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# Official Transcript of Proceedings

## NUCLEAR REGULATORY COMMISSION

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P R O C E E D I N G S

1  
2 CHAIRMAN BECHHOEFER: Good morning, ladies and  
3 gentlemen.

4 Are there any preliminary matters before we  
5 resume the cross examination of Dr. Karam?

6 MR. JOHNSON: I believe I did have a question.  
7 I wanted to clarify a ruling that you made yesterday. We  
8 were obviously pressed for time and trying to get through  
9 with the panels. In terms of the ruling that you had made  
10 about the SAR. You had said that the only parts of the SAR  
11 that would be relevant or admissible are the ones directly  
12 concerning management structure and control, like the  
13 section between page 156 and 170, I guess.

14 Did you mean that just in terms of panel B or  
15 was that ruling -- were you intending to make that a  
16 binding ruling just about this document in this proceeding,  
17 period?

18 CHAIRMAN BECHHOEFER: I believe that would  
19 apply more or less across the board, because you're bound  
20 by your contention. The contention is firmly rooted in  
21 that section. That section was distributed as a Georgia  
22 Tech exhibit, by the way.

23 ADMINISTRATIVE JUDGE KLINE: That is a  
24 management section of the SAR.

25 MR. JOHNSON: Yeah, I believe it's page 156 to

1 170, at least in the copy we have.

2 ADMINISTRATIVE JUDGE KLINE: I think what we  
3 said is that you really can't do a random search through  
4 the SAR hunting for an error here or there as part of the  
5 management contention. But if you want to use the  
6 management chapter in the SAR, for whatever purpose, you  
7 may.

8 CHAIRMAN BECHHOEFER: With respect to other  
9 sections, if there are other sections that bear on  
10 management, I'm not saying management made a typographical  
11 error in some detail -- that we would not accept, but if  
12 there happened to be other sections bearing on some aspect  
13 of management -- and I don't know that there is or isn't.  
14 My guess is that there probably wouldn't be, but I can't  
15 rule it out out of hand. You could use those, but you  
16 could at least request our permission to explore, if  
17 there's objections to a question. But we won't consider  
18 just typographical errors as management errors.

19 MR. JOHNSON: So then, just again -- and I  
20 won't try to belabor it too much -- even though this is a  
21 management document, so to speak, even though it was a  
22 document that in our view at least, was something that was  
23 produced by management of the facility, the document itself  
24 is not held to be relevant to management issues unless --  
25 except for those sections which specifically are?

1 CHAIRMAN BECHHOEFER: Yeah, that specific  
2 section. I think it was Georgia Tech Exhibit 22, but I  
3 don't have it in front of me right now.

4 ADMINISTRATIVE JUDGE LAM: Unless you  
5 demonstrate whatever portion within the FSAR relate to  
6 management deficiency.

7 MR. JOHNSON: Okay.

8 ADMINISTRATIVE JUDGE KLINE: I thought we  
9 mentioned yesterday that the fact that there is a  
10 management contention simply does not open up the entire  
11 operation of the reactor to your inquiry, just because it's  
12 under the direction of Dr. Karam. That's the reason we  
13 have a contention process. You have to be more specific  
14 than that. Otherwise a single management contention could  
15 always open up the entire reactor to inquiry, no matter  
16 where it was. And we just can't do that, we have to be  
17 more specific than that if we're going to make any progress  
18 here.

19 And we have a contention process that we've  
20 already been through that says look, if you think there's  
21 something wrong, tell us that thing. And if you have a  
22 basis for it, you'll get a contention and that's the thing  
23 that we'll talk about. And it doesn't really -- it's not  
24 going to be permissible to keep enlarging that on the  
25 grounds that there's a philosophical basis that management

1 controls everything. That's just not specific enough to  
2 conduct litigation on.

3 We understand that management may well sign off  
4 on every document that goes out the door, but that isn't  
5 going to be helpful here.

6 MR. JOHNSON: Because we were pressed for time  
7 yesterday, I didn't --

8 ADMINISTRATIVE JUDGE KLINE: It isn't a  
9 question that we are pressed for time that we rule that.  
10 We would rule that if we had all the time in the world.

11 MR. JOHNSON: No, no, I'm just saying that the  
12 reason that I'm asking about it again today is that I  
13 didn't get a chance to really absorb your ruling yesterday  
14 because we were trying to move on.

15 MS. CARROLL: It's Georgia Tech 29.

16 MR. TURK: Your Honor, I would simply reiterate  
17 something that Judge Kline said yesterday. Yesterday's  
18 questioning got into potential typographical or other types  
19 of errors in the SAR as well as the proper accident for  
20 consideration in the accident analysis. Those were two  
21 contentions that were rejected specifically by the Board  
22 when it ruled upon the admissibility of contentions. And I  
23 think that's what triggered the ensuing order, an attempt  
24 to get back at the issues which had been raised and  
25 rejected as contentions, by the Board's order of April 1985

1 (sic).

2 MR. JOHNSON: When we had -- we're on the  
3 record?

4 CHAIRMAN BECHHOEFER: Yes, we're on the record.

5 MR. JOHNSON: On Monday, we had started cross  
6 examining -- does Dr. Karam need to be resworn?

7 CHAIRMAN BECHHOEFER: No. Dr. Karam should  
8 probably go to the stand, but he doesn't have to be  
9 resworn, he's still under oath.

10 Whereupon,

11 RATIB A. KARAM

12 RESUMED his status as a witness herein, and was examined  
13 and testified further as follows:

14 MR. JOHNSON: When we had started cross  
15 examining Dr. Karam on Monday, we had attempted, as we have  
16 with some other witnesses, to try and follow a  
17 chronological sort of sequence, and we had left off -- we  
18 were talking about some things in the '87-'88 time frame  
19 still, and we are -- I believe that the last questions that  
20 I had asked had been about Dr. O'Bannon's report and that  
21 aspect of the whole situation.

22 CROSS EXAMINATION (Continued)

23 BY MR. JOHNSON:

24 Q On page 38 of your testimony, Dr. Karam, --  
25 this is towards the end of the O'Bannon report section --

1 Dr. O'Bannon apparently is saying that he surmised that  
2 these dirty tricks, as they've been called, were very  
3 likely by someone on the Radiation Safety staff, and that  
4 he suspected one particular member.

5 The questions I have on that -- well, first, --

6 A Where are you reading from?

7 Q I'm sorry, this is at the top of page 38 of  
8 your testimony, right above the removal of the health  
9 physics staff section beginning -- it's the very end of the  
10 little section about the O'Bannon report.

11 A All right.

12 Q He surmised they were very likely by someone on  
13 the Radiation Safety staff and that he suspected one  
14 particular member.

15 To your knowledge, Dr. Karam, what was he  
16 basing this statement that it was very likely by somebody  
17 on the Radiation Safety staff? We've heard -- well, I'll  
18 just let you answer that to the best of your ability.

19 MR. EVANS: I have no objection with the  
20 understanding that if the witness knows what was on the  
21 mind of Dr. O'Bannon.

22 MR. JOHNSON: Well, I mean, he was working with  
23 him while this report was going on.

24 MR. EVANS: If he knows, I have no problem.

25 A This has been sometime, I can't really

1 speculate what he had in mind.

2 BY MR. JOHNSON:

3 Q Understood. Well then the part where he said  
4 he suspected one particular member. Did he convey to you  
5 who that was or did he present it to you in this  
6 confidential fashion that we see here?

7 A Yes, he conveyed to me who that member was.

8 Q And who was that?

9 A That member was Steve Millspaugh.

10 Q Do you recall specific reasons why he felt that  
11 he was the most likely suspect?

12 A I don't really know other than based on his  
13 analysis of the reactions of the people involved, he  
14 suspected that Millspaugh was that person.

15 Q Do you feel that Millspaugh and Sharpe's  
16 unwillingness to take a polygraph test affected Mr.  
17 O'Bannon's judgment on this matter?

18 MR. EVANS: Again, if the witness has any means  
19 of knowing, but it is kind of speculative as to what  
20 influenced O'Bannon. I have no problem but I think that  
21 needs to be clear in the record, you're asking him what's  
22 on someone else's mind.

23 BY MR. JOHNSON:

24 Q To the extent of your knowledge. I mean, you  
25 were working with Dr. O'Bannon during this --

1 MR. EVANS: Excuse me, why don't -- if I could  
2 help -- why don't you say did Dr. O'Bannon say anything to  
3 you to indicate -- and then I'll have no objection at all,  
4 it's clear.

5 BY MR. JOHNSON:

6 Q Did Dr. O'Bannon say anything to you to  
7 indicate that perhaps one of the factors that contributed  
8 to this is that Millspaugh and Sharpe had refused to take a  
9 polygraph test?

10 A No.

11 Q The next section here is the removal of the  
12 health physics staff, also on page 38, moving along.  
13 Question number 65 is, "Was any personnel action taken  
14 involving the Radiation Safety staff?" It says, "They were  
15 removed in early February 1988."

16 Dr. Karam, isn't it true that these individuals  
17 were later reinstated at other positions in the university?

18 A That is correct.

19 Q Am I correct in my understanding that the  
20 original dismissal of these two individuals contravened  
21 Board of Regents' policy that Georgia Tech is governed by  
22 or that the Board of Regents felt that way?

23 A I'm not sure it did. My recollection of the  
24 facts of that issue is that the gentleman right there named  
25 Mr. Evans --

1 MR. EVANS: I could give a wonderful answer,  
2 but I don't think it's appropriate.

3 A -- he called in and he says there is such a  
4 thing as due process and you guys are reinstated in some  
5 other place, and Georgia Tech did.

6 BY MR. JOHNSON:

7 Q Yes. And I do feel like, for a point of  
8 clarification that I want to make, not necessarily that  
9 there was not sufficient reason for their dismissal under  
10 Board of Regents' policy, but I guess as you just said that  
11 due process was not followed in the eyes of certain  
12 individuals. Is that accurate?

13 A I really can't say at this point in time  
14 whether it was or it wasn't. If you want to ask Mr. Evans  
15 that question, ask him. We, meaning Dr. Stelson and  
16 myself, looked at all issues and we felt what we were doing  
17 was indeed the correct thing.

18 We would have given the two gentlemen ample  
19 time to get their belongings and simply go. One of the  
20 things that we discussed very, very carefully and at length  
21 is the potential security problems once they know they were  
22 on the way out, they indeed could have made these tricks a  
23 real problem for us. So we decided that we would write  
24 these letters, give it to them and say you have four or  
25 five hours or three hours to take your personal effects and

1 leave.

2 Q I see. And especially in light of your belief  
3 at the time that these two gentlemen were engaging in  
4 sabotage of some kind, as it was, that would have been one  
5 of the reasons why you were concerned that it may have  
6 escalated to an even higher level.

7 A Yes.

8 Q And you said that Vice President Stelson was  
9 involved in this decision with you. Was the President or  
10 the President's Office also involved?

11 A Yes, there were several meetings involved and  
12 which the meetings were held in the President's Office.

13 Q I see. On page 39, there's a reference to the  
14 cadmium spill -- here we have a little bit of a jump in the  
15 chronology, I suppose. It's still in the same general  
16 area. There is a general rundown of the cadmium spill --  
17 if you can excuse me.

18 One further question along the last line. Do  
19 the two gentlemen in question currently work for Georgia  
20 Tech?

21 A One of them I understand is indeed working for  
22 Georgia Tech, the other one I don't really know if he is  
23 still working for Georgia Tech or left.

24 Q For the benefit of the record, do you know  
25 which one --

1 A Steve Millspaugh still works for Georgia Tech.

2 Q Thank you. Now moving on to the next  
3 statement. We're talking -- this is the general story of  
4 the cadmium spill. This incident came about as a result of  
5 what we've heard referred to as a rabbit, which is a -- I'm  
6 having a hard time getting a physical picture, but some  
7 kind of capsule which is inserted into the hot cell in  
8 order to irradiate certain materials for the purposes of  
9 experiments and there was some kind of contamination  
10 involved.

11 Is it -- was there a proper calculation of how  
12 much radiation this particular sample should have been  
13 exposed to? In other words, was this incident caused by an  
14 error in applying the experiment or was the experiment  
15 itself conducted outside of the safe parameters?

16 A The experiment did not involve the rabbit, as  
17 you started your question. It did involve a few stones of  
18 topaz. The stones were encapsulated in a cadmium jacket to  
19 remove the thermal neutrons before they get to the topaz,  
20 and the cadmium jacket was inserted into an aluminum can  
21 with a bale on it and was inserted in one of the vertical  
22 ports -- up and down -- but the rabbit was not involved.

23 The experiment was unwise, from two  
24 perspectives. One is the amount of reactivity inserted in  
25 the cadmium to measure the swing of reactivity due to the

1 insertion of the cadmium. The activity of cadmium with  
2 regard to the amount of radioactive substances, any time  
3 you put any material in the reactor, some of it becomes  
4 radioactive because when a nucleus absorbs the neutrons,  
5 some of the resulting nuclides become radioactive. That  
6 was also analyzed and it has been done before, that exact  
7 geometry has been done before.

