITNESS: Because Dr. Karam is my boss. He  
18 is first line responsible for safety. I think if there is  
19 an issue where I don't have his ear or I felt it was  
20 overwhelming, I do have the opportunity to go around him,  
21 but he's the one who hired me and I try to do -- carry out  
22 his program as he wishes.

23 ADMINISTRATIVE LAW JUDGE LAM: But aren't you  
24 in a unique position to see an impact on safety if you so  
25 choose?

1 THE WITNESS: I am in a unique position. There  
2 are not many faculty members who have the ear of President  
3 Clough.

4 ADMINISTRATIVE LAW JUDGE LAM: Or can go above  
5 their immediate supervision?

6 THE WITNESS: That is correct.

7 ADMINISTRATIVE LAW JUDGE LAM: Or have  
8 independent authority to do things without seeking any  
9 approval from him?

10 THE WITNESS: But the authority that I have is  
11 either shut down operations or don't shut it down or go  
12 around my boss.

13 ADMINISTRATIVE LAW JUDGE LAM: And you do not  
14 consider that significant authority?

15 THE WITNESS: I consider it significant for the  
16 manager of the Office of Radiation Safety. That's the  
17 reason I would say from a personal opinion situation, I  
18 would say to have a separate chain of command.

19 ADMINISTRATIVE LAW JUDGE LAM: Thank you.

20 CHAIRMAN BECHHOEFER: So I take it from that  
21 answer that you, yourself, could not have suspended Mr.  
22 Downs from acting reactor operator, senior reactor operator  
23 as distinguished from going through Dr. Karam.

24 THE WITNESS: I do not approach radiation  
25 safety from an individual standpoint. I would really deal

1 directly with the principal investigator. If I thought  
2 there was a safety situation with the reactor -- with any  
3 reactor operator, I would go to Dr. Karam and say, you  
4 either correct this or I shut you down.

5 CHAIRMAN BECHHOEFER: That's all we have at the  
6 moment.

7 MR. EVANS: Absolutely no rererredirect.

8 CHAIRMAN BECHHOEFER: Why not?

9 (Laughter)

10 MS. CARROLL: We have what I think is probably  
11 called a couple of follow-up questions.

12 MR. EVANS: Can we make certain they are  
13 confined to questions asked by either the court, the panel?

14 MS. CARROLL: They are.

15 MR. EVANS: Fine. I just don't want to open  
16 doors up and go ---

17 CHAIRMAN BECHHOEFER: They should be confined  
18 to those matters.

19 MS. CARROLL: I believe everybody else may  
20 understand but GANE doesn't.

21 BY MS. CARROLL:

22 Q Mr. Downs' SRO status was on hold following the  
23 SCRAM jumper accident. Was that by the -- by Georgia Tech  
24 or by the NRC that his license was on hold?

25 A I believe what we are talking about is he was

1 suspended from operations by Dr. Karam.

2 Q So that would be a Georgia Tech action because  
3 apparently he's authorized by the NRC as well, but they  
4 didn't have to get involved because Georgia Tech suspended  
5 him.

6 A That's my understanding. Dr. Karam made the  
7 decision and suspended him on the spot.

8 Q This is my last question -- unless your answer  
9 is very provocative. But if it is as short as it usually  
10 is, it will probably be my last question. You said that  
11 you never had had -- and it was implied that you never  
12 needed to shut the reactor operation down. And you said  
13 you never had the need or you had not gone around Dr. Karam  
14 and it was implied in your testimony you didn't need to.  
15 Now, my question is, do you feel that if this situation  
16 arose and you had to, do you feel that it might damage your  
17 relationship with Dr. Karam?

18 A No.

19 Q Thank you.

20 CHAIRMAN BECHHOEFER: Dr. Ice, I believe that's  
21 all the questions for you. Thank you for your appearance.

22 MR. TURK: Your Honor, may I ask --

23 CHAIRMAN BECHHOEFER: Pardon?

24 (Laughter)

25 MR. JOHNSON: It's not our fault, don't look at

1 us. MR. TURK: May I just have a moment.

2 CHAIRMAN BECHHOEFER: Okay, sure. We don't  
3 want to cut you off.

4 MR. TURK: I'm really not interested in asking  
5 anymore questions, but I feel I need to consult one  
6 document before I make that final decision. May we go off  
7 the record?

8 CHAIRMAN BECHHOEFER: Off the record.

9 (Off the record)

10 CHAIRMAN BECHHOEFER: Back on the record.

11 MR. TURK: I apologize, Your Honor, for  
12 interrupting your discharge of the witness. I have  
13 consulted the text specs and the FSAR, which I had  
14 indicated I needed to look at, and I am content at this  
15 time not to ask any further questions.

16 CHAIRMAN BECHHOEFER: Dr. Ice, you are finally  
17 excused, and again, we appreciate your appearance and your  
18 time and your insights.

19 (Witness excused)

20 CHAIRMAN BECHHOEFER: Let's adjourn for a  
21 break. Let's say 15 minutes and that'll be 4:30.

22 (A short recess was taken.)

23 MS. CARROLL: Are you ready for us to call John  
24 Harding Galloway to the -- it's not called a stand, John,  
25 it's called a table. If you'll please take the table. And

1 I believe the Judge will swear you in.

2 CHAIRMAN BECHHOEFER: Yes.

3 Whereupon,

4 JOHN HARDING GALLOWAY

5 appeared as a witness herein, and having been first duly  
6 sworn, was examined and testified as follows:

7 MS. CARROLL: The parties have testimony which  
8 was prefiled by Mr. Galloway and I'll bet we owe you three  
9 copies, Mr. Court Reporter and we'll take care of that.

10 DIRECT EXAMINATION

11 BY MS. CARROLL:

12 Q Is this the testimony that you served on all  
13 the parties?

14 A Yes, it is.

15 Q Do you have anything that you would -- maybe I  
16 should leave this with you for a moment.

17 A If you would, because I don't have a clean  
18 copy, thank you.

19 Q Do you have anything to -- wait a minute,  
20 there's a sequence here.

21 Do we move to enter his testimony --

22 CHAIRMAN BECHHOEFER: You ask him to correct it  
23 first.

24 BY MS. CARROLL:

25 Q Do you have anything -- is your testimony

1 correct?

2 A Correct as it stands, yes.

3 Q Or would you change anything in that? I'll ask  
4 you if you want to add something after I ask you if you  
5 want to change anything.

6 A To change anything at this point, no, it  
7 stands.

8 Q And would you have anything to add to that? Do  
9 you need a moment to review it and refresh your memory on  
10 what you've already said?

11 A Yeah, if you'd -- I mean, I know what's in  
12 here, I just want to find the relevant places to insert.

13 (The witness reviews the document.)

14 A The only relevant things I have to add right  
15 now are in regards to my meeting with the Georgia Tech  
16 Police records officer and with the police officer with  
17 whom I spoke, which is sort of elucidated in paragraph 4,  
18 page 1.