8           The total time required to put this topaz in  
9 was estimated to 14 megawatt hours, I believe. The  
10 experiment was started and I think once during the  
11 experiment it was lifted, inspected and returned. Okay?  
12 The second time it was lifted by the same guy to inspect,  
13 when he turns back -- he has to pour it out of the aluminum  
14 can -- that second time, it was found that the cadmium has  
15 indeed changed phase. Now instead of a solid sheet of  
16 metal, it is granular and some portions of the sheet of  
17 metal are still there, but that granular material, when he  
18 was pouring it out, it apparently also fell outside the  
19 container where he was pouring it out, on top of the  
20 reactor.

21           Q       I see.

22           A       So now, did we calculate the activity -- the  
23 reactivity of the sample correctly? The answer is yes.  
24 Did we anticipate the amount of radiation in it? The  
25 question is yes, although it may not have been documented

1 to the extent that the NRC wanted it documented. Did we  
2 know or did we anticipate the change in the cadmium? The  
3 answer is no.

4 In fact, one of the reasons for taking the  
5 whole capsule to inspect it is to see if there are any  
6 changes. And I don't recall the exact data, but something  
7 like past halfway the experiment it looked perfectly good  
8 condition.

9 Q I see.

10 A So somewhere between that midpoint and the end,  
11 the problem developed with the cadmium.

12 Now since then, we understand that cadmium,  
13 especially where if there is solder on it, forms a eutectic  
14 point that change in the cadmium itself does take place.  
15 And that eutectic point is as low as maybe 300 degrees C.  
16 And obviously that's what happened.

17 Q I see. And so this effect that you're  
18 describing -- eutectic, what does that word mean?

19 A Eutectic?

20 Q Yes. Can you spell that?

21 A When you take two metals, the melting point of  
22 each metal -- although in this case there was no indication  
23 there was any melting, it was a simple change from a solid  
24 sheet to granular material, just exactly what happened in  
25 between we don't really know. But going back to eutectic,

1 is when you take a metal, the melting point of that metal  
2 is 500, you take another metal, the melting point of that  
3 metal is say 700, when you put the two together, the  
4 melting point could go down as low as 300. That's what's  
5 meant be eutectic.

6 Q I see. So then the effect that caused the  
7 problem here was the way that the cadmium -- there's a  
8 synergistic effect of some kind involved with the cadmium  
9 and another metal that was present, and that was what led  
10 to this unexpected change of form. Had this kind of change  
11 of form been observed with perhaps other materials that  
12 you'd used at the facility before?

13 A No. I'm not aware of any. Of course it hasn't  
14 happened since or as far as I know, before.

15 Q Is this -- has there been any change of  
16 procedure or additional training to account for this  
17 unusual effect since this time?

18 A Yeah, several procedures were impacted, it's  
19 been totally revised from beginning to end to make sure  
20 that nothing is introduced in the reactor prior to total  
21 quantification of what you anticipate. And indeed, if some  
22 of us don't know, to seek out expertise in that area  
23 outside the facility to make sure that we understand what  
24 we're doing.

25 Q To your knowledge, had this kind of effect been

1 observed perhaps in other research reactors before this  
2 time? Would there have been, you know, information about  
3 this effect available to you perhaps in professional  
4 journals or in other papers?

5 A We, -- within the reactor community, there is  
6 an organization called TRTR, we have reported that through  
7 that medium. Did it happen anywhere else? I can't tell  
8 you, to tell you the truth.

9 Q On page 40, question 63 is inquiring about how  
10 localized or widespread contamination was from this  
11 incident, and the answer says that the masslinn indicated  
12 it was highly localized and one of the radiation safety  
13 technicians wrote a memorandum detailing locations of  
14 decontamination efforts, suggesting that the contamination  
15 had become airborne and was widespread. I was some months  
16 later to discover that this report indicating widespread  
17 contamination was either deliberately or inadvertently  
18 incorrect.

19 I'm wondering if perhaps since then you have  
20 discovered which one of these is true or which you believe  
21 to be true. Do you believe it was deliberately incorrect?  
22 Do you believe it was inadvertently incorrect?

23 A I didn't really have any evidence that would  
24 stand in court that these guys indeed deliberately did it.  
25 I had suspicions that there were elements of that in what

1 we were going through at that point in time, yes.

2 Q I understand your reservation, wanting to be  
3 precise, but I'll go ahead and ask the question  
4 differently. Do you believe that they did this  
5 deliberately?

6 A Seems that way, because there was another  
7 document which later was given to me and in this  
8 proceeding, Mr. Kuzo said he was never told about that  
9 document, and in fact the NRC Region II was extremely,  
10 extremely irritated that that document was not given to  
11 them during the fiasco, which really exploded in all our  
12 faces at that point in time. So did Mr. Boyd give it to  
13 him, did he tell him it existed but he never requested it?  
14 You heard Mr. Kuzo say he never did. Mr. Boyd says he did.

15 Q Has this document that you're speaking of been  
16 entered as an exhibit in this proceeding? Is it in the  
17 record?

18 A I believe so.

19 MR. EVANS: The masslinn report, let's see, is  
20 Tech Exhibit --

21 MR. JOHNSON: Is it attached to Mr. Karam's  
22 testimony?

23 MR. EVANS: Yes, it is attached -- GT-11,  
24 Georgia Tech 11. Either as an exhibit here or independent  
25 documents.

1 THE WITNESS: There was a cover letter for that  
2 Exhibit 11, which I transmitted to --

3 MR. EVANS: That's 12 I think -- oh, no, no, 12  
4 is --

5 THE WITNESS: No, 12 is something else.

6 MR. JOHNSON: And this is a document signed off  
7 on by Mr. Boyd.

8 THE WITNESS: I think our exhibit is  
9 incomplete. The data is in but not the cover letter, in  
10 the copy I have anyway.

11 MR. EVANS: Exhibit 11 is the report that was  
12 apparently withheld from the NRC by Mr. Boyd or --

13 MR. JOHNSON: Apparently.

14 MR. EVANS: -- apparently, that's the testimony  
15 from Mr. Kuzo. I have no reason to doubt him, that he was  
16 not made aware of it. He said he wasn't. Mr. Boyd, on the  
17 other hand, said he did.

18 THE WITNESS: But in addition to that report,  
19 there was a significant amount of analysis after the fact,  
20 looking for the possibility of widespread contamination  
21 from the cadmium incident. And that report we included in  
22 the incident report which we gave the NRC a copy. And in  
23 that report, we went to the filters, to ducts, to  
24 everywhere where dust could have gone in, looking for  
25 signature of the cadmium and we found absolutely none.

1 BY MR. JOHNSON:

2 Q And I believe what you're talking about right  
3 now is referred to in your testimony.

4 A That's right.

5 Q If I may take a moment to find it. This is on  
6 page 44 where you're saying I immediately initiated an  
7 investigation, in answer to question number 74.

8 When did this investigation take place that  
9 you're talking about, Dr. Karam?

10 A I can't give you exact dates but a few months  
11 later after the incident.

12 Q I see.

13 MR. EVANS: If I may, on the top of page 45, it  
14 indicates January '88.

15 MR. JOHNSON: And it says respecting the five  
16 months earlier spill, so that is indicating a five month  
17 time period there.

18 BY MR. JOHNSON:

19 Q And it says that you were able to do this, or I  
20 believe -- is it technically possible to ascertain, is the  
21 last statement on the previous page, which indicates this,  
22 since cadmium has a 453 day half-life.

23 A One isotope in the cadmium mixture does indeed  
24 produce 453 day half-life, yes.

25 Q Which isotope would that be?

1           A        I think it's 109.

2                   MR. EVANS:  Not 115.

3                   MR. JOHNSON:  I was getting ready to note that  
4 I believe it was Mr. Turk who earlier in the proceeding  
5 looking up the half-life of cadmium 115 and it was 56.5  
6 hours.

7                   THE WITNESS:  That is correct.

8 BY MR. JOHNSON:

9           Q        Is it possible that even if the cadmium 109  
10 would have been a valid tag at this point, so to speak, you  
11 know, the isotopes I suppose can travel in a group and the  
12 cadmium 109 may be a valid tag in some ways.  If there was  
13 cadmium 115 contamination five months earlier, that it  
14 would have long since decayed by this point, five months  
15 later.

16           A        That's partially correct.  I think another  
17 cadmium 115 which is metastable has longer half-life than  
18 the 15 and we've made analysis of that and that should have  
19 also stayed in place and again, we found none.

20           Q        I see.  What form is the cadmium 115 that would  
21 have resulted from this, is it the metastable, is that the  
22 word you're using?  Would it be that form or would it be  
23 another form?

24           A        Well, let me see if I can give you -- cadmium I  
25 believe has at least maybe five or six isotopes, all of

1 them stable.

2 Q I see.

3 A Let's start -- I don't have the facts in front  
4 of me but I'm giving you an example. Let's start with 108,  
5 111, 113, 114, 115, 116. 115 doesn't exist in nature  
6 because it's radioactive. 109 doesn't exist in nature  
7 because it's also radioactive. But 108 does. So when you  
8 put neutron on top of 108, it becomes 109, it becomes  
9 radioactive.

10 Q I just want to interject to clarify my layman's  
11 understanding. Would cadmium 108 then, in my  
12 understanding, would that be the isotope that you would see  
13 on a periodic table? That's something that I'm familiar  
14 with.

15 A Actually, if the periodic table has provisions  
16 for isotopes, yes, you would see it.

17 Q I see.

18 A If it doesn't, then it would be an average of  
19 all of these isotopes, even though they are stable, that  
20 you would see the molecular weight as an average of the  
21 atomic weight, the average of all the isotopes on that  
22 table.

23 Q I see. I think you were getting ready to  
24 elaborate more on the different isotopes, I didn't mean to  
25 cut you off, I just wanted to relate that to my

1 understanding of the periodic table.

2 A Mr. Johnson, that's the point, is that you have  
3 several stable isotopes in cadmium and when you pour them  
4 in a nuclear reactor, each of these isotopes would absorb a  
5 neutron and would go one notch up. It's still cadmium but  
6 it's one notch up. And in some cases, the one notch up is  
7 also stable isotope, in which case you won't see anything.  
8 In some of the cases, the one notch up is a radioactive  
9 substance which decays with a specific half-life and a  
10 specific radiation being emitted. And 109 is one of those,  
11 115 is one of those.

12 MR. JOHNSON: If we can go off the record for  
13 just a moment.

14 CHAIRMAN BECHHOEFER: Off the record.

15 (Brief pause.)

16 CHAIRMAN BECHHOEFER: Back on the record.

17 BY MR. JOHNSON:

18 Q When you were doing the survey and trying to  
19 identify if there is any cadmium contamination, to clarify,  
20 were you only testing or only looking for radioactive  
21 isotopes or was this a very broad spectrum search for any  
22 cadmium isotope?

23 A We were looking only for the radioactive  
24 substances because we have the technique to measure very,  
25 very low concentrations of this isotope anywhere.

1           Q       We were speaking about Cadmium 109 having the  
2 longer half life and the Cadmium 115 having a shorter,  
3 how -- Let me ask you this question. Is Cadmium 109  
4 something that Cadmium 115 would decay into over a period  
5 of time?

6           A       No.

7           Q       Is there any connection whereby the Cadmium 109  
8 could transform into Cadmium 115?

9           A       No.

10          Q       And the base state -- the rest isotope --  
11 Again, I'm not very good with these technical terms. Would  
12 both the Cadmium 115 and the Cadmium 115 eventually decay  
13 into Cadmium 108. Is that --

14          A       No.

15          Q       -- accurate? How would they come to rest, if  
16 that is a term that sheds some light?

17          A       I really need to consult the chart, but  
18 generally there is abated decay in which the cadmium when  
19 it decays, it becomes totally a different element, and when  
20 that happens there is a gamma that is admitted and what we  
21 measure is the gamma with a specific energy and a specific  
22 half life that gives us the assurance that what we are  
23 measuring is in the Cadmium 109 or 115 or whatever.

24          Q       And these are what I think are often referred  
25 to as daughters sometimes?

1 A Daughters, right.

2 Q Daughter products. Dr. Karam, if you are  
3 taking Cadmium 108 or a stable cadmium isotope and making  
4 it radioactive, is there a specific breakdown, predictable  
5 breakdown of which isotopes will be produced? Is there  
6 going to be 20 percent Cadmium 109 and 70 percent Cadmium  
7 112 and so forth? Is it that exact a science or is there  
8 more unpredictability involved?

9 A Well, that is an exact science. Each isotope  
10 has a specific cross section for absorbing a neutron, and  
11 if you know the neutron flux, you can estimate the amount  
12 of Cadmium 109 used in a sample that contains Cadmium 108.

13 Q Cadmium 109 just being one example.

14 A That's right.

15 Q You can also find others?

16 A That is correct.

17 Q If you will move on to page 42 -- Well,  
18 actually -- No page 41, I apologize.

19 A Actually was on page 45. I thought you were  
20 going --

21 Q Well, I had been going through chronologically,  
22 and since you mentioned the investigation and the survey I  
23 decided it would make sense and probably flow better and be  
24 good for the record to jump ahead a bit, but I want to move  
25 back a few pages now.

1           A       Okay.

2           Q       Page 41, right before the section starting 1988  
3 Shutdown, you are saying you did report the spill to Dr.  
4 Kahn, the chairman of the Nuclear Safeguards Committee. He  
5 similarly did not consider the spill to be sufficiently  
6 serious to make it an event which was reportable to the  
7 NRC, an assessment in which Bob Boyd also agreed. Mr. Boyd  
8 did testify though that even though this was not a  
9 reportable event in the specific confines of what we  
10 understand reportable to mean in this context, he testified  
11 that he would have told the NRC anyway just as a good faith  
12 effort in terms of trying to give them as much knowledge as  
13 possible. Do you feel this is appropriate and why was this  
14 not done?

15           A       Yeah. To the best of my recollection Mr. Boyd  
16 never told me that, but I had no problem, really, going to  
17 the NRC. The fact that the package was hot, we needed to  
18 really find out what happened. We were waiting until we  
19 could examine it in a hot cell or in a hood before we made  
20 the report to the NRC, and the reason for that was, in  
21 terms of accidents, it's really not a major accident. It  
22 is not, you know, something that you can forget about or  
23 want to forget about, but we really wanted to know what  
24 happened before we wrote the report and gave it to the NRC.  
25 It was my judgment, with which the NRC agreed, that it was

1 not a reportable accident, and that is the reason. It had  
2 absolutely nothing to do with the fact that some made  
3 comments or charged that we were trying to hide it from the  
4 NRC. That was not the reason.

5 Q So your position was you didn't want to give  
6 the NRC incomplete information?

7 A Yes.

8 Q You weren't adverse to the idea of reporting it  
9 to the NRC, but you felt it would be best if you knew more  
10 about what had actually happened before you did so?

11 A Right. Right.

12 Q At this point we'll go ahead and move to page  
13 42 where I have some other questions. The first sentence  
14 on the page is, "While some operator errors were noted,  
15 such as the improper opening of the topaz container  
16 resulting in the cadmium spill, the bulk of the  
17 deficiencies found by NRC in connection with the spill  
18 related to surveys and assessments which were the  
19 responsibility of the health physics staff." We have just  
20 talked about the cadmium incident in some detail. You had  
21 said that the effect, which led to the cadmium becoming  
22 granular was very unprecedented, and I guess the question  
23 is, what about the opening of the topaz container was  
24 improper? I haven't heard so far today that  
25 characterization. We heard about this unusual effect which

1 couldn't haven't been predicted, and I want to get you to  
2 elaborate on what you mean by improper opening of the  
3 container.

4 MR. EVANS: I might say that this is in the  
5 record. I went through the whole -- the report item by  
6 item and the first item it was stated, that was an operator  
7 error. I mean, that's in the record. I don't know why we  
8 are repeating it.

9 MR. JOHNSON: I wish to get elaboration of what  
10 about the opening of the topaz container was improper.  
11 This is something I'm not clear on and I just want to --

12 THE WITNESS: Sure, I've got you. There were  
13 actually a couple of items that were improper in what Mr.  
14 Downs did. One item that he allowed the total megawatt  
15 hours to exceed the experiment limit, which was 40 megawatt  
16 hours. That was improper. The other thing that was  
17 improper, although he had authorization given to him by  
18 Boyd to open it on top of the reactor, the improper portion  
19 of that is he was not careful enough when he was pouring it  
20 out so that it would be completely over the container  
21 before he poured it out. Some of it spilled on top of the  
22 reactor. That was improper. Any person with good  
23 laboratory practices and experience would have done a much  
24 better job than this gentleman did.

25 MR. JOHNSON: I see. If we can go off the

1 record for a moment.

2 CHAIRMAN BECHHOEFER: Okay. Off the record.

3 (Off the record)

4 CHAIRMAN BECHHOEFER: On the record.

5 BY MR. JOHNSON:

6 Q So you are saying that anyone with proper  
7 laboratory, you know, experience or skills would not have  
8 made this error. Mr. Downs was the senior reactor  
9 operator? Was he already the senior reactor operator at  
10 this time or was he a reactor operator? The chronology --

11 A I believe so, yes.

12 Q Don't you think those senior reactor operators  
13 should have these kind of proper laboratory skills?

14 A A senior reactor operator is a designation that  
15 the NRC gives to people who pass an exam, written exam, as  
16 well as visual observation of that person operating a  
17 facility, and a walk-through throughout the facility. I  
18 don't think the NRC examines -- or a part of their  
19 examination is whether or not a person has good laboratory  
20 practices. So that's not part of licensing.

21 Q I see. It's your understanding it is not part  
22 of the requirements?

23 A That's correct. Well, part of the license as  
24 well too. Was he trained in this? The answer is yes. Did  
25 he do everything expected of him in that particular

1 instance? The answer is no.

2 Q In the second part of the sentence saying the  
3 bulk of the deficiencies found by NRC in connection with  
4 the spill related to surveys and assessments which were the  
5 responsibility of the health physics staff. However, would  
6 you not agree that from a safety standpoint the most  
7 significant deficiency surrounding this incident lies with  
8 Mr. Downs.

9 A Say that again? I'm sorry?

10 Q Although the bulk of individual examples of  
11 wrongdoing may have fallen to surveys and assessments by  
12 the health physics staff, from a standpoint of reactor  
13 safety and public health and safety, don't you think the  
14 most significant deficiency, or deficiencies, would be on  
15 the part of Mr. Downs as the one who was sloppy in his  
16 procedures and spilled some of this radioactive material?

17 A Well, Mr. Johnson, I think you are entitled to  
18 draw any conclusions, it's your right. If you assume that  
19 in the complex operation of a nuclear reactor there is  
20 never going to be any mistakes made, then I think what you  
21 are saying is absolutely correct, but if you assume that  
22 during the course of day in and day out operation and since  
23 there are anywhere from maybe 12 to 30 people involved in  
24 the operation at a particular time, somebody may indeed  
25 make a mistake. Then we, as an organization, also have the

1 responsibility to arrest the mistake in place and make sure  
2 all the records are created and documented as it should be,  
3 and the NRC's criticism to us found quite a few items in  
4 the performance of the health physics group. That does not  
5 excuse what Bill Downs did.

6 Q Let me ask another question which maybe gets  
7 more to what I am -- to what I would like to ask. These  
8 surveys and assessments which may have been done  
9 inaccurately or in a haphazard manner by the HP staff would  
10 not have been necessary to perform if it were not for Mr.  
11 Downs' error.

12 A I think we covered that. I agree with you. If  
13 the incident didn't take place --

14 (Laughter)

15 Q That's all I'm saying. That's all I'm getting  
16 at. That's all I'm saying. And, although at this point,  
17 the reorganization was still in embryonic stage, I don't  
18 believe the management structure is exactly the same way it  
19 was now, I believe it was in one of these limbo charts that  
20 was only active for a brief period of time in terms of the  
21 flow charts, but at this point -- and you've testified that  
22 even before any reorganization, according to the technical  
23 specifications and so forth, it was your understanding that  
24 you had responsibility for both the operations staff and  
25 the health physics staff?

1           A       Uh-huh (affirmative). Well, I had the  
2 responsibility for the license.

3           Q       I see.

4           A       And through the text specs, I have overall  
5 responsibility, that's true, even though they were two  
6 separate entities and one did not report to me, I always  
7 felt that I had the responsibility for both of them.

8           Q       I see. On page 44 -- I'll move forward a few  
9 more pages -- answer to question number 73, did anything  
10 occur at the time of your conference with NRC to give you  
11 any additional perspective on how this seeming difference  
12 of view as to how widespread the contamination was came  
13 about? And you say, the survey showed that the  
14 contamination from the cadmium spill had not been  
15 widespread or airborne as a subsequent memo report of a  
16 disgruntled radiation safety technician indicated. The  
17 survey showed that the spill had in fact been confined to a  
18 very small area of the containment building. Had any of  
19 this radioactive material, to your knowledge, contaminated  
20 Mr. Downs' clothing?

21          A       There were a few counts on -- I don't know if  
22 you knew Mr. Downs, but Mr. Downs was a very big guy.

23          Q       He sounds a lot like my uncle.

24          A       When he wore his slacks, it always kind of fell  
25 down below his considerable bulge in the middle.

1 Q That's a lovely picture.

2 A And as a consequence, the bottom of his pants  
3 dragged on the floor. Okay? And when we made the surveys,  
4 and I was present at that survey of Mr. Downs, and found  
5 there was contamination on top of the reactor, we did check  
6 him thoroughly. There were a few counts on the bottom of  
7 his britches. Very, very few counts, but there were a few  
8 beyond background. Now, every morning when I normally  
9 arrive around 6:30 to 7:00 in the morning at the facility,  
10 I take a tour of all the facility. I simply go around to  
11 see if there are any things out of the ordinary, and that  
12 tour included walking around the base of the reactor  
13 itself, as well as walking up top, but not on top of the  
14 reactor where the contamination was. And on the way out we  
15 have what we call a foot and hand monitor. That means  
16 every time you come out you must survey, as a minimum, the  
17 bottom of your shoes and your hands, and that process  
18 should be that there is absolutely nothing on the bottom of  
19 my shoes or my hands.

20 Q I see.

21 A The other thing is, on top of the reactor  
22 itself, there is a step-off bed. If you were in the  
23 contaminated area you go to the step-off bed and surveyor's  
24 pad and survey yourself at that point before you leave,  
25 before you go anywhere else. Mr. Downs did that also.

1 Now, granted the background at that spot is a little bit  
2 higher than the one on the outside, but he did not detect  
3 anything on his pants also. When he goes out from the  
4 security zone, all the way out, he has another monitorin-  
5 station that he has to go through. He did not find  
6 anything on himself. That one, you do have to go on the  
7 bottom of your shoes, just like the other one. He was not  
8 able to detect the small amount that were on his britches.  
9 So it was extremely small.

10 Q Yes, sir.

11 A So, that's your answer.

12 Q Yes. And my question is, your testimony is  
13 that this contamination was a very small amount, but if it  
14 was a small amount of contamination on his pants and he  
15 left the facility, could there not have been a very small,  
16 perhaps, amount of contamination, if it left the facility  
17 that it rode the MARTA bus home with him and so forth and  
18 so on?

19 A Well, okay. That's the reason why we did make  
20 a survey of the whole building. We found nothing. We did  
21 send the Geiger counter with this gentleman to his  
22 apartment. He came back, there's absolutely nothing. So  
23 it connects -- it makes sense in the sense that the few  
24 counts on his britches -- and I might add, those britches  
25 is kind of worn out. They're loose threads. I guess if

1 you drag your pants on the floor, ultimately you get loose  
2 threads. Very, very few counts on those loose threads.

3 ADMINISTRATIVE JUDGE KLINE: Let me clarify  
4 something. There was testimony previously that Mr. Downs -  
5 - that there was some dispute over whether Mr. Downs had  
6 surveyed himself at home or carried a Geiger counter home  
7 or whether any of that really happened. Did I understand  
8 you to say just now that whether he did or not, there was  
9 an independent survey of his home by someone else who came  
10 later?

11 THE WITNESS: Yes, later.

12 ADMINISTRATIVE JUDGE KLINE: So someone else  
13 surveyed as well?

14 THE WITNESS: Right. Later.

15 ADMINISTRATIVE JUDGE KLINE: I didn't  
16 understand that previously.

17 BY MR. JOHNSON:

18 Q How much later if we can clarify? I think  
19 that's relevant.

20 A A few months later.

21 Q I see. I see. At which time all the shorter  
22 half life isotopes would have been long gone?

23 A That is correct. That is correct.

24 MR. JOHNSON: What time is it?

25 ADMINISTRATIVE JUDGE KLINE: Twenty-five till

1 eleven.

2 CHAIRMAN BECHHOEFER: When you get to good  
3 breaking point.

4 MR. JOHNSON: That's fine. Whatever is a good  
5 morning break.

6 THE WITNESS: Those of us who are diabetics  
7 sometimes have more need than others.

8 MS. CARROLL: Well, you would state your need?

9 THE WITNESS: I'm sorry?

10 MS. CARROLL: You would interrupt us so that  
11 you could eat your meal, wouldn't you?

12 CHAIRMAN BECHHOEFER: Anyway let's take a  
13 break.

14 (A short recess was taken.)

15 CHAIRMAN BECHHOEFER: Back on the record.

16 BY MR. JOHNSON:

17 Q There's a line of questioning on page 46  
18 relevant to some things you say on page 46 in your answer  
19 to question number 77. Would you describe any actions you  
20 took in response -- would you describe if any actions you  
21 took in response to the shutdown of irradiation experiments  
22 in January and of all reactor operations in February.

23 We took what might be described as a complete  
24 overhaul of our entire operation. The personnel action  
25 contemplated respecting the two radiation safety

1 technicians was expedited. They were replaced first on a  
2 temporary basis by qualified health physicists from Georgia  
3 Power Company.

4 Is it not part of your testimony elsewhere that  
5 you have, for the past 11 years or so, served as a  
6 consultant for Georgia Power?

7 A Yeah.

8 Q Is there any concern in your mind about a  
9 perceived or potential conflict of interest in terms of  
10 replacing someone, even if on a temporary basis, with  
11 employees from a company that you have these kinds of  
12 outside ties to?