19 Those are being followed upon. The officer has  
20 acknowledged this conversation, remembers it, and was  
21 unavailable up through today for me to verify further some  
22 of the points in here, but those are being verified and  
23 followed up on, as well as with the records officer.

24 I do have one change, I believe I --

25 MR. TURK: I'm sorry, just so we're clear,

1 could you explain again which paragraph you're speaking  
2 about?

3 THE WITNESS: Paragraph 4, page 1.

4 MR. TURK: It begins, "My next exposure?"

5 THE WITNESS: Yes.

6 MR. TURK: And what is it that you're  
7 indicating?

8 THE WITNESS: That the police officer that I'm  
9 speaking of there, this incident, this conversation was --  
10 how should you say, verified by that officer as of this  
11 week.

12 BY MS. CARROLL:

13 Q This is the fellow that related to you a  
14 previous incident about seeing guys in radiation suits and  
15 he now remembers that, you said?

16 A Yes. He -- the only thing that he pointed to  
17 was that he remembered our conversation and that beyond  
18 that, you know, like I said that's all the other  
19 information I have. I just wanted to verify.

20 I'd like to go back for a moment and make one  
21 change. On the next page I called him a -- I believe it  
22 was on the next page, I referred to him as sergeant. His  
23 title is not sergeant, he's just a police officer with the  
24 Georgia Tech Police, not a sergeant.

25 Q Is that Vickery?

1           A       No, this is not Vickery, he's the police chief.

2                   MR. TURK: It says Kemp in the second full  
3 paragraph on page 2, the paragraph which begins, "I was  
4 looking to find from".

5                   THE WITNESS: Yes, second full paragraph, that  
6 is not sergeant, it should be officer.

7                   But the remainder of this document stands.

8 BY MS. CARROLL:

9           Q       And what I had understood when we talked  
10 previously that he remembered more about the night when he  
11 saw men in radiation suits. You're saying he remembers  
12 your -- the conversation with you better and can help you  
13 establish when you had the conversation and particularities  
14 like that.

15           A       That's what I was after, yes.

16           Q       Thank you for clarifying that.

17           A       Certainly.

18                   MS. CARROLL: We move to enter John Galloway's  
19 prefiled testimony with his addendums into evidence.

20                   MR. EVANS: We have a substantial number of  
21 objections, Your Honor.

22                   Starting with the third paragraph. "I have  
23 attached my resume as required," on page 1. We object to  
24 the -- about midway down, the last word on line 6, starting  
25 "While research reactors have contributed much to our

1 understanding of nuclear physics and have recovered  
2 wondrous mysteries about the nature of matter, they do not  
3 belong in the middle of a densely populated metropolitan  
4 area. As my personal beliefs dictate, this particular one  
5 does not belong on our doorstep." I would object down  
6 through "doorstep." I do not object to any conditions he  
7 has witnessed about its operation mentioned in this  
8 paragraph.

9 I object to this, first of all, it's based on  
10 personal belief, which is not relevant. It is not  
11 evidence. It is a statement of personal opinion. It is  
12 not evidence in any way, shape or form. The witness, by  
13 his vitae, has no expertise in the area of nuclear physics  
14 or -- nuclear engineering or health physics or anything  
15 related to nuclear matters. There's nothing in his vitae  
16 to suggest he has any expertise at all. So you have here a  
17 purely personal opinion, which isn't relevant to anything,  
18 and I would say also it is not evidence, it is not even  
19 purported to be evidence, it is posed as a purely personal  
20 opinion that you ought not to have a reactor in a densely  
21 populated metropolitan area. And I think this body could  
22 judicially notice that it is quite common to have these  
23 reactors in metropolitan areas. At MIT in Boston or near  
24 Boston; in Charlottesville, Virginia come to mind.

25 Oh, should I go on and make all objections?

1 MR. TURK: I would add, Your Honor, if we're  
2 looking at that paragraph, the sentence which immediately  
3 precedes the one that Mr. Evans referred to, the one which  
4 states, "My concern with the Neely facility is spawned from  
5 the quantity of time." As I understand the thrust of this  
6 testimony, it is to relate to the Board conversations the  
7 witness has had with various members of the security force  
8 at Georgia Tech. This sentence is extraneous to the  
9 information which he brings to bear and I would oppose the  
10 admission of that sentence along with the ones that Mr.  
11 Evans referred to, all the way through to the end of the  
12 paragraph.

13 MS. CARROLL: Your Honor, I think that --

14 THE WITNESS: May I ask for clarification on  
15 what you are proposing?

16 (No response.)

17 CHAIRMAN BECHHOEFER: The Board believes we  
18 should grant Mr. Evans' motion but we would wonder how the  
19 last part of the last sentence would fit in, the part that  
20 you didn't move to strike. Do we add a noun or a predicate  
21 or how do we make it a sentence?

22 MR. EVANS: I suppose logic would dictate we  
23 delete the entire area, at least while I think my brother  
24 wanted to delete and I certainly don't object to that --

25 CHAIRMAN BECHHOEFER: By the way, we are

1 denying Mr. Turk's portion.

2 MR. EVANS: Okay. My motion, I would correct  
3 it to say eliminate all of that paragraph starting with  
4 "While research reactors have contributed much to our  
5 understanding of nuclear nature" -- I would omit the entire  
6 balance of the paragraph. Because the "Not with the  
7 conditions I have witnessed" hanging in the air, that  
8 doesn't tell us anything.

9 MR. TURK: And also, he does not state that he  
10 has witnessed conditions, his testimony goes on to state  
11 what it is that he did.

12 MR. EVANS: That's the next objection.

13 MR. TURK: He spoke to security officers.  
14 There's no witnessing of conditions. In any event, to the  
15 extent there is a witnessing of conditions, it's set forth  
16 later in the testimony, so you don't need that predicate.

17 CHAIRMAN BECHHOEFER: I think that is correct.  
18 We'll grant your portion, but we won't grant the staff's  
19 portion.

20 The Board believes that to the extent the  
21 earlier portion indicates why Mr. Galloway may have been in  
22 the place he was to observe what he observed could be  
23 indicated to some degree by that earlier part, although it  
24 is more relevant to standing actually than to substance.  
25 But we will leave it in, in any event.

1 MR. TURK: Incidentally, I would back up for a  
2 m moment, Your Honor. The front portion of it is really  
3 not necessary either, the part beginning with "To the  
4 justices of the hearing," that introduction plus that first  
5 paragraph requesting consideration of delay in submittal.  
6 It's really extraneous to the testimony.

7 CHAIRMAN BECHHOEFER: Well, as long as no  
8 objection is being made for lateness, I think that's --

9 MR. TURK: None for the staff, Your Honor.

10 CHAIRMAN BECHHOEFER: Pardon?

11 MR. TURK: I'm not objecting on grounds of  
12 lateness for the staff.

13 CHAIRMAN BECHHOEFER: I think the first two  
14 paragraphs can be omitted in that event because no one is  
15 contesting the lateness.

16 MS. CARROLL: Does it go without saying that  
17 I'm sitting over here because we're sharing this document,  
18 the one copy?