13 A I don't understand the connection. I did not  
14 have any concerns, no. If you elaborate, I may be able to  
15 shed some light on it.

16 Q If your testimony is that you don't -- you were  
17 not concerned that someone might consider it improper that  
18 you replaced these people temporarily with employees of a  
19 company that you had ties with -- if that's your testimony,  
20 then that's clear and we can --

21 A We were looking for competent people to come in  
22 and take charge and Georgia Power Company had competent  
23 people.

24 Q If I can I guess just ask one follow up  
25 question, did you pursue or did you investigate whether

1 there might be qualified individuals available from  
2 companies or people that you had not had this kind of  
3 relationship with?

4 A We were faced at that point in time that we  
5 needed some personnel immediately and the only place where  
6 we could borrow, if you will, is either the NRC, which was  
7 probably improper, or Georgia Power. And since I had known  
8 people there who were in health physics, we tried to indeed  
9 provide the coverage and the personnel capabilities to  
10 allow us to operate in a normal fashion, and that's the  
11 route we took yes.

12 Q So time being of the essence and being that  
13 your facility is located in Georgia --

14 A Right.

15 Q -- near Georgia Power --

16 A Right.

17 Q -- this was a practical solution in your mind.

18 A Okay.

19 CHAIRMAN BECHHOEFER: Just as a follow on, did  
20 the permanent health physicists come from Georgia Power?

21 THE WITNESS: No, sir.

22 CHAIRMAN BECHHOEFER: They did not. That  
23 wasn't clear here.

24 THE WITNESS: No. In fact, further elaboration  
25 on Mr. Johnson's question, the people we borrowed were at

1 one point working for the NRC. The permanent replacement  
2 also was at one point working for the NRC and in fact was  
3 one of our inspectors, Dr. Betty Revsin. We didn't hire  
4 her directly from the NRC, we hired her from a small  
5 company in Tennessee after she left the NRC.

6 BY MR. JOHNSON:

7 Q That is interesting. At the bottom of page 46,  
8 you say that in his place, we employed the NRC inspector,  
9 Dr. Betty Revsin. And further on page 47, we believed,  
10 quite correctly as it turned out, that being intimately  
11 familiar with NRC procedures and requirements, Dr. Revsin  
12 would be in a position to provide the center with the  
13 health physics leadership needed to correct the situation.

14 Had Dr. Revsin, even though she was intimately  
15 familiar with NRC procedures and requirements, did she have  
16 experience in terms of fulfilling this particular kind of  
17 function at a research reactor or power reactor before?

18 A We didn't really go after Betty Revsin just  
19 because she was an NRC person.

20 Q I understand.

21 A Betty Revsin came in when she inspected us and  
22 she asked some pertinent questions to which I had no  
23 answers. For example, we have a technical specification  
24 requirement that if the argon 41 concentration in the  
25 containment building reaches 585 microcuries per second,

1 then the containment building must be isolated. And the  
2 license was given to us on that basis, that specific  
3 requirement. When NRC gives you that license, I mean it's  
4 already been investigated that the system we have in place  
5 to assure that the 585 is never exceeded, works.

6 Well, Betty Revsin wasn't satisfied that that  
7 assurance is adequate. She wanted it verified. In fact,  
8 she put me through about nine months of significant amount  
9 of work to prove to her satisfaction that the system we  
10 have indeed worked, so we had to design experiments, make  
11 measurements, go back and forth. On that basis, I came to  
12 respect Dr. Revsin's ability, scientific ability, as well  
13 as knowledge of regulations and what is needed to indeed  
14 meet regulations at all times. So she was one of the best,  
15 if not the best, health physicist we've ever had, to tell  
16 you the truth.

17 Q I see. I find some of those comments  
18 interesting. At this time, you know, the reorganization  
19 was already in full effect and you were Dr. Revsin's  
20 supervisor, but what you're testifying to is that even  
21 though you were her boss, she expressed to you certain  
22 requirements or things that needed to be proven to her for  
23 her satisfaction, and you complied willingly in the  
24 interest of the facility being safe, in the interest of  
25 answering her questions or concerns.

1           A       That's right.

2           Q       There may be something unclear here. At the  
3 time that Ms. Revsin was going through this process of  
4 proving that the systems were adequate and so forth, was  
5 this when she was an NRC inspector?

6           A       Yes.

7           Q       I see. At the time that she came to the center  
8 and began working more closely with you, what was your sort  
9 of interaction, like what was your work relationship like  
10 in terms of going from a situation where she had been an  
11 inspector with supervisory capacity over you in some  
12 respects, and then moving into a situation where you had  
13 supervisory responsibilities over her -- how did that  
14 relationship develop and do you feel that it was productive  
15 and constructive?

16                   MR. TURK: I would just have to note that an  
17 NRC inspector does have supervisory authority, they have  
18 regulatory authority.

19                   MR. JOHNSON: We'll stipulate that, or change  
20 our question.

21           A       Part of my management scheme is that people in  
22 that position are really partners with me. They have --  
23 even though I accept responsibilities, I share with them  
24 the feeling that we're partners, both of us responsible to  
25 specific requirements under the two licenses that we have,

1 one from NRC, one from the state. And Betty Revsin's  
2 performance was something like a breath of fresh air  
3 frankly. We had the kind of staff that if you ask  
4 something, it's always gee, I'm extremely busy, one week is  
5 just too short to do this sort of thing, to something  
6 that's kind of overnight we had about 300 procedures that  
7 we had to change and put them in a mode and form that  
8 anyone with high school education can read and follow.  
9 This was our goal.

10           Whereas before Betty Revsin, they've always got  
11 excuses why we couldn't, after we assigned these people to  
12 do specific procedures, and I might add that I took the  
13 lead in all of this but I just couldn't possibly do all the  
14 300 procedures and do everything else. I had to have some  
15 help. And when Betty Revsin came in, between her and  
16 myself, we did all of that in a very, very short time. So  
17 I really appreciated what Betty Revsin did for us.

18           She guided us on the format and the  
19 requirements of references to the procedures and we worked  
20 very well, we worked very well. So professionalism was  
21 back into the picture whereas before, personal feuds and  
22 always excuses were the norm rather than efficiency, hard  
23 work and dedication.

24           Q       The last sentence of this paragraph on page 47  
25 says that Dr. Revsin ably served the center for about four

1 years -- you definitely reinforced that with your testimony  
2 -- resigning for personal reasons in 1992.

3           Based on the testimony you've just given, can  
4 we conclude that it was not due to any dissatisfaction or  
5 unhappiness with the center or with management at the  
6 center, that those personal reasons did not include that?

7           A       I did not detect a dissatisfaction with the  
8 management of the center, if you're referring to the  
9 management of the center on my part. She and I --

10          Q       You or others.

11          A       She and I worked very, very well. She did have  
12 some personal problems in terms of headaches and those  
13 migraine headaches were extreme and on more than one  
14 occasion I had to go to her apartment to take her to a  
15 physician. They were experimenting with new drugs about  
16 headaches and she wasn't really getting any better. My  
17 interpretation, those headaches were the primary reason for  
18 her leaving.

19          Q       I'm sorry to hear that.

20          A       We still talk on the phone, by the way, quite  
21 often. I always remind her that she's always welcome back  
22 if she wants to come back.

23          Q       How would Dr. Ice feel about that?

24          A       Well, remember that when she left, she was  
25 Associate Director. We brought in Copcutt to occupy her

1 slot.

2 CHAIRMAN BECHHOEFER: So there would not likely  
3 be an icy reception?

4 THE WITNESS: I'm sorry?

5 (Laughter.)

6 MS. CARROLL: What did he say?

7 CHAIRMAN BECHHOEFER: I said there would not  
8 likely be an icy reception.

9 THE WITNESS: I never discussed it with Dr.  
10 Ice, but I might try to find out. She is happily married  
11 and I think her husband is a professor at the University of  
12 North Carolina at Chapel Hill.

13 BY MR. JOHNSON:

14 Q Down at the bottom of page 47, after you talk  
15 some about Mr. Ice, you say, in my opinion, the ability,  
16 competency and quality of both the current health physics  
17 leadership and its staff is light years beyond that of the  
18 replaced unit.

19 Being, if this is the case, why did you call  
20 Mr. Boyd recently -- oh, excuse me -- why do you feel or do  
21 you know why -- do you know why Les Petherick called Bob  
22 Boyd to consult him about moving of radioactive material  
23 recently?

24 A No, I don't.

25 Q Did Mr. Petherick consult you about this before

1 he decided to make that call?

2 A No, he did not.

3 Q On page 48, at the top of the page, there's one  
4 last paragraph for the previous section, saying that on the  
5 operations side, all personnel were thoroughly trained and  
6 retrained as to correct procedures with emphasis on strict  
7 adherence to detailed written procedures.

8 Would this include Mr. Downs?

9 A Yes.

10 Q Is it safe to assume, in light of an instance  
11 that happened after this, that for whatever reason, this  
12 training didn't take or was not received as well as it  
13 should have been?

14 A Mr. Johnson, training -- you could guarantee  
15 that the person understands what he's being trained in, you  
16 could test him about what he's trained in, but to try to  
17 force a change in personality, training doesn't seem to  
18 work. My testimony earlier with regard to Mr. Downs is  
19 that there were gaps in his judgment, in his ability to do  
20 things, and when you confronted him, he says he made a  
21 mistake and he won't repeat it. We've gone through the  
22 litany of that but when he was summoned by the NRC for  
23 enforcement conference, I detected that he was blaming his  
24 lack of consistent performance on training. So through  
25 this cycle of training, we left absolutely nothing to

1 imagination. We went step by step. You must not do  
2 procedures from memory, take the copy, put it in front of  
3 you and go line by line and check it. All right? And it  
4 seemed to work for some time, but until '94, the first  
5 evidence that I found that he has fallen back on his old  
6 habits.

7 So if you find ways that enhances training so  
8 that you can modify behavior, I'll be delighted to talk to  
9 you, but I don't know how to do that. In this particular  
10 case, it did not work.

11 Q Did you hire Mr. Downs?

12 A No, I did not.

13 Q He was already working at the facility when you  
14 became director?

15 A Yes.

16 Q For how long, roughly, just off the top of your  
17 head, had he been working there when you arrived?

18 A I understand that he came in, in 1976, so he  
19 was there almost eight years.

20 Q Again, in this same paragraph, you're saying  
21 all personnel were thoroughly trained and retrained as to  
22 correct procedures, we heard in panel B testimony  
23 yesterday, also a comment on their part that they had an  
24 understanding that there was thorough training done for all  
25 personnel who had handled radioactive materials at the

1 center and elsewhere on campus.

2 Did you have an integrated training program  
3 whereby you were training people both who were working  
4 within the NRC license and people who were working within  
5 the state license, or were there two different training  
6 programs?

7 A Two different training programs.

8 MR. TURK: It might help to get some  
9 identification of the time period you're speaking about.  
10 If you recall, the staff testimony was that the licensee  
11 had informed the staff of a retraining program that had  
12 been put into effect. They pinned it down in time.

13 MR. JOHNSON: I think we can get a good  
14 reference from the panel B testimony.

15 ADMINISTRATIVE JUDGE KLINE: Are you leaving  
16 the question of the cadmium spill now?

17 MR. JOHNSON: Most likely.

18 ADMINISTRATIVE JUDGE KLINE: Would you mind if  
19 we asked our questions relating to that now rather than  
20 tomorrow night?

21 MR. JOHNSON: No, no, certainly. Please do.

22 BOARD EXAMINATION

23 BY ADMINISTRATIVE JUDGE KLINE:

24 Q Dr. Karam, would you turn to page 44, question  
25 73? Your answer to question 73 refers to GT-11 and then

1 down below, GT-12. Having looked at those two, it appears  
2 that those two references might be reversed, in that GT-12  
3 does not appear to be authored by someone who was  
4 disgruntled, at least in the copy I have. And GT-11 does  
5 appear to exhibit a widespread radioactivity in the  
6 document -- in the diagram. So I'm just wondering if we  
7 can clarify that.

8 A I'm looking at GT-11 and GT-12.

9 Q For example, it says the report of a  
10 disgruntled radiation safety technician (GT-12). But when  
11 I read the text, it says in the second paragraph, the decon  
12 efforts were shown to be a good success and that it was  
13 reporting relatively low levels of radioactivity to you.  
14 It didn't seem that that was the report of someone who was  
15 disgruntled. I'm just wondering if these two got reversed.

16 MR. EVANS: No, they are two different reports  
17 by two different people.

18 ADMINISTRATIVE JUDGE KLINE: I understand that.  
19 That's why I'm wondering if just the references got  
20 reversed.

21 A GT-12 makes the tacit assumption there is  
22 widespread contamination.

23 BY ADMINISTRATIVE JUDGE KLINE:

24 Q Oh, I see. Okay.

25 A And was that on purpose or was that real. Data

1 that we measured afterward shows there was no widespread  
2 contamination, although at the time, we didn't -- I didn't  
3 question it because I did not know the existence of GT-11.

4 Q Oh, I see. But GT-11, didn't it also have  
5 diagrams showing at least locations of contamination?

6 A That's correct, yes.

7 Q That is, after the tabular material, there is a  
8 diagram showing -- at least with marks on it, I can't tell  
9 exactly what they are -- outside of the reactor top.

10 A Yeah. There's some on reactor top, and on the  
11 day in question, 19th, I believe 19th of August, in all  
12 stations except 7 -- and the copy I have, I can't read what  
13 was written in there, but something --

14 Q No, I can't either, I just see the marks that  
15 do appear to be widespread but I can't tell what it means.

16 A If you look at the numbers, where the numbers  
17 are, 1, 2, 3 on the first diagram.

18 Q Yes.

19 A Okay, where that number 1 is, that means they  
20 made a smear there.

21 Q Oh, I see.

22 A So if you go on the data, you would see a  
23 number 1, there was nothing, less than --

24 Q Oh, I see, okay, that's just what I'm trying to  
25 find out, what this means, what this diagram means.

1                   So in effect though, my original question, GT-  
2 11 and GT-12 have not been reversed?

3                   A       No, they're not.

4                   Q       Okay. Now in a freshly irradiated sample  
5 containing the normal mixture of isotopes of cadmium, which  
6 of the isotopes -- which of the radioactive isotopes are  
7 the largest -- is the largest contributor to health risk?

8                   A       15 and 15-M would be the highest risk. They're  
9 the most abundant.

10                  Q       When you -- do your present procedures permit  
11 someone to remove a capsule that's been exposed to neutrons  
12 and then open it in the open air?

13                  A       No.

14                  Q       What do present procedures require?

15                  A       Requires that any container that's been  
16 irradiated must be opened in the hood and with more than  
17 one person.

18                  Q       Did the excessive irradiation time of the spill  
19 of the container that failed, account for the failure of  
20 the cadmium, in your view?

21                  A       I don't believe so.

22                  Q       You don't believe so. Did the temperature get  
23 as hot as 300 degrees C. inside the reactor?

24                  A       Because cadmium has a large absorption cross-  
25 section, we suspect it did.

1 Q Oh, I see. Okay.

2 ADMINISTRATIVE JUDGE KLINE: Okay, that's all I  
3 have -- oh, one more.

4 BY ADMINISTRATIVE JUDGE KLINE:

5 Q Since you lost your cadmium shield, did the  
6 topaz crystal then become radioactive and did that --

7 A Very, very little. Slightly, but in time it  
8 decays off.

9 Q But it didn't contribute to the immediate risk?

10 A No, not at all. Remember, the cadmium removes  
11 the thermal neutrons where the cross-sections are very  
12 large.

13 Q Yes.

14 A And the cadmium was doing just that. So the  
15 exposure to the topaz is fast neutrons.

16 Q Oh, I see, okay. No, no, I understand in the  
17 normal case, what I'm saying -- the question is since the  
18 cadmium shield lost its integrity, was the topaz then  
19 exposed to thermal neutrons?

20 A Where the can, cadmium cover, if you will, or  
21 jacket, disintegrated, yes, that was the case. But  
22 remember --

23 Q The activity induced by that, did that  
24 contribute anything to risk?

25 A When we got it out, it was hot, yes.

1 Q But it didn't escape your notice, it's not --

2 A That is correct.

3 Q It's not an unreviewed item.

4 A That is correct.

5 MR. JOHNSON: No other questions?

6 ADMINISTRATIVE JUDGE KLINE: No others from me.

7 MR. JOHNSON: Okay.

8 BY MR. JOHNSON:

9 Q While the panel was asking their questions, we  
10 were able to find our reference so to speak in panel B.  
11 This is the statement, the licensee has since initiated a  
12 program to provide retraining for personnel who work with  
13 radioactive material at the research reactor and elsewhere  
14 on campus. And this is in the section of testimony  
15 regarding inspection report 90-02. And this was an  
16 inspection performed June 12 through 14, 1990. So I think  
17 that we're on pretty firm ground in assuming that when it  
18 says "has since initiated" that that means within the past  
19 six years or so.

20 So my question then, if I can try to pick up my  
21 train of thought here, is you were saying that there were  
22 separate training programs -- you know, this makes it seem,  
23 in our perception, as if it was one comprehensive program,  
24 singular, for both state licensed and federally licensed  
25 activities, and you're saying that there are actually two

1 distinct programs.

2 A There are two distinct programs.

3 Q Could you elaborate on that?

4 A The program for training and retraining reactor  
5 operators is something that we submit to the NRC, the NRC  
6 approves and once the NRC approved, then we are monitored  
7 for compliance with that program.

8 Under the state license, most of the users of  
9 radioactive material are professors. So they have had  
10 significant experience in handling radioactive material,  
11 some of them never did.

12 We have a program that every quarter, we bring  
13 in all personnel who would like to use radioactive  
14 materials and go through the requirements for using  
15 radioactive material on campus and explain good health  
16 physics practices to all of them.

17 If you were say a faculty member that wanted  
18 to, let's say, look at make up of certain protein in the  
19 treatment of let's say diabetes, we'll use that as an  
20 example. You may want then to tag that protein with  
21 something like perhaps carbon 14, in which case you need to  
22 go through this training program to be able to get the  
23 carbon 14 in the first place. So after you've gone through  
24 it and it's certified, then you apply what we call the  
25 application to the Safeguard Committee, it's a form that

1 sometimes may be 15-20 pages long. The form comes to us,  
2 Ron Ice and I evaluate it. If we have questions, we go  
3 back to the PI, the principal investigator, to explain or  
4 if we see deficiencies, we ask the principal investigator  
5 to revise the application and send it again. Once Ron Ice  
6 and I are satisfied, then we'll give it to the Safeguards  
7 Committee and then the Safeguards Committee evaluates it  
8 and if they find the person's not only knowledge but also  
9 the experimental program meets their approval, then  
10 approval is given for that person to order the carbon 14,  
11 which comes to us first for inspection and logging, and  
12 then is given to the PI, and from there on the PI can use  
13 it in the prescribed manner that he stated on the  
14 application to the Safeguards Committee.

15 Q I see. Okay, well that's helpful. So  
16 obviously, judging from what you've just said, you do --  
17 one of the things that we can construe from this testimony  
18 is that you do have significant management oversight of the  
19 state licensed activities as well as federally licensed  
20 activities.

21 A Me personally?

22 Q Yes.

23 A As the Director, that is part of the charge  
24 given to me under the previous President and has not been  
25 changed, yes.

1           Q       I see. In light of what you've just said and  
2 in light of your management authority and responsibility in  
3 the state license, do you agree with the statement on page  
4 2 of GANE Number 62 -- I can show this to you if you wish -  
5 - this statement, the licensee does not conduct retraining  
6 for principal investigators or for persons working under  
7 their supervision. You know, you've just testified to your  
8 perception of the training program for the state license  
9 that you have management authority over --

10          A       I have no problem answering, but he is  
11 referring to the state inspection where that statement was  
12 made.

13          Q       That's true. I'm trying not to refer to state  
14 licensed materials and things that are outside the  
15 jurisdiction, but I think that does affect management.

16          A       Depending on whether you folks want me to  
17 answer it, I have no problem.

18                 MR. JOHNSON: Again, I could easily go through  
19 this document and ask lots of questions about cobalt and so  
20 forth, I mean the management contention is valid and I feel  
21 that how Dr. Karam manages the state license is --

22                 ADMINISTRATIVE JUDGE KLINE: Counsel has not  
23 objected that I heard.

24                 MR. EVANS: Well I would object, if you're  
25 going into how he -- because again, you're opening up a

1 whole new door, since it apparently differs somewhat and  
2 that is not the issue in this case, I would object to you  
3 going into how he manages the state materials, since you  
4 have a different training program, things are apparently  
5 different, the requirements may be different. As far as I  
6 know that is not a part of this proceeding. So I would  
7 object to going into the management with respect to state  
8 licensed operations.

9 MR. JOHNSON: And I guess I would claim that  
10 the style or pattern of Dr. Karam's management in other  
11 ways may shed light on how he manages the NRC license and I  
12 feel that it is relevant. Obviously, it's for the Court to  
13 decide.

14 MR. EVANS: Well, I would just suggest that  
15 whatever he's doing -- we obviously have different  
16 programs, you have different standards, you have different  
17 requirements. We now hear that the training is different.  
18 It just seems to me that you could be doing something  
19 horrible in one area and that wouldn't necessarily mean  
20 you're doing anything horrible in the other area, either  
21 way. So I'm saying that whatever is going on in management  
22 of cobalt or the state licensed areas, I just think again  
23 we're doubling the time -- well, I don't know if we're  
24 doubling it, but we're opening up another door that this  
25 Court has ruled on very early in the proceeding, that we're

1 confining this to the state -- I mean to the NRC licensed  
2 reactor essentially.

3 ADMINISTRATIVE JUDGE KLINE: Is there a  
4 question pending?

5 MR. JOHNSON: I believe there was.

6 ADMINISTRATIVE JUDGE KLINE: No, I think the  
7 witness objected.

8 (Laughter)

9 MR. EVANS: Well, I will say for the record  
10 that I believe that Dr. Karam is perfectly capable of  
11 giving rational answers to the state license too, but that  
12 is adding probably hours to the hearing, and it is not  
13 relevant.

14 MR. JOHNSON: I would say that one of the  
15 things that is within the scope of this ad -- I do want to  
16 state that this is not something that I intend to pursue  
17 for hours, certainly, but when Mr. Copcutt was on the stand  
18 -- Dr. Copcutt was on the stand, just as a basis in terms  
19 of his credibility, he was asked questions about state  
20 license materials that he had responsibility for, as a  
21 MORS, part of the radiation safety staff -- as a matter of  
22 fact, over our objections of him being asked about it, and  
23 I feel for similar purposes of Dr. Karam's credibility or  
24 his overall management ability, I basically only have two  
25 or three basic questions.

1 ADMINISTRATIVE JUDGE KLINE: We don't want to  
2 go into a focused inquiry on Dr. Karam's performance under  
3 the state license. If you believe there is some  
4 interaction or some sort of synergistic effect, which would  
5 affect his performance under the federal license, I think,  
6 you know, we can go with that, but in terms of a focused  
7 inquiry on performance under the state license, I think  
8 that is out beyond our --

9 MR. JOHNSON: I do understand, and it has never  
10 been my intention to use this document to ask questions  
11 about cobalt or things like that. That is definitely not  
12 what I had in mind. Let me see if I can focus my questions  
13 more along the lines of what he just said.

14 THE WITNESS: Could I say something that could  
15 maybe be what you want, to try to shorten this?

16 CHAIRMAN BECHHOEFER: Yes, why don't you?

17 THE WITNESS: There is no requirement from this  
18 state for retraining. Okay? In response to the statement  
19 you've raised, we have already instituted a newsletter to  
20 all the PI's which come under the state to inform them of  
21 things that are current in the industry, some of the  
22 mistakes that have taken place elsewhere on the national  
23 scene. For example, it might be that someone ingested some  
24 radio isotopes. We made a point of telling all our PI's  
25 through a newsletter that this indeed has happened and be

1 absolutely careful that wherever you keep radio isotopes  
2 must be under lock turn switches -- in locked rooms, which  
3 is part of their license to use radioactive materials. So  
4 we have that and we are indeed talking to the state about  
5 how might we institute retraining for some of these people,  
6 but we have not committed to do any retraining. The reason  
7 is, there is no requirement for retraining under the state  
8 license.

9 MR. JOHNSON: I see.

10 BY MR. JOHNSON:

11 Q Would you then find it a fair characterization  
12 to say that this -- Again, the statement on page 18 on  
13 Panel B where they feel you initiated a program to provide  
14 retraining for personnel both in terms of the NRC license  
15 and the state license, that perhaps they are mistaken in  
16 perhaps the level of commitment that you had made to it or  
17 the requirement --

18 A Where are you reading from?

19 Q This is page 18 of Panel B testimony. I can  
20 bring it up and show it to you if you like.

21 A But it does -- It is putting me to testify for  
22 Panel B. If there is misunderstanding in the  
23 transcription, I don't know exactly what Panel B testified  
24 to. What I am telling you, the program we had is our  
25 training and the NRC license is very detailed and specified

1 by the requalification program, which we submitted to NRC  
2 and approved by NRC. That is there. There is training and  
3 retraining together. In the state license, I just told you  
4 what we do.

5 I would also want to add, training -- people  
6 who want to use Carbon 14 and how you operate the reactors,  
7 it just doesn't make sense. You can't integrate it into  
8 one training program.

9 CHAIRMAN BECHHOEFER: Let me ask you along that  
10 line. I take it you have different training programs for -  
11 - retraining programs for reactor operators and other  
12 personnel at the facility? I take it they are different  
13 programs?

14 THE WITNESS: Yes.

15 BY MR. JOHNSON:

16 Q Let me put this question to you in light of  
17 Judge Kline's comments to try and make somewhat of a  
18 connection or nexus, however you wish to... Being that  
19 this is a facility and a situation where the people who are  
20 working within the state license and the people who are  
21 working within the federal license are often -- you know,  
22 they are on the same campus, they are probably, in some  
23 cases if they are graduate students, perhaps in the same  
24 classes, having a good bit of familiarity with each other.  
25 Wouldn't the example set by the management of one license,

1 could that not have some influence on the people who are  
2 working under the other license? Or to restate it, if  
3 people working under one license observed, you know,  
4 management of one type or of one degree or training of one  
5 level or one degree, under the other license, might that  
6 not pose some confusion as to what their required behavior  
7 was?