19 CHAIRMAN BECHHOEFER: Yes.

20 You may proceed.

21 MR. EVANS: The following paragraph we move to  
22 delete in its entirety. This is the one starting out, "I  
23 first became aware of activities that went on behind the  
24 shadowy doors" -- I might point out that shadowy I think is  
25 a term of art, there is no evidence as to whether the door

1 is dark or light -- "of the Neely Nuclear Center when Glenn  
2 Carroll of GANE and Pamela Blockey-O'Brien spoke to the  
3 environmental forum."

4 I would suggest that this paragraph (a) is all  
5 hearsay; it's reporting on a conversation, he became aware  
6 of something through conversation of Blockey-O'Brien, we  
7 don't know what the conversation was, we don't know how  
8 accurate it was. So it's hearsay to start with. And then  
9 when he goes down and says based on the hearsay he found --  
10 he proceeded to examine portions of the Neely safety  
11 analysis report, finding some of the precaution, lack  
12 thereof actually, designed to protect me, my property and  
13 my fellow students grossly inadequate. I would suggest  
14 that the witness is not competent as an expert to give an  
15 opinion on adequacy or inadequacy of what is contained in  
16 the Neely safety analysis report. That's a very technical  
17 report on safety and I just respectfully don't believe the  
18 witness is competent -- he doesn't have the expertise and  
19 he's not qualified as an expert. I don't think he can  
20 testify on that, but in any event, at least the first part  
21 of it is all hearsay about what he heard Pamela O'Brien  
22 said and we all know the sort of things that Pamela O'Brien  
23 has to say.

24 MR. TURK: I would join in the objection, Your  
25 Honor. Your Honor --

1 (Brief pause.)

2 MR. EVANS: If I might, Your Honor, I'd like to  
3 amplify my objection. As far as inadequacy, not only is he  
4 not competent because he's not an expert, but there is  
5 absolutely no factual foundation for the conclusion of  
6 inadequacy. If you're going to say something is  
7 inadequate, you want to have some factual predicate or a  
8 foundation, because otherwise it is simply a conclusion.  
9 And I'm not sure it's not a conclusion of law rather than  
10 fact, which we be improper for a lay witness to give a  
11 conclusion of law.

12 MR. TURK: May I join the objection, Your  
13 Honor? The purpose of this testimony, as has been  
14 explained to us by GANE in response to discovery and  
15 otherwise, is that Mr. Galloway has information to bring to  
16 you concerning conversations he had with the security  
17 personnel at their facility. That's why he's appearing as  
18 a witness. GANE has not indicated to us that they want to  
19 bring Mr. Galloway forward as an expert on reactor safety  
20 or on the adequacy of the SAR. That's not his purpose,  
21 that was not a purpose stated to us in discovery.

22 This paragraph is really extraneous to the  
23 purpose for his testifying and it's not needed for his  
24 testimony. In addition, Mr. Galloway is a junior in  
25 college; as I understand it, he's an electrical engineering

1 student, he is not shown to be qualified through his vitae  
2 to be an expert on matters of nuclear physics or nuclear  
3 engineering or health physics or reactor management or the  
4 preparation of safety analysis reports. There is nothing  
5 in his background that's been shown to us that would let  
6 you accept this statement of opinion as the opinion of an  
7 expert. And because it's extraneous, I think that we can  
8 simply agree, rather than have to cross examine him on the  
9 basis for these opinions and his expertise, simply to do  
10 away with it and move on to the heart of his testimony.

11 CHAIRMAN BECHHOEFER: Okay, the Board is going  
12 to strike that entire paragraph except for the factual  
13 statement that Mr. Galloway has examined portions of the  
14 safety analysis report. Not the portion dealing with  
15 finding -- we'll strike the portion dealing with finding,  
16 based on lack of expertise, but the factual statement that  
17 he's examined portions of the safety analysis report, we  
18 will leave in there as a background statement, if nothing  
19 else.

20 MR. TURK: And then what happens to the first  
21 sentence, is that coming out?

22 CHAIRMAN BECHHOEFER: We're striking that,  
23 everything except for that one short statement that he's  
24 examined portions of the --

25 MR. EVANS: Okay, my question was the

1 sentence -- is a portion of that sentence struck out? I  
2 have no problem with "I proceeded to examine" --

3 CHAIRMAN BECHHOEFER: After the word "report"  
4 put a period and then strike the rest of the sentence.

5 MR. EVANS: Okay.

6 CHAIRMAN BECHHOEFER: It's the conclusion that  
7 we're striking, but the factual statement that he has  
8 examined a portion of the report, which may or may not bear  
9 on the remainder, but the fact that he's looked at it shows  
10 some familiarity perhaps.

11 ADMINISTRATIVE JUDGE LAM: The only phrase that  
12 remains is "I proceeded to examine portions of Neely's  
13 safety analysis report," That's the only thing that would  
14 stand.

15 CHAIRMAN BECHHOEFER: Period. Or I have  
16 examined --

17 MR. EVANS: I think that's appropriate, yes, I  
18 would agree to that.

19 Okay, we now go down to the next paragraph. I  
20 have no problem with the first three sentences, but where  
21 it gets down to "On discussing the Neely facility, he  
22 proceeded to inform me that on one unspecified and  
23 undetailed occasion, he and another officer were called to  
24 the facility to investigate an incident" and I won't read  
25 it all, but I think everyone can read it. I would move to

1 strike from "On discussing," from there to the end of the  
2 paragraph.

3 First of all, of course, it is hearsay. Now  
4 I'm familiar with one well-recognized exception to the  
5 hearsay rule and that is where he is trying to show how his  
6 own mind developed as opposed to the truth of the  
7 statement. But in addition to being hearsay, I also  
8 question -- it appears to me to be of no probative value,  
9 from a viewpoint of relevancy. In other words, what is  
10 this showing, that an officer agreed to -- again, all  
11 hearsay -- someone reporting what someone said about people  
12 going into the room or not going into the room -- or into  
13 the building. I question the -- I would object on the  
14 grounds of relevancy. I think it has no probative value to  
15 anything, and it is hearsay, which taints it to some  
16 extent, although I recognize that if it's to show his  
17 mental state, hearsay can be admissible, not for the truth  
18 of the statement, but to show his mental state, but I don't  
19 really see where he's developing his mental state or  
20 suggesting that he took any action based on the statement.  
21 Therefore, it seems to me the weight is that this is being  
22 tendered as hearsay for the truth of the statement.

23 MR. TURK: Your Honor, I do not object to these  
24 portions on grounds of hearsay. Hearsay is admissible in  
25 administrative proceedings. The key is whether the

1 testimony is reliable, hearsay or not. Reliability,  
2 however, is a factor, in looking at this paragraph in that  
3 the police officer's name is not provided, the incident  
4 which he addresses is, as the testimony indicates,  
5 unspecified and undetailed.

6 MS. CARROLL: The officer's name is provided,  
7 it's Officer Kemp, it's in the last sentence, which  
8 probably should stay no matter what is decided about the  
9 rest of it.