8 A I think that is a misunderstanding of the kind  
9 of people and the class of people that we are dealing with.  
10 The reactor operators, other than Rod Ice, are people with  
11 a MS degree, bachelor's degree. They are operational in  
12 sense. They are not involved in a great deal of research.  
13 The PI's under the state license are all professors. They  
14 may have graduate students helping them and everyone of  
15 those graduate students come for training, including the PI  
16 himself, but once done, the inspections that we do on a  
17 regular basis, some of it weekly, some of it monthly, keep  
18 us in touch with these people as to what they are doing and  
19 how they are doing it, and those inspections, if we see any  
20 infraction, we bring it immediately to the attention of the  
21 PI and say, look you are doing something wrong, that door  
22 was kept open. We play a little bit like a police. A can  
23 of Coca-Cola may be found in a place it shouldn't be. In  
24 every room that contains radioactive material, there cannot  
25 be drinking, smoking or eating. When you find an empty can

1 of Coca-Cola, that may suggest that someone was drinking,  
2 or it could be he finished it outside, brought it in and  
3 put it in the trash can. We emphasize this on a continuous  
4 basis. Do we bring them back to class to retrain them?  
5 The answer is no. Do we continue the training as we go in  
6 terms of performance? The answer is yes. The bottom line  
7 in both of these is that the state does not really require  
8 retraining. Does that answer your question?

9 Q You have been helpful. You have answered some  
10 of my questions.

11 A I can also give you another example. We have a  
12 national academy scientist. He has been trained. He also  
13 had a spill of tritium in his laboratory. We brought him  
14 back for retraining, but we don't have a formal training --  
15 retraining program for everyone on a periodic basis, every  
16 six months or every year that they must come and  
17 participate in a retraining program. We do not have that,  
18 and the state does not require it.

19 CHAIRMAN BECHHOEFER: But I take it you do have  
20 that under the federal license?

21 THE WITNESS: Yes.

22 MR. JOHNSON: Could we go off the record for a  
23 moment to confer?

24 CHAIRMAN BECHHOEFER: Yes. Off the record.

25 (Off the record)

1 CHAIRMAN BECHHOEFER: On the record.

2 BY MR. JOHNSON:

3 Q In light of what you just said, Dr. Karam -- I  
4 think this may be the last question on this line. In light  
5 of what you just said about there not being any state  
6 requirement for retraining and so forth, how did you  
7 respond if -- I think you already mentioned in the  
8 newsletter -- How did you respond to the fact that the  
9 state apparently considered these items about training to  
10 be of concern, even though apparently it is not a  
11 requirement. How did you understand that to happen and how  
12 did you respond to it?

13 A That's still under discussion. That has not  
14 been settled.

15 Q Is it a similar process to the NRC in which you  
16 do have a -- Well, let me -- How would you characterize it?  
17 Do you have an opportunity to respond to this sort of  
18 report on the state level or do you have an obligation to  
19 respond to it?

20 A I think when they ask us to respond, we do  
21 respond, but that is still under discussion with them.

22 Q Understood.

23 MR. JOHNSON: At this point, I think GANE would  
24 like to stipulate, before we even offer it -- We would like  
25 to offer Number 62 and we want to do it with a very

1 conscious stipulation that the only parts of this document  
2 we wish to enter are those concerning training procedures,  
3 things which may reflect the overall management climate of  
4 this facility, again, being that the same management team  
5 is in charge of the licenses.

6 MR. EVANS: We, of course, object to it for the  
7 reasons already stated. I won't belabor the point, but  
8 assuming, hypothetical, guaranteed hypothetical, that --  
9 assuming the management under the state license is  
10 atrocious, horrible, that does not show anything as to what  
11 is before this court, which has to do with the management  
12 under the NRC license. Two different subjects. There is  
13 no relationship between the two. Particularly where all  
14 we've heard is the programs are very different.

15 MR. TURK: Your Honor, I would oppose the  
16 admission of the document also. It is not something that  
17 relates to this license. To whatever extent GANE has  
18 wished to examine on the contents of the document, they  
19 have done so. So the record already has that information  
20 in it. There is no indication there is something else in  
21 this document that requires your attention beyond what they  
22 have already been allowed to explore. Therefore, being  
23 irrelevant and no showing of a need for it in the record, I  
24 would oppose it.

25 CHAIRMAN BECHHOEFER: The Board will not admit

1 this document. We would point out though that it will  
2 travel with the record so that anybody reading the  
3 transcript that needs to have some guidance as to what is  
4 being talked about can reference it, and it will go with  
5 the record.

6 MR. JOHNSON: We understand.

7 ADMINISTRATIVE JUDGE LAM: Dr. Karam, the  
8 essence of your testimony just now, regarding to retraining  
9 under the state license, is that even though the state does  
10 not require it, you and your staff are continuously doing  
11 it? Is that --

12 THE WITNESS: It's not a formal retraining  
13 where you say on a piece of paper that every six months  
14 every PI must come back and attend a class of two hours or  
15 three hours or half a day.

16 ADMINISTRATIVE JUDGE LAM: But with the absence  
17 of formalities, you are doing that?

18 THE WITNESS: We do that, right.

19 ADMINISTRATIVE JUDGE LAM: Thank you.

20 MR. JOHNSON: Can I inquire what time it is?

21 CHAIRMAN BECHHOEFER: Twelve noon. High noon.

22 MR. JOHNSON: This may be a good lunch break.  
23 We've completed most of our chronological -- There are some  
24 more questions we'd like to ask just in terms of management  
25 structure and the Nuclear Safeguards Committee and how they

1 relate to Dr. Karam and so forth, but I think that the  
2 first phase of our examination is near an end.

3 CHAIRMAN BECHHOEFER: It's 12 noon. Maybe  
4 1:15? That will give you plenty of time.

5 (Whereupon, a luncheon recess was taken at  
6 12:00 noon, to reconvene in the same place at 1:15  
7 p.m.)

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AFTERNOON SESSION

CHAIRMAN BECHHOEFER: Back on the record.  
Anything preliminary before we start again?

MR. JOHNSON: I don't believe so.

Whereupon,

RATIB KARAM

RESUMED his status as a witness herein, and was examined  
and testified further as follows:

CROSS EXAMINATION (Continued)

BY MR. JOHNSON:

Q Dr. Karam, I do have a few more questions here.  
On page 51 of your testimony, if you'll go down to question  
number 82, have you had any feedback from NRC, respecting  
these submissions. And this is concerning the renewal of  
the license.

Not directly from NRC, but I have heard from  
the private consultant firm which I understand NRC employs  
to evaluate license submissions.

My first question I suppose is how did you come  
to understand this, how did you discover that this firm  
does do this?

A Is this question 82, is that what you're  
saying?

Q Yes, how did you acquire this knowledge, how  
did you come to understand that the NRC employs this firm

1 to evaluate licenses?

2 A The consultant in question called to ask  
3 clarifying questions about the submission.

4 Q I see. What is the name of this firm?

5 A I don't know the name of the firm, but the name  
6 of the consultant I think is James Miller.

7 Q I see. On page 52 now, conversation with the  
8 firm did not indicate to me that there was any problem with  
9 our submission or that it was in any way inadequate.

10 This does not bear the same weight as NRC  
11 approval of your submission, even though this consultant  
12 may be reviewing it on a contract basis for the NRC -- I'd  
13 just like the record to show that this -- that your  
14 conversation with the firm that did not indicate that it  
15 was in any way inadequate, that does not assure the  
16 adequacy of your submission.

17 MR. EVANS: We'll stipulate that. There's  
18 nothing in here that suggests that.

19 A Not only that, nothing has been approved by the  
20 NRC. This is still under consideration.

21 BY MR. JOHNSON:

22 Q Okay, thank you. On page 54, this is the last  
23 page, question 86, of your testimony. Do you have any  
24 opinion as to whether discontinuation of the research  
25 possibilities offered by the reactor could be detrimental

1 to the public.

2 In my opinion, it would be detrimental to the  
3 public interest to foreclose the important research  
4 possibilities the reactor affords, particularly although  
5 nowise limited to, medical cancer research, including the  
6 treatment of brain tumors where surgical intervention is  
7 not a viable option.

8 This is the boron neutron capture therapy that  
9 you're referring to?

10 A Yes.

11 Q When Rodney Ice testified, he said that in  
12 order for this boron neutron capture therapy to really be a  
13 functional possibility, again regardless of the adequacy of  
14 the reactor facility, that the pharmaceutical end of the  
15 process would need to be improved. Basically he said that  
16 they were still several years away from developing the kind  
17 of, as I understand it, carrier drugs that can -- I'm going  
18 to try and represent this accurately -- that will carry --  
19 that would basically make sure that this therapy only  
20 affected the cells that wished to be affected, that it  
21 would sort of seek out these tumors and selectively attack  
22 them.

23 In light of Mr. Ice's testimony, is it not true  
24 that this boron neutron capture therapy may never become a  
25 reality through no fault of your own, that there are

1 factors outside of your control that could prevent this  
2 therapy from becoming a reality?

3 A Is there a question in all that? It's more of  
4 a statement.

5 Q I did get tangled up, I'm going to rephrase it.  
6 Is it not true that there are factors beyond your control  
7 which could make it impractical or impossible for this  
8 therapy to become practical at this facility?

9 A There are always factors beyond my control that  
10 would derail us on this issue. I think you must understand  
11 that as we speak, there are over 50 new compounds that have  
12 never been fully tested, but tested to the point that we  
13 know that concentration in a tumor tissue relative to the  
14 healthy tissue could be as high as 400 to 1. The two  
15 compounds which we are dealing with right now have  
16 concentrations of the order of about 3 to 1 or 4 to 1.  
17 Despite the fact that the ratio is extremely low for the  
18 compounds that we have, the trials that are being conducted  
19 now at Brookhaven National Laboratory, they are in the  
20 second phase.

21 The first phase, they deliberately reduced the  
22 total dose or the exposure time of the patient to find out  
23 precisely what happens. And they found out what happens is  
24 that there were good effects except they did not give  
25 enough dose. So consequently in the first trials, most of

1 the people who received the treatment are already dead or  
2 dying.

3 The new phase increases the total dose by about  
4 25 percent and there is expectation that this new regime  
5 would be significantly better than the first trial.

6 The reason is, the first trials, the quality of  
7 life immediately after the exposure to the dose was  
8 significantly better. The lady that came on television all  
9 over the nation felt that she was dying, almost a few days  
10 before; after it, she was up and about and playing tennis  
11 and doing all that good sort of thing and her quality of  
12 life was significantly better. On that basis, Food and  
13 Drug indeed approved the second phase.

14 So there is a possibility that the new drugs --  
15 that the drugs that are in use right now are not adequate  
16 and the new drugs could indeed come in. There is no  
17 question in my mind if we get the correct drug to  
18 concentrate in the tumor, then the targeting of those drugs  
19 contained in the boron with neutron is an effective way to  
20 killing the cells which we want to kill. There is no such  
21 thing that the other cells will not be affected, it's a  
22 matter of how much. The brain cells tolerate a significant  
23 amount of dose, significant amount of dose. Physicians  
24 right now give the brain sometimes as high as six to ten  
25 thousand rems.

1           The research that's needed is really to  
2 differentiate at what point do you really want to stop  
3 exposing the healthy cell. That precise knowledge,  
4 currently we don't know. We're kind of experimenting with  
5 it.

6           Q       I see.

7           A       So what are the factors that could derail this?  
8 There's a lot of factors. The President of Georgia Tech  
9 could say gee, I want out of this, so that derails it  
10 immediately no matter what happens on boron capture  
11 therapy.

12                   There's another thing that's extremely  
13 promising. This treatment is not limited to glioblastoma  
14 multiform which is cancer of the brain, specific cancer of  
15 the brain. If you find boron containing compounds that  
16 target other types of cancers, breast cancer, neck cancer,  
17 prostate cancer, then the same treatment is indeed viable  
18 and the cooperation -- we started with Emory University,  
19 we're already looking at prostate cancer and in fact we are  
20 testing now, when the reactor was shut down, certain  
21 chemicals that were produced by a boron chemist at Emory  
22 University by the name of Ray Schnauze to see whether or  
23 not indeed that is a promising compound for prostate  
24 cancer.

25                   So the start and the concentration is on brain

1 tumors, but hopefully the goal ultimately would apply to  
2 practically all other cancers. But that's quite a bit in  
3 the future.

4 Q I see. And just to clarify, although you do  
5 seem to feel optimistic that there are some promising drugs  
6 still in the testing procedure right now, the fact is that  
7 the testing program is not completed on these drugs, and  
8 however promising they seem at this point, new information  
9 could arise that would disqualify them and that would make  
10 them not applicable to this process?