10 MR. TURK: I would not move to oppose it on  
11 grounds of hearsay. In terms of reliability, it really  
12 does push the envelope in that the incident is not  
13 described by date, the type of incident is not described,  
14 there's no indication here whether something of substance  
15 happened at the reactor or not, was it a drill, was an  
16 event? It's just a tidbit of a conversation and I think by  
17 itself it really doesn't show anything.

18 MS. CARROLL: Your Honors, this is the  
19 potential witness that I knew that Mr. Galloway had not met  
20 with yet, but is meeting with later in the week. Now I did  
21 misunderstand what he remembered, and he may or may not  
22 remember more about the men in radiation suits. He  
23 evidently remembers about his conversation with John.

24 John will be exploring that and it might be  
25 that you include it somehow or another reserving how much

1 weight you give it, until we see if Officer Kemp  
2 materializes as a witness and can testify to that himself.

3 MR. TURK: I can live with it to just ask Your  
4 Honors to consider the weight of it based on the --

5 MR. EVANS: Our objection was no probative  
6 value at all, what's written here.

7 MR. TURK: In terms of its relevance to the  
8 management contention, it's tangential at best.

9 ADMINISTRATIVE JUDGE KLINE: Does GANE want to  
10 argue in favor of admitting this paragraph, in particular  
11 connecting it up to the management contention?

12 MS. CARROLL: Only so far as the possibility  
13 that Officer Kemp may be able to elaborate as a witness.

14 ADMINISTRATIVE JUDGE KLINE: If he is, he is.  
15 I want to know if you -- if this paragraph, which is  
16 written by Mr. Galloway, connects it up to -- is connected  
17 in some fashion to the management contention.

18 MS. CARROLL: Insofar as my question would be,  
19 what I'd like to find out from Officer Kemp is besides the  
20 radiation suits, what other identification that he had that  
21 these personnel belonged there and had sanctioned business  
22 there. And the security office is part of managing that  
23 facility on behalf of the licensee, and that's pretty  
24 much --

25 CHAIRMAN BECHHOEFER: The Board is going to

1 leave this paragraph in. We will take it -- it is hearsay,  
2 but we'll take it for what it's worth, what weight to give  
3 it we can decide.

4 ADMINISTRATIVE JUDGE LAM: I'd like to state  
5 for the record, you know, the weight the Board will give it  
6 will really be tempered by the really unspecific nature of  
7 this testimony. Plus the other considerations, both the  
8 staff counsel and the applicant's counsel have stated, the  
9 Board will give due consideration to all these arguments.

10 MR. EVANS: Thank you.

11 Okay, moving to the next paragraph -- I  
12 apologize for taking so long, but a lot of these things  
13 have to be sentence-by-sentence almost.

14 CHAIRMAN BECHHOEFER: That's okay.

15 MR. EVANS: Okay, moving to the next paragraph,  
16 "Sometime shortly before our fall break in 1995." That  
17 sentence has to do with the CO 60 pool level. Consistent  
18 with the Court's ruling on cobalt to date, I suggest that -  
19 - I would move that that be deleted as not being relevant  
20 to any issue in the case.

21 MS. CARROLL: Shall I wait for Mr. Turk or jump  
22 in there?

23 CHAIRMAN BECHHOEFER: Well, why don't you wait  
24 for Mr. Turk and then respond to that.

25 MR. TURK: I have nothing to add really, Your

1 Honor.

2 CHAIRMAN BECHHOEFER: Well, do you join that  
3 portion of the objection?

4 MR. TURK: I would phrase it differently.  
5 Again, I don't see the relevance to management. The  
6 portion, however, that I would move to strike is not the  
7 entire paragraph, but the very last two and a half lines  
8 following the semicolon. I would oppose that admission.

9 MR. EVANS: I did have other objections to  
10 follow on the rest of the paragraph, I haven't gotten there  
11 yet.

12 MR. TURK: That part I would object to, based  
13 on lack of expertise.

14 CHAIRMAN BECHHOEFER: The Board will leave that  
15 paragraph in. We think the reference to cobalt 60 here is  
16 incidental and relates to an occasion rather than any  
17 technical considerations about the cobalt 60 pool.

18 MR. EVANS: With anticipation of an adverse  
19 ruling, I next move to strike the following -- let's see,  
20 "My initial discussion with a female officer on duty at the  
21 window," that sentence, the next sentence starting "The  
22 officer informed me. The next sentence, "He would then  
23 advise the course," down to but not including "At this  
24 point." For the record, I would move to strike all of this  
25 testimony because it obviously relates to the incident

1 involving cobalt, and consistent with my former objection,  
2 which the Court has overruled, for the record, I believe I  
3 should make the same objection here, that it has to do --  
4 the incident on its face has to do with cobalt. Secondly,  
5 again it is hearsay about what someone else said.

6 And for all of those reasons together, I would  
7 move to strike that.

8 MR. TURK: On this portion, Your Honor, I would  
9 join in terms of reliability. The discussion with this  
10 unnamed female officer cannot be cross examined, there's no  
11 way of testing its accuracy, absent at least a name. It is  
12 unreliable. The fact that it's hearsay is not my  
13 objection, but reliability is a concern.

14 MS. CARROLL: Point of clarification. One of  
15 the meetings that John referred to that he has scheduled is  
16 with Amber Burris and the point of that meeting will be to  
17 establish when he met with this unnamed woman at the  
18 window, get into the logbooks and name that woman and name  
19 that date, so that should be supplied later making it more  
20 reliable.

21 MR. EVANS: But it's not in the written  
22 testimony.

23 MS. CARROLL: No, it's not in the written  
24 testimony.

25 CHAIRMAN BECHHOEFER: It does make cross

1 examination somewhat difficult at this time.

2 MR. TURK: Also, the time for submitting  
3 testimony by Mr. Galloway has arrived. If there was some  
4 preparatory work that had to be done, it should have been  
5 done by now, quite frankly. We can't keep discovery open.

6 In addition to that problem, Your Honor,  
7 there's a statement on page 2 of the testimony, seven lines  
8 down in that first paragraph, in which Mr. Galloway makes  
9 the observation how easy it would be for Dr. Karam to cover  
10 up actions at the facility. That's totally speculative,  
11 that has no basis and I would move to strike that.

12 MR. EVANS: We had not reached that. I agree  
13 with my brother, he's anticipating, but I do intend to --

14 MR. JOHNSON: Were you separated at birth?  
15 (Laughter.)

16 MR. TURK: Now that you are counsel, you are  
17 also our brother, Mr. Johnson, welcome to the family.

18 MR. JOHNSON: When are you going to teach me  
19 the secret handshake.

20 (Laughter.)

21 MR. TURK: We are all brothers under the  
22 Georgia sun.

23 CHAIRMAN BECHHOEFER: The Board has decided to  
24 strike only the sentence reading how easy it would be for  
25 him to cover up the actions inside the facility. That's --

1 there's no expertise behind that.

2 MR. EVANS: I have not, of course, presented  
3 any objections on the balance of the paragraph yet. I  
4 suppose for the record I should do so. That was one  
5 objection, that particular sentence.

6 CHAIRMAN BECHHOEFER: Well, that one is out.

7 MR. EVANS: But if I may at least present the  
8 objection, then the Court is free to overrule it.

9 My objection to the balance of the paragraph  
10 starting "At this point, I seriously began to question the  
11 procedure, what if Dr. Karam could not be reached" and  
12 going on.

13 My problem with this is we have here again non-  
14 expert opinion and worse than that, there's absolutely no  
15 foundation for it in the sense, the fact that he doesn't  
16 know the procedure doesn't mean the procedure doesn't  
17 exist. Nowhere in his testimony does he say there is not  
18 procedure which is applicable if Dr. Karam is not  
19 available.

20 And if the Court wants, I would in my place as  
21 an officer of the Court, I would assure the Court there are  
22 alternative procedures. But the witness doesn't negate  
23 that, all he says is he begins to wonder. Well, I think  
24 wondering is the same thing as conjecture or speculation  
25 and I don't think that has any -- that's not evidence.

1 I also note the cobalt pool is mentioned again  
2 in the third line from the bottom.

3 CHAIRMAN BECHHOEFER: The Board has decided to  
4 strike the last part of the last sentence after the word  
5 "is", "really is." I think the rest of that sentence we  
6 will strike.

7 MR. EVANS: What are we striking, Your Honor?

8 CHAIRMAN BECHHOEFER: The "and how Dr. Karam  
9 holds a frightening autonomy over Neely's activities."

10 MR. TURK: That's out.

11 CHAIRMAN BECHHOEFER: Yeah. I think you need  
12 an expert for the word "frightening" and that we don't see,  
13 and so after "is" put a period.

14 MR. TURK: Your Honor, I would ask you to  
15 reconsider to the extent that you're not taking out the two  
16 lines before that, starting with "Based on my learnings".  
17 Again, that part of the sentence, "Based on my learnings, I  
18 agreed" in terms of whether the cobalt pool was critical or  
19 not, and then just pointed out in bold letters how single  
20 pointed the management structure of the facility really is.

21 Those are expert type opinions for which no  
22 expertise has been shown.

23 CHAIRMAN BECHHOEFER: I think the Board will  
24 strike everything after the word "critical."

25 MR. EVANS: After the word what, Your Honor?

1 CHAIRMAN BECHHOEFER: "Critical."

2 MR. TURK: "Critical;" should become a period?

3 CHAIRMAN BECHHOEFER: Become a period. And we  
4 agree with the last -- Mr. Turk's objection to the "Based  
5 on my learnings", that is expert testimony.

6 So we'll put a period after "critical."

7 MR. EVANS: Okay, I guess we now move on to the  
8 next sentence -- or the next paragraph. I have no problem  
9 with the first sentence. I would move to strike everything  
10 following the first sentence, starting "I took an  
11 interested note that there was no emergency drill for 1994.  
12 I am also amazed." I don't think being amazed or not being  
13 amazed has anything to do with evidence of anything other  
14 than his subjective state of mind. And going on, "that  
15 given the high enriched uranium, cobalt, the facility is  
16 charged with, that neither the drills were known to the  
17 campus and no evidence was detected by anyone with whom I  
18 have spoken." Again, I think this just has no probative  
19 value of anything, it's just irrelevant. What is the  
20 difference whether a drill is known to the campus  
21 generally, if you have one or if you don't have one. I  
22 think it has no probative at all.

23 I agree with my -- I think in administrative  
24 proceedings, I think the fact that it's hearsay wouldn't  
25 keep it out, but it does seem to me that it's irrelevant

1 and not only irrelevant, of no probative value whatsoever.

2 CHAIRMAN BECHHOEFER: The Board will strike  
3 everything in that paragraph after "1994." Starting with  
4 "I am also amazed" throughout the rest of the paragraph.

5 MR. EVANS: The next paragraph, we would again  
6 move to strike it in its entirety. It's a short one, "I  
7 was looking to find from Ms. Burris some information  
8 regarding the strange incident which Officer Kemp described  
9 to me. Though she provided no details of an alarm serious  
10 enough to warrant men in radiation suits greeting the  
11 responding officers." I have no idea what possible  
12 probative value this could have on anything what particular  
13 costume or uniform people are wearing when they appear  
14 somewhere or other. There is absolutely nothing in here to  
15 suggest any -- what does it have to do with?

16 MR. TURK: I don't oppose that statement, Your  
17 Honor, in light of the fact that the other information at  
18 the top of the page has come in concerning the incident at  
19 the facility and Ms. Burris' comments. This really is just  
20 a continuation of that same thought. It perhaps provides  
21 additional context for the prior statement which has been  
22 admitted. So I would not oppose its admission.

23 CHAIRMAN BECHHOEFER: The Board will not strike  
24 that.

25 MR. EVANS: Could I request -- or could I -- I

1 would move to strike the word strange because that's again  
2 the subject of opinion and whether an incident is strange  
3 or not is in the eyes of the beholder.

4 CHAIRMAN BECHHOEFER: Is there any reason for  
5 the word strange being in there in the context of recording  
6 factual material?

7 MR. EVANS: Your Honor, the word strange is a  
8 conclusion. If the Court thought it was strange --

9 CHAIRMAN BECHHOEFER: We're just asking --

10 MS. CARROLL: I think you could take it into  
11 the realm of personal opinion and give it weight as such.

12 CHAIRMAN BECHHOEFER: Yeah, the Board will  
13 strike the word strange.

14 MR. EVANS: That you, Your Honor.

15 MS. CARROLL: You have struck the word strange?

16 CHAIRMAN BECHHOEFER: The word strange.

17 MS. CARROLL: While you can't put words in the  
18 mouth of the witness, you can take words from the mouth of  
19 the witness.

20 CHAIRMAN BECHHOEFER: Well, lack of the  
21 expertise to know whether it's strange or --

22 MS. CARROLL: Good point.

23 CHAIRMAN BECHHOEFER: -- unusual or --

24 MR. EVANS: In the next paragraph there is  
25 again the conclusory charge. The minutes are very brief --

1 I have -- I won't strike that -- and often misleading. We  
2 have no -- there's no foundation, there's no specification  
3 as to what's misleading. There is evidence in the record  
4 and they to be brief and I have no objection to the phrase  
5 the minutes are very brief. I do object to often  
6 misleading when there's no foundation, no facts to support  
7 that conclusion.

8 MR. TURK: Let me see if we can do a more  
9 general objection first however before getting into  
10 particulars. I would object to the entire paragraph. What  
11 this paragraph consists of is number one, a statement  
12 concerning the minutes of the NSC. We've already provided  
13 those minutes to GANE so that we would not need to get into  
14 testimony by Mr. Galloway or Ms. King or Mr. Johnson or  
15 anyone else like Glenn Carroll as to what they read in the  
16 NSC minutes. We've circumvented that by agreement of the  
17 parties. There is further no reason to accept Mr.  
18 Galloway's testimony concerning the adequacy of the  
19 minutes. He's not shown to have any expertise in  
20 describing how committee minutes should be prepared or what  
21 standard should be held up to them. It's just personal  
22 opinion by an untrained, although interested observer.