11 A Could very well be. There's a world class  
12 biochemist, actually two of them, one at UCLA and one at  
13 University of California-San Francisco. And both of these  
14 gentlemen are producing compounds that have extreme  
15 benefits if these compounds test out that toxicity due to  
16 the infusion of these compounds is not a problem. The two  
17 compounds we have, you can administer those compounds to  
18 humans without really fearing the ill effects that are  
19 going to come from the compounds themselves. Those other  
20 compounds which are promising have not been tested. The  
21 testing process is lengthy, takes quite a bit of time.

22 Q And just more towards the operational aspect of  
23 this therapy, is this something that would require that  
24 patients be brought into the Neely facility?

25 A Yes.

1           Q       What, if any, modifications would have to be  
2 made to the facility in order for it to be a medical  
3 facility in that way?

4           A       Well, we have basically two modifications.  
5 One, which we call cosmetics, to make the rooms where the  
6 patients are brought in appear like a hospital, but these  
7 are not needed really. The other one that's absolutely  
8 needed is to install this filter in place to give the -- to  
9 alter the neutron distribution in such a way that the beam  
10 that comes out is concentrated between the energy of one eV  
11 to 10 kV. The reasons you want it at that energy are as  
12 follows: If you have energetic neutrons in this range that  
13 can penetrate the skin, that can penetrate the skull and go  
14 up to maybe four or five centimeters in the brain before  
15 they are thermalized and then they are absorbed in the  
16 boron, the absorption of the neutron in the boron would  
17 release quite a bit of energy right in that cell which  
18 contains the boron. And that's where you try to  
19 concentrate the dose to kill that cell.

20                   The range of the particles that come out of  
21 this burst of boron atom are -- the range is of the order  
22 of five to ten microns, so the alpha particle and the  
23 lithium atom that results from this reaction, then deposit  
24 their energy entirely within that cell, and that's what you  
25 hope to kill.

1 Q Thank you. In preparation for this therapy,  
2 would you be preparing to fix the bismuth block leak before  
3 it would take place?

4 A It's an integral part of that filter change,  
5 yes.

6 MR. JOHNSON: If we can go off the record for a  
7 moment, I need to --

8 CHAIRMAN BECHHOEFER: Okay, off the record.

9 (Brief pause.)

10 CHAIRMAN BECHHOEFER: Back on the record.

11 BY MR. JOHNSON:

12 Q Dr. Karam, we heard testimony most recently  
13 yesterday about the key card system that was put in place  
14 after the Current Affair intrusion. We would like to ask  
15 your expertise for clarification. Is the key card system  
16 that has been put in after the Current Affair incursion the  
17 same kind of system that is reflected in the inspection  
18 report 89-05, which I believe was entered as GANE Number  
19 61, where it speaks of failure to maintain key controls.  
20 Is that the same kind of key card system or are there  
21 substantial differences? If so, could you elaborate?

22 A Mr. Johnson, I don't know. I mean, I hate to  
23 correct the record, what you're saying, there was no card  
24 system instituted after the Current Affairs episode. What  
25 was instituted is that the front door and a few other doors

1 are locked permanently, you cannot walk into the building  
2 any more. The card system that is in place has been  
3 modified since the -- not very much -- I'll tell you how it  
4 was modified, since the 1989 inspection. The modification  
5 didn't really affect what we had in place. What we did was  
6 to make better control of all the cards and all the keys  
7 that we issued. So in that sense, there was better  
8 control. But that system was in place at that time as  
9 well.

10 Q I see. So when we see in GANE Number 65, which  
11 is inspection report 95-04 the statement that public access  
12 to the center was revised to now require either the use of  
13 a coded key card reader or the presence of an authorized  
14 individual. Is your testimony that there may have been an  
15 additional card reader put in place but it's part of the  
16 same kind of system?

17 A The card reader has always been there. During  
18 the day time, starting at about 7:00 when I come in, I  
19 unlock the door and the public building where the  
20 classrooms are was always public building. Students can  
21 come, attend classes and leave through that one door in the  
22 front. At 5:00 that door is locked again and the only way  
23 you could get in is through the card system. So that card  
24 system was always in place.

25 Q That answers our question. Dr. Karam, in light

1 of your testimony, page 9 of your testimony, about having  
2 been a member of the Nuclear Safeguards Committee for six  
3 years and also the fact that you are currently the director  
4 of the facility, you do have a unique perspective on how  
5 the Nuclear Safeguards Committee operates and functions --  
6 you have been a member, just a rank and file member and  
7 you've also been the director of the facility and had  
8 interaction with the committee in that way.

9 We would like to ask you a few questions about  
10 how that interaction works and how we perceive some of the  
11 minutes that you provided to us of those meetings.

12 On March 1, 1988 --

13 MS. CARROLL: There's an extra copy if you'd  
14 like.

15 MR. JOHNSON: Yes, let me present this extra  
16 copy to the witness.

17 MS. CARROLL: And warn him about the gold.

18 MR. JOHNSON: Oh, yes. If you get this gold  
19 ink on your suit, Glenn will never forgive herself, so  
20 please be careful.

21 We're going to be starting around -- it's  
22 chronological in sort of an inverse order.

23 MS. CARROLL: At this time, there was a set  
24 missing and I got copies. So you can just put these in  
25 your notebook at the right place, there was just one set

1 missing. This would be inserted in here, it's not extra.

2 BY MR. JOHNSON:

3 Q Item number 11, at this meeting which we note  
4 that you were present at the meeting, says the committee  
5 discussed Robert Boyd's letter regarding hot cell storage  
6 pool operations. The committee decided not to close down  
7 the operation of the hot cell. And the letter from Mr.  
8 Boyd is attached immediately after, for reference.

9 MR. EVANS: Again, I'm sorry, but are we  
10 looking at this unmarked document?

11 MS. CARROLL: I'm sorry. It was missing from  
12 the big set.

13 MR. EVANS: All right. But is this the one  
14 you're talking about?

15 MR. JOHNSON: No, no.

16 MS. CARROLL: I just provided that so your set  
17 will be complete.

18 CHAIRMAN BECHHOEFER: Which one are you talking  
19 about?

20 MR. JOHNSON: We're talking about March 1,  
21 1988.

22 CHAIRMAN BECHHOEFER: Oh, okay.

23 MR. EVANS: That explains it.

24 MR. JOHNSON: I'll allow Mr. Evans a chance to  
25 find it. It's sort of an inverse chronological order, it

1 starts with the most recent and goes back.

2 MR. EVANS: Excuse me again, which one are we -  
3 - I'd better forget this one.

4 MR. JOHNSON: March 1, 1988. I have it.

5 MS. CARROLL: Oh, wait a minute, Rob, before we  
6 get into this, do we want to enter any of these minutes  
7 into the record -- should we be numbering them as we refer  
8 to them? Does anybody have a sense of it, -- I'm pretty  
9 clear Mr. Turk won't let us put the whole thing in as GANE  
10 Number 44.

11 MR. TURK: I'm not going to let you do  
12 anything, it's up to the Board.

13 MS. CARROLL: Maybe we should do GANE 44,  
14 subpart A; GANE 44, subpart B -- could we number them that  
15 way? Because we might lose track if we don't start with a  
16 system now.

17 CHAIRMAN BECHHOEFER: It also depends whether  
18 you wish to stress any negatives, for instance.

19 MR. JOHNSON: That is --

20 CHAIRMAN BECHHOEFER: It depends on -- our  
21 ruling on all of them might depend on the use you propose  
22 to use them for.

23 MR. JOHNSON: That's a good point, Your Honor.

24 CHAIRMAN BECHHOEFER: But it might be useful to  
25 have ones that you specifically reference, 44-A, 44-B and

1 that kind of thing because they might go in on their own  
2 separately.

3 MR. TURK: It might be administratively easier  
4 if we get an offer right now of the entirety and see if  
5 there's a ruling on that. And if the ruling is to deny  
6 admission, then take out pieces and have them identified  
7 separately.

8 MS. CARROLL: Yeah, I'm not sure, I feel like  
9 this is going to be sort of amorphous.

10 MR. TURK: Approximately how many of the  
11 different minutes that are contained in this book do you  
12 propose to examine on?

13 MR. JOHNSON: We are going to examine specific  
14 things in perhaps eight to ten minutes, but Judge  
15 Bechhoefer's comment is very well taken. There is at least  
16 one point that we wish to make about a commitment or  
17 recommendation made in one of the minutes that was not  
18 followed up in any of the following minutes, and I don't  
19 believe that we can make that point without submitting the  
20 entirety of the minutes. You can't say it was not covered  
21 in any of the minutes if all of the minutes are not  
22 available for review.

23 MR. TURK: That wouldn't necessarily indicate  
24 that the matter wasn't followed up on by the facility or by  
25 the committee. You can examine that.

1 MR. JOHNSON: And that is quite possible.

2 MR. TURK: And merely submitting the book to  
3 show that the committee minutes may or may not reflect a  
4 discussion won't establish that it wasn't actually  
5 addressed. You need the witness to speak to that.

6 MR. JOHNSON: Well, I think we would prefer to  
7 proceed with our examination and try and make our  
8 connections and make our case for the inclusion of the  
9 document and then attempt to move it into evidence later,  
10 but I think we're going to at least proceed with some of  
11 our questions first so that hopefully there'll be more  
12 basis and our effort to move it into evidence will be  
13 better received.

14 MS. CARROLL: Well maybe Rob, if I keep the  
15 date of every set of minutes that we refer to and you help  
16 me stay on top of this, that will give us a start to  
17 recovering everything we've definitely asked questions  
18 about and have testimony concerning.

19 MR. JOHNSON: That's not a bad idea.

20 MS. CARROLL: I said this loud so if anybody  
21 sees a flaw in this approach, they'll say so.

22 MR. EVANS: That will at least help so we know  
23 what's been mentioned. I'll try and keep a double check on  
24 it, for that matter. We're starting with March 1.

25 MR. JOHNSON: We are starting with March 1,

1 1988 and we're going to try and proceed.

2 MR. TURK: May I ask if you have any intention  
3 to follow -- to do examination on matters that happened  
4 before March 1 of '88?

5 MR. JOHNSON: Not as concerns the minutes.  
6 There are, as you see, other --

7 MR. TURK: That's a good 40 percent of the  
8 book, according to my rough guess of the number of pages  
9 involved in this. So 40 percent of the book you're not  
10 going to examine on already.

11 MR. JOHNSON: Well, then perhaps we are going  
12 to end up having a stipulation that all the minutes  
13 subsequent to the one that we are getting to where a  
14 commitment was made by the committee that we do not  
15 perceive as being followed up on or at least not mentioned  
16 in the minutes, --

17 MS. CARROLL: I'm glad we haven't gotten into  
18 this because --

19 MR. JOHNSON: Actually, I'm going to back up  
20 slightly in light of Mr. Turk's comment, to the February  
21 16, '88 minutes. I don't believe we are going to go any  
22 earlier than that. A lot of the committee minutes  
23 regarding the cadmium incident and so forth, we've already  
24 heard extensive testimony on the cadmium incident. We  
25 don't necessarily feel the minutes are necessary for that

1 purpose. We are going to ask one question about the  
2 February 16, '88 minutes and then we will move forward  
3 chronologically from there.

4 BY MR. JOHNSON:

5 Q In item number 6 --

6 MR. TURK: February 16 of '88?

7 MR. JOHNSON: February 16 of '88. We are  
8 moving basically one meeting further back than March 1.

9 MR. EVANS: I don't have a February 16.

10 MR. JOHNSON: It's out of order. Unfortunately  
11 February 4 comes between the March 1 and -- since they are  
12 in this bound notebook, perhaps everyone would wish to just  
13 take them out.

14 MS. CARROLL: I don't know what happened. I  
15 mean Georgia Tech gave them to the NRC, the NRC gave them  
16 to -- sold them -- the NRC sold them to CANE.

17 MR. EVANS: All I want to know is --

18 MR. TURK: We'll reorder the books to pub  
19 February 4 antecedent to February 16.

20 MS. CARROLL: There may be other little --

21 MR. TURK: I mean behind February 16.

22 MR. JOHNSON: Exactly.

23 If everyone would look at number 6, item number  
24 6 which is the second page of those minutes.

25 MR. EVANS: February 4 or February 16?

1 MR. JOHNSON: February 16. Items 1 through 5  
2 going through on the first and then item 6 on the second  
3 page.

4 BY MR. JOHNSON:

5 Q Towards the bottom of the paragraph, there's a  
6 sentence that reads as follows: A question was raised  
7 regarding the lack of any previous intimation of the health  
8 physics personnel's incompetency over the past many years  
9 of reactor operation. J.M. Puckett related that to the  
10 relatively lax attitude of the NRC staff in inspecting  
11 research reactors in the past.

12 Q Dr. Karam, I would ask you if you agree with  
13 Mr. Puckett's characterization here of the NRC's attitude  
14 towards inspecting research reactors.

15 MR. TURK: May we ask -- I'm sorry.

16 THE WITNESS: Do you want to object to the  
17 question or to the answer.

18 MR. TURK: I don't care. I just want to see if  
19 there's a foundation. I notice that the minutes reflect  
20 that Dr. Karam was present at the meeting.

21 MR. JOHNSON: Yes.

22 BY MR. JOHNSON:

23 Q Let me ask you this, Dr. Karam, you were  
24 present during this conversation, did Mr. Puckett give  
25 foundation for this claim?