23 MR. EVANS: I would -- oh, excuse me.

24 MR. TURK: The remaining parts -- the remaining  
25 parts of the paragraph get into the same problem that we

1 had when Ms. Carroll proposed to introduce her own  
2 testimonies on events that happened in which it was  
3 established that she was not a person with firsthand  
4 knowledge, nor was she a person with expertise to comment  
5 upon matters that she read about. Those same limitations  
6 exist with Mr. Galloway's presentation of these issues.  
7 So, I think the entire paragraph really is improper and  
8 unnecessary.

9 MR. EVANS: And if I could, I haven't reached  
10 the rest of the paragraph, but I will, so long as we're  
11 talking about the entire paragraph.

12 When it's stated as evidence, it furthered my  
13 doubt of the ability of the Neely management to safely  
14 operate; this is a personal doubt. A doubt is not evidence  
15 of anything. He is not an expert. He has no background in  
16 radiation safety. This is a personal doubt of a person  
17 without any expert -- he cannot give an expert opinion, and  
18 he doesn't even give an opinion. He gives a doubt. I  
19 would think that this again is kind of scary conjecture  
20 which ought not to be permitted in as evidence. It's not  
21 evidence, particularly where he says at the bottom, and are  
22 not the focus of my testimony, the contents of the minutes.  
23 He says that's not even the focus of his testimony.

24 MS. CARROLL: Your Honor.

25 CHAIRMAN BECHHOEFER: Yes.

1 MS. CARROLL: The witness would like for you to  
2 hear -- and please speak for yourself if I don't say this  
3 correctly -- that it was the experience of reading the  
4 minutes that made him understand these conversations that  
5 he was having with the security office were interesting and  
6 should be passed on.

7 THE WITNESS: It is not the contents of the  
8 minutes that I'm even pointing to here. I think Glenn  
9 interpreted that --

10 CHAIRMAN BECHHOEFER: The Board would propose  
11 to strike everything except the initial sentence in that  
12 paragraph and then it would go rather directly to the next  
13 paragraph.

14 MR. EVANS: Reaching the next paragraph. I  
15 frankly object to the next paragraph in its entirety on  
16 multiple grounds. First of all, it is hearsay. Now, I  
17 understand that you can accept hearsay, but to have -- to  
18 accept hearsay, it ought to be of some probative value.  
19 This is basically saying the police chief didn't talk very  
20 much to him. I don't know of any obligation that the  
21 police chief do talk to him. There is nothing in there  
22 which has -- sheds any light on management one way or the  
23 other, which is the issue before the Court. And it ends up  
24 saying that the plaintiff distrusts -- he distrusts  
25 apparently Dr. Karam and Dr. Ice and others, all of whom I

1 distrust after reading the NSC minutes.

2           Again, this is frankly rather wild conjecture  
3 about distrusting people. We don't have any specificity as  
4 to what minutes he's talking about or what is in there  
5 that's misleading or why he would mistrust them. It's just  
6 an impression -- a mental impression of his own attitude,  
7 which while it might be interesting, it is not evidence.  
8 It is not fact.

9           MS. CARROLL: I'll let Mr. Turk speak first, if  
10 he has anything to say.

11           MR. TURK: I hope you won't make a decision  
12 without hearing from anyone else that wants to speak. I  
13 would just say that it's not hearsay. It was his  
14 conversation and he's reporting it as a participant in the  
15 conversation. There may well be phrases and items that you  
16 would strike for reasons I can appreciate, but this is  
17 conversation.

18           MR. TURK: Actually in terms of hearsay, it is  
19 hearsay under the definition of hearsay. Hearsay is  
20 defined under Rule 801 of the Federal Rules of Evidence as  
21 "a statement other than one made by the declarant while  
22 testifying at the trial or hearing offered into evidence to  
23 prove the truth of the matter asserted".

24           CHAIRMAN BECHHOEFER: The Board believes that -  
25 - turn to page 3, I guess. The Board will strike material

1 starting with the word Vickery on the first line. Keep  
2 through that word and strike the rest of the paragraph.

3 MR. EVANS: We're talking on the final page,  
4 Vickery when questioned about the safety?

5 CHAIRMAN BECHHOEFER: From there on until the  
6 end of that paragraph will be stricken.

7 MR. TURK: Your Honor, please understand that  
8 I'm not objecting on grounds of hearsay. I was simply  
9 pointing out to Ms. Carroll the definition of hearsay would  
10 include the statement made by an out-of-court declarant.

11 MS. CARROLL: Your Honor, why are you striking  
12 that?

13 MR. TURK: He's reconsidering.

14 MR. EVANS: Well, our objection was that it was  
15 both hearsay and of no probative value. That was our  
16 objection.

17 MS. CARROLL: We would point out that Sgt.  
18 Vickery sits on the Nuclear Safeguards Committee

19 MR. TURK: Your Honor, may I speak?

20 CHAIRMAN BECHHOEFER: Yes.

21 MR. TURK: I'm sorry to throw you off on my  
22 last statement. As I understand the rules of evidence, Mr.  
23 Vickery, because he is not in court making the  
24 declaration -- rather it's a statement by the declarant out  
25 of court and is being submitted for the truth of the

1 statement, it is hearsay. That doesn't make it  
2 inadmissible, the fact -- I believe there are some cases  
3 that hold that the exclusion of hearsay from an  
4 administrative proceeding solely on grounds that it's  
5 hearsay would be in error. The question that I've raised  
6 in the past concerning hearsay is reliability. Here Mr.  
7 Vickery is cited by name, the statement is precise and I  
8 think that is something which has the earmarks of  
9 reliability. We can always question Mr. Vickery if  
10 necessary or he can appear as a rebuttal witness to address  
11 the statement which is attributed to him. My own objection  
12 would really have to do with the tag at the very end of  
13 that paragraph in which Mr. Galloway provides his opinion  
14 as to distrust of what he's being asked to do.

15 MR. EVANS: Of course, our objection is not  
16 limited to hearsay. It's also relevance, no probative  
17 value.

18 CHAIRMAN BECHHOEFER: Okay, the Board will  
19 change it's conclusion and strike everything in the  
20 paragraph after the word -- after he would not comment on  
21 the management structure at Neely. The rest will be expert  
22 interpretation. So, we'll leave the paragraph through that  
23 -- through the word Neely in line 4.

24 MR. EVANS: Am I correct that what is deleted  
25 starts with the words he would not comment?

1 CHAIRMAN BECHHOEFER: No. It starts with  
2 though.

3 MR. EVANS: Oh, okay.

4 CHAIRMAN BECHHOEFER: We would strike the last  
5 three and a half lines of that paragraph.

6 MR. EVANS: Okay, I have that, Your Honor.

7 Finally, we come to the final paragraph, most  
8 recently the Environmental Forum requested a tour of the  
9 reactor facilities. We move to strike that on the ground  
10 that it is irrelevant, having absolutely nothing to do with  
11 the management issue or any other issue that I know of in  
12 this case having to do with tours.

13 CHAIRMAN BECHHOEFER: Ms. Carroll, do you have  
14 any comments on that particular paragraph?

15 MS. CARROLL: I probably do. You know, John is  
16 a member of the Environmental Forum and he has a perception  
17 about the inability of the student group to somehow or  
18 another actually succeed in touring the facility.

19 ADMINISTRATIVE JUDGE LAM: What does that have  
20 to do with the management deficiency at the reactor?

21 MS. CARROLL: Oh, you know, it's a campus  
22 facility. Part of its mission is education and you've got  
23 the students -- some of the students have not succeeded in  
24 fulfilling their interest in the facility via a tour which  
25 is regularly given. I've had a couple.

1 CHAIRMAN BECHHOEFER: I don't think that  
2 statement about tours is really relevant to management. In  
3 fact, I'm not sure that Dr. Karam would be expected to even  
4 conduct tours at the facility.

5 MS. CARROLL: Actually, I'd like to point out  
6 that there is a graduate student -- as I understand it,  
7 he's joined the Environmental Forum. It was something they  
8 cooked up at one of their meetings. And apparently Dr.  
9 Karam got interested in leading the tour but then was  
10 unable because of his schedule to follow through.

11 CHAIRMAN BECHHOEFER: I don't know that that  
12 reflects adversely or even has any bearing on management.  
13 So we will strike that paragraph. And, of course, the last  
14 paragraph is just --

15 MR. EVANS: I didn't object to the last  
16 paragraph.

17 (Laughter.)

18 CHAIRMAN BECHHOEFER: Well, it's not necessary  
19 for testimony.

20 ADMINISTRATIVE JUDGE KLINE: At this point, I  
21 would like to make a comment. We scientists hesitate to  
22 overrule the legal interpretations of members of the  
23 brotherhood --

24 (Laughter.)

25 ADMINISTRATIVE JUDGE KLINE: -- and therefore

1 do not do so now. Nevertheless, I would have granted  
2 Georgia Tech's motion to strike in their entirety as being  
3 lacking in probative value. There isn't the remotest  
4 chance that this will influence our decision on the  
5 contention before us. And lacking in reliability.

6 MS. CARROLL: I'm sorry I laughed about the  
7 brotherhood. I thought it might have been a reference to  
8 this running joke between the counsel here. I really don't  
9 know what that refers to.

10 MR. EVANS: She obviously hasn't read the book  
11 The Brethren.

12 MS. CARROLL: I'm obviously not a brother. I  
13 don't know if that's okay or not.

14 MR. EVANS: Off the record. It was a book  
15 about the United States Supreme Court called The Brethren.  
16 It was a very good book. That's off the record, I hope.

17 MS. CARROLL: No.

18 CHAIRMAN BECHHOEFER: The Board will admit the  
19 portions of the testimony that we have not struck thus far.

20 MR. TURK: Is there any point in objecting to  
21 the entirety at this point, Your Honor, based on Judge  
22 Kline's observation?

23 (Laughter.)

24 CHAIRMAN BECHHOEFER: I would not --

25 MR. TURK: I have a feeling --

1 CHAIRMAN BECHHOEFER: I personally would not  
2 strike the whole testimony.

3 MR. TURK: I do note that it doesn't really  
4 have any apparent value to me in terms of what it shows for  
5 the adequacy of management. On the other hand, it's a  
6 small piece of testimony and I don't oppose it for that  
7 reason.

8 CHAIRMAN BECHHOEFER: Well, as I said, the  
9 portions of the testimony that have not been struck will be  
10 admitted.

11 MS. CARROLL: Would it be appropriate at this  
12 time to move to enter the testimony as if --

13 CHAIRMAN BECHHOEFER: No, it wouldn't because  
14 it's already entered.

15 MS. CARROLL: Okay, once it goes through the  
16 objection filters, then it becomes entered, what's left?

17 CHAIRMAN BECHHOEFER: It's in. I just ruled.

18 MS. CARROLL: Now we have a supporting exhibit  
19 which is -- Mr. Galloway was given a copy of the police  
20 report. This was for the cobalt 60 water pool dropping.  
21 However, we don't have our eight copies at this moment and  
22 I don't know if possibly we could get -- since it's one  
23 piece of paper, if we could get copies or if you might want  
24 to look at it and we'll pass it around and get you copies  
25 later.

1 MR. EVANS: If I could look at it, I could at  
2 least in the meantime argue my likely objection.

3 MS. CARROLL: Well, it's a Georgia Tech  
4 document.

5 MR. EVANS: Okay. Well, we could maybe save a  
6 little bit of time. It's not a question of authenticity.  
7 I don't question the authenticity. It's a Georgia Tech  
8 Police Department --

9 MS. CARROLL: Actually, it looks like an  
10 original.

11 MR. EVANS: But the whole thing is, again, it's  
12 about a water drop at the cobalt pool. I really think,  
13 based on the rulings that we've had from the tribunal up to  
14 date, that that is not within the jurisdiction and it is  
15 not relevant to anything in this case. It's about a  
16 flashing light indicating that the water level in the  
17 cobalt pool was down. So what? That's vernacular. But, I  
18 really don't see where it has any relevance or is within  
19 the scope of the hearing.

20 MR. TURK: I would inquire, is this the same  
21 incident report that's referred to on page 2 of Mr.  
22 Galloway's testimony at the top of the page and you refer  
23 to a deposition exhibit?

24 THE WITNESS: Yes.

25 MS. CARROLL: And I would argue that the cobalt

1 60 is worth whatever it is worth establishing managerial  
2 style on the part of the licensee and that the security  
3 office has a role in management of the facility and it is  
4 relevant for those reasons.

5 MR. EVANS: Well, if I may read it? I mean,  
6 what does it say? It says "Officer Pestel", I gather, "and  
7 myself responded to an alarm at the reactor. Upon our  
8 arrival, we noticed a flashing red light at the front door.  
9 We notified dispatch and asked him to make contact with  
10 someone in charge of the building. Mr. Karam was advised  
11 of the situation and he came to check the problem. Upon  
12 his arrival at 03:11" -- that's a.m. -- "he discovered the  
13 alarm was activated due to a drop in the water level."  
14 This is the cadmium pool. I mean, what does this show? It  
15 seems to me it shows that Dr. Karam came and checked it  
16 out. He was doing what I assume he was supposed to. I  
17 don't understand what relevance this has to showing  
18 anything incorrect about management. I guess, I could  
19 offer it to show that he did indeed respond. I just don't  
20 see the relevance, particularly from their case. So, I  
21 would object to it on that ground.

22 MS. CARROLL: And you can have a copy, Mr.  
23 Turk.

24 MR. TURK: Thanks.

25 The only other part that might be worth noting

1 in terms of timing is, the report indicates that the  
2 alarm -- if I'm reading this correctly, it would indicate  
3 that the alarm occurred at 2:26 a.m.; Dr. Karam responded  
4 at 3:11 a.m., which is 45 minutes later and the report was  
5 written -- or was sent in at 3:39, 28 minutes following Dr.  
6 Karam's arrival at the facility. I don't know that that  
7 shows anything.

8 MR. EVANS: It shows he came.

9 MR. TURK: Unless it is the report referencing  
10 the testimony.

11 CHAIRMAN BECHHOEFER: Well, the Board doesn't  
12 see how this particular document would reflect at least  
13 adversely on management. It does show that Dr. Karam  
14 showed up at an early hour of the day and tended to  
15 whatever he had to do. I'm wondering why you wish that  
16 report to -- I believe we've left in the circumstance that  
17 you were told about the incident.

18 MS. CARROLL: It's documentary evidence that's  
19 referred to in here. It just seems useful to append to  
20 this.

21 CHAIRMAN BECHHOEFER: I don't think the Board  
22 would need the documentary evidence of that particular  
23 point. We're not doubting that some action was taken when  
24 the water level dropped. That would be management -- that  
25 would have something to do with management but maybe not

1 even of the reactor as distinguished from the pool.

2 ADMINISTRATIVE JUDGE LAM: I find it reassuring  
3 that he showed up at 3:00 in the morning.

4 CHAIRMAN BECHHOEFER: Yeah, I would say it's  
5 not particularly relevant except unless -- Georgia Tech  
6 might want to put that in, but I don't think so. I don't  
7 think you would. I don't see what it would add to the  
8 record.

9 MR. EVANS: Well, our view was it had to do  
10 with the cobalt pool and --

11 CHAIRMAN BECHHOEFER: That's true. I mean, in  
12 substance it does. So the Board will not accept that  
13 particular document.

14 Let me ask this. It's getting time that we  
15 have to get out of here. What are the parties' plans for  
16 cross examining Mr. Galloway?

17 MS. CARROLL: Well, just to be really funky  
18 this afternoon, Mr. Galloway did remember another  
19 adventure, if you will, being a student, having his way  
20 with the campus, it is not at the Neely facility but it was  
21 involving a radiation source. I don't --

22 CHAIRMAN BECHHOEFER: I don't know if it would  
23 be relevant though to our proceeding at least.

24 MS. CARROLL: It's about the Cherry Emerson  
25 Building.

1 MR. TURK: Can we ask when this incident  
2 occurred?

3 MS. CARROLL: Why don't you just tell it and  
4 let him object then.

5 MR. TURK: Well, no, I asking in a way of  
6 background because if it occurred sometime ago, I would  
7 object to any reference to it coming in now.

8 MS. CARROLL: It was around the time of the  
9 cesium source removal.

10 MR. TURK: Which is when, several months ago at  
11 least?

12 MS. CARROLL: It was last fall during football  
13 season. I think it was right before --

14 MR. TURK: I think the time is long past to  
15 identify old events. If there's something new, I might  
16 argue differently. If we're talking about seven, eight or  
17 nine months ago, it could have been identified to us sooner  
18 and it was not. It would be unfair to raise it at this  
19 late date, especially after the testimony has already been  
20 submitted in writing.

21 MR. EVANS: We would join in that objection,  
22 Your Honor.

23 CHAIRMAN BECHHOEFER: I think on the basis of  
24 relevance, although not timeliness, the Board will reject  
25 that proffer of testimony. I don't think that matters at

1 the Cherry Emerson Building would have any direct  
2 relationship on the management of the reactor.

3 Would that complete your direct testimony?

4 MS. CARROLL: Yes.

5 CHAIRMAN BECHHOEFER: Do the parties wish to  
6 cross examine on this testimony? We're wondering if it's  
7 necessary for Mr. Galloway to come back? We have to  
8 shutdown for the evening.

9 MS. CARROLL: What time is it?

10 MR. JOHNSON: Six o'clock.

11 CHAIRMAN BECHHOEFER: Three minutes until six.

12 MR. TURK: At this point, Your Honor, I would  
13 intend to do a limited amount of cross examination. No  
14 more than half an hour perhaps, or five minutes. Perhaps  
15 overnight, I can look at it more carefully and decide if  
16 it's even necessary and advise first thing in the morning  
17 whether we need Mr. Galloway to come back. And if he had  
18 to come back, I would ask him to do the same thing as  
19 today, come in towards the end of the day and we'll conduct  
20 limited cross examination at that point.

21 CHAIRMAN BECHHOEFER: Can you come in toward  
22 the end of tomorrow, if necessary?

23 THE WITNESS: The end of tomorrow. What time?

24 MS. CARROLL: Fourish, I think.

25 CHAIRMAN BECHHOEFER: Four or after.

1 MS. CARROLL: Four to 4:30. I would think 5:00  
2 would be pushing it.

3 CHAIRMAN BECHHOEFER: Five would be pushing it  
4 a little bit.

5 THE WITNESS: I have an engagement at five  
6 o'clock that cannot be missed.

7 MS. CARROLL: Are you guys leaving early on  
8 Friday?

9 CHAIRMAN BECHHOEFER: We hope to.

10 MR. TURK: I think if Mr. Galloway comes at  
11 4:00, we can finish by 4:30 and let him get out of here in  
12 time.

13 MR. EVANS: I have basically on cross one  
14 question. I don't know if we want to do it now?

15 CHAIRMAN BECHHOEFER: If you want to ask your  
16 one question.

17 MR. EVANS: Yes, sir.

18 CHAIRMAN BECHHOEFER: We can't stay here  
19 another half hour.

20 MR. EVANS: No, sir, that one question.

21 CHAIRMAN BECHHOEFER: They're not going to kick  
22 us out for five minutes.

23 CROSS EXAMINATION

24 BY MR. EVANS:

25 Q Mr. Galloway, is it not true that as you see

1 it, you don't really care about whether management changes  
2 or management -- the organization changes, because whether  
3 or not it changes, is it not true that you simply are  
4 opposed to the operation of the center because it is  
5 located in Atlanta?

6 A It's more specifically within half a mile of my  
7 home, yes.

8 MR. EVANS: Thank you.

9 MS. CARROLL: Would it be more practical to --  
10 and John -- maybe we should go off the record.

11 CHAIRMAN BECHHOEFER: Off the record.

12 (Discussion off the record.)

13 CHAIRMAN BECHHOEFER: We're back on the record.

14 We will adjourn for the day. Tomorrow the  
15 witness will be Mr. Boyd and we will start at 9:00 a.m.  
16 tomorrow.

17 (Whereupon, the hearing was adjourned at 6:03  
18 p.m., to resume at 9:00 a.m., Thursday, May 30,  
19 1996.)

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21

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C E R T I F I C A T E

This is to certify that the attached proceedings before the  
U. S. Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Georgia Tech Research Reactor

Docket Number: 50-160-REN

Place of Proceeding: Atlanta, Georgia

Date: May 29, 1996

were held as herein appears, and that this is the original  
transcript thereof for the file of the United States  
Nuclear Regulatory Commission taken by me and, thereafter  
reduced to typewriting by me or under the direction of the  
court reporting company, and that the transcript is a true  
and accurate record of the foregoing proceedings.

*William L. Warren*

---

WILLIAM L. WARREN  
Official Reporter

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