1           A       I really don't recall, but the question you  
2 were asking, has the NRC ever been lax in inspecting the  
3 Georgia Tech reactor. In my experience ever since I've  
4 been there, they've always been very thorough, very  
5 professional. There has been attempts in the past by none  
6 other than Mr. Boyd to kind of attempt to direct the NRC  
7 toward specific perceived or real deficiencies. If that's  
8 a criticism, then be it, but my own experience with the NRC  
9 during the entire time I've been at the center, that they  
10 have been extremely thorough. In fact, sometimes I felt  
11 they kind of come at us because we are close, harder  
12 perhaps than any other reactor in the region. They may  
13 debate that, I don't know that for a fact. So I do not  
14 agree with Mr. Puckett's comment.

15           Q       Do you recall whether at the time this  
16 statement was made in the meeting, do you recall making  
17 that assertion to Mr. Puckett? Do you recall defending the  
18 NRC's effectiveness at the time he made this statement?

19           MR. TURK: Let me say that Dr. Karam has  
20 indicated he doesn't recall Mr. Puckett saying this. I  
21 have no objection to your asking Dr. Karam on the other  
22 hand does he recall making a statement to the contrary.

23 BY MR. JOHNSON:

24           Q       Do you recall making a statement to the  
25 contrary?

1           A        I really don't recall. If the minutes don't  
2 show it, you're talking about many, many minutes before, so  
3 I really don't recall.

4           Q        Now I believe that we can move on to the March  
5 1, 1988 minutes and the question regarding that, which is a  
6 few pages earlier, just on the other side of the letter  
7 from Mr. Boyd about the hot cell.

8                    The committee apparently, according to item  
9 number 11 of the March 1 minutes, did discuss this letter  
10 concerning Mr. Boyd's concern about the hot cell.

11           MR. EVANS: Again, maybe I'm a little slow.  
12 Are we still on February 16?

13           MR. JOHNSON: No, moving to March 1, 1988, just  
14 a few pages.

15           MR. EVANS: Well, I'm also trying to write down  
16 some notes as we go along.

17           MR. JOHNSON: Please.

18           MS. CARROLL: Take your time.

19           MR. JOHNSON: If we get ahead of you, please  
20 feel free to say so.

21 BY MR. JOHNSON:

22           Q        Do you recall this discussion about Mr. Boyd's  
23 letter, Dr. Karam?

24           A        Yes, it's in the minutes.

25           Q        What was the committee's reasoning, or if you

1 made any specific comments during the meeting, your  
2 comments or reasoning, in deciding not to close down the  
3 operation of the hot cell?

4 A Well, Mr. Boyd, in his letter, didn't really  
5 give any reasons, any reasons, good or otherwise, why this  
6 should be so. It seems like he recognized that his control  
7 and influence on events is slipping and it seems to me this  
8 was sort of a desperate attempt to say to anyone and  
9 everyone who listens that without him the whole damn  
10 operation is going to go to hell in a hurry and he made  
11 last attempt to stop it.

12 Q How long after this meeting on March 1, 1988,  
13 did Mr. Boyd leave the facility?

14 A I'd say weeks, if not months. It is during  
15 that time frame. I can give you the dates correctly if I  
16 get back to my office, but it is in that time frame.

17 Q I don't think that's necessary. You say that  
18 you feel this was an action on Mr. Boyd's part to try and  
19 reclaim authority that you say he felt his authority was  
20 slipping away and this was an attempt to regain it. Can  
21 you elaborate on why you feel that Mr. Boyd felt that his  
22 authority was slipping and how did he feel that this would  
23 help him regain it to your knowledge?

24 A Let's see. There was some place in the minutes  
25 that Dr. McDonald was making comments -- Was that in this

1 minutes -- or maybe before that.

2 Q It should be complete so that you should be  
3 able to find the records.

4 A After the reorganization and during this period  
5 of time after the termination of Mr. Millspaugh and Mr.  
6 Sharpe, on several occasions Mr. Boyd chose to be totally  
7 uncooperative. He was sort of openly defiant. Not just to  
8 me, but McDonald and everybody else. The Vice president,  
9 not Dr. Stelson at that point, but Dick Fuller, I believe,  
10 was involved in these negotiations, and he stepped in and  
11 he felt, let's go beyond Boyd, let's get someone to replace  
12 Boyd and let's decide what we do with Boyd a little bit  
13 later. This was happening at this point in time.

14 MR. EVANS: For the record, I could clarify,  
15 the paragraph we had asked about previously on the February  
16 16th meeting goes into this in some detail, Item 6. We  
17 were asked about the bottom line, but the top part goes  
18 into this McDonald and some of his views, same paragraph.  
19 I believe that's what you are talking about and I'm just  
20 trying for the record to maybe save a little time.

21 MR. JOHNSON: That is helpful.

22 MR. TURK: I noticed that Dr. Karam, when he  
23 began answering the last question opened with the remark  
24 the minutes show a discussion by Mr. McDonald -- or Dr.  
25 McDonald. I don't know if this is the paragraph that you

1 had in mind.

2 THE WITNESS: That is what I was referring to.

3 MR. EVANS: And this is after -- So the record  
4 can show, this is after the termination of Millspaugh and  
5 Sharpe.

6 MR. JOHNSON: That is true.

7 BY MR. JOHNSON:

8 Q Our next question refers to the minutes of  
9 September 30, 1988, which is approximately ten pages or so  
10 further up.

11 A Did you say September?

12 Q September 30.

13 A Okay, I'm there.

14 Q In this meeting -- Let me find the actual  
15 specific item. It's 3-A. And these are non-agenda items,  
16 they are listed as. "Our chairman informed the committee  
17 that H. Edwards and T. Thomas had resigned from the  
18 committee. He pointed out that other members were free to  
19 indicate their preference on whether or not they wished to  
20 continue to serve on the committee." Two parts to this.  
21 Why is it that Mr. Edwards and Mr. Thomas resigned?

22 A In the case of Mr. Thomas, Dr. Thomas, this was  
23 his second job after retirement from Union Carbide, I  
24 believe, and after learning how the committee operates and  
25 how much time it takes, he felt he didn't have the time,

1 and he retired from Georgia Tech thereafter. Dr. Edwards  
2 was in the Dean's office also about to retire. So, he felt  
3 that he could not give it the full time too.

4 Q Then, to follow on that, you are pointing out  
5 that other members are free to resign as well. Is that, on  
6 your part, intending that anyone who is not willing or able  
7 to devote sufficient time to the committee should take this  
8 opportunity to follow the lead of these two gentlemen and  
9 resign as well?

10 A That was not -- I would not give it that  
11 interpretation. I would say it was just a time that these  
12 gentlemen have indeed expressed their desire to retire or  
13 is there anybody else who would like to do the same, so the  
14 president would go on and make a replacement for the two,  
15 more the two or whatever. I was not inviting anyone to get  
16 off.

17 (Laughter)

18 Q So in other words, so there would only have to  
19 be one replacement process? Since you were already going  
20 to have to replace these two people, that was going to  
21 require a process by the president and so forth, you might  
22 as well, if there is anyone else who wishes to resign, deal  
23 with it then so you can make it a nice clean --

24 A That was the intention, yes, sir.

25 Q We are going to move on to October 14, 1988.

1 MS. CARROLL: Which is the one we just  
2 distributed to you.

3 MR. JOHNSON: This is one we got from the  
4 document room, I'm sure.

5 MS. CARROLL: No, it was just missing from the  
6 set. I just happened to notice that and Georgia Tech faxed  
7 this to us immediately.

8 THE WITNESS: This one that I have doesn't have  
9 October 14. It has October 21.

10 MS. CARROLL: Oh, yes. That is sort of an  
11 extra set, and I didn't give you a copy. So let me loan  
12 you a court copy.

13 MR. JOHNSON: Yes, these are additional ones --

14 MS. CARROLL: It's just we noticed they were  
15 missing when we were getting organized and ready to refer  
16 to it.

17 BY MR. JOHNSON:

18 Q So you have a copy now?

19 A Right.

20 Q On Item 2-B on the minutes of this meeting, it  
21 pointed out there was a continuing problem with people  
22 eating, drinking, smoking in areas where radio isotopes  
23 were used. This further pointed out that access to rooms  
24 where radio isotopes are stored are not strictly  
25 controlled.

1 MR. EVANS: Now, where on October 21st is this?

2 MR. JOHNSON: This is October 14th. 2-B.

3 MR. EVANS: Do I have that one somewhere?

4 MS. CARROLL: It's the new one I distributed,  
5 that you just removed from yourself so you wouldn't get  
6 confused. The one I handed out at the beginning of this  
7 line of questioning and you kept thinking I was referring  
8 to it when I wasn't.

9 CHAIRMAN BECHHOEFER: It's time to stick it in  
10 the book --

11 MR. JOHNSON: -- and get confused. Time out.

12 MR. EVANS: I thought I inserted one. Must  
13 have gotten --

14 MR. TURK: I notice Mr. Warren is trying to  
15 catch all this.

16 MR. JOHNSON: Mr. Warren earns his pay  
17 everyday.

18 MS. CARROLL: He put that in the record. He  
19 was sure to do that.

20 THE REPORTER: Just doing the best I can with  
21 what I've got to work with.

22 (Laughter)

23 BY MR. JOHNSON:

24 Q It says at this point that Chairman Kahn asked  
25 for specific recommendations from the committee on these

1 issues. You were present at this meeting as well, Dr.  
2 Karam. Do you recall what those specific recommendations  
3 were?

4 A I think as stated in there, he anticipated  
5 members of the committee making the recommendations at a  
6 later time. May I also point out, it has nothing to do  
7 with the Neely Nuclear Research Center. This is activities  
8 on campus, so it is under a state license.

9 MR. JOHNSON: And at this point is where we  
10 would wish to note that if those recommendations were made  
11 at a later date, we do not find them in the entirety of  
12 these minutes that we have supplied to you and that is,  
13 again, one of the reasons why this large sequence of  
14 documents are being presented to you as a piece, is that we  
15 don't feel that we can make that claim with a good  
16 foundation in fact without presenting to you all of the  
17 minutes afterwards. It is also -- And Dr. Karam's answer  
18 agrees with our perception. We also were under the  
19 impression that this was something that was going to be  
20 followed up on by the committee at a later date, and we  
21 find no evidence of any --

22 MR. EVANS: Do you have an extra copy of that?

23 MS. CARROLL: Of?

24 MR. EVANS: I think you have the only copy. I  
25 don't know.

1 MS. CARROLL: Well, no, I gave it to you and  
2 you kept trying to look at it and we weren't ready for it  
3 and didn't understand why we had given it to you. And  
4 finally you put it to the side.

5 MR. EVANS: Okay.

6 CHAIRMAN BECHHOEFER: This is purely a  
7 statement. If Dr. Karam has testified, then I'm not sure  
8 why it matters that it ever appears again in the minutes as  
9 far as we are concerned.

10 MR. JOHNSON: Well, our concern is that part of  
11 the management structure at Georgia Tech is the Nuclear  
12 Safeguards Committee is supposed to provide a measure of  
13 oversight and it concerns us that matters which are  
14 addressed by the committee, and understood that they are  
15 supposed to be followed up on, not be followed up on. In  
16 other words, if this issue, even if it is a state related  
17 issue, was not followed up on, does the Safeguards  
18 Committee have sufficient diligence that we can be assured  
19 that they would follow up on in NRC regulated matters.

20 MR. TURK: May I address the issue?

21 CHAIRMAN BECHHOEFER: Yes.

22 MR. TURK: What we are hearing essentially is  
23 that there is one item that GANE has identified that they  
24 cannot find to follow up on in the minutes, and we are  
25 looking at minutes now for the last six or seven or eight

1 years. What is the significance of that one matter not  
2 appearing again in the minutes? Assuming -- Let's assume,  
3 first of all, we have not yet established that the matter  
4 was never recorded in the minutes again. We would all have  
5 to check our minutes and do a thorough search to see if we  
6 agree with that. That would not establish if the matter  
7 was not addressed by the committee, even if not recorded in  
8 the minutes. It would not establish also that there was  
9 not follow up by the university through some method other  
10 than discussion again through the committee. If Mr.  
11 Johnson asks Dr. Karam was there a subsequent follow-up or  
12 what was done with respect to this, we may have more  
13 evidence that puts the whole thing in light. In any event,  
14 to say that this entire document has to be admitted for  
15 that purpose -- this entire set of documents has to be  
16 admitted for the purpose of showing that this one item was  
17 never discussed again in the NSC, it's just not probative.  
18 It doesn't show anything.

19 ADMINISTRATIVE JUDGE KLINE: Dr. Karam, did you  
20 say Item 2-B had nothing whatever to do with the research  
21 reactor?

22 THE WITNESS: Exactly. I did say that.

23 ADMINISTRATIVE JUDGE KLINE: In addition, was  
24 it a general practice of the committee or is it any kind of  
25 practice of the committee that when the Chairman calls for

1 advice like this that he might receive it individually from  
2 members outside the meeting or -- outside of the meeting?

3 THE WITNESS: I would say that the likelihood  
4 that he got an outpour of response is probably not very  
5 high.

6 (Laughter)

7 THE WITNESS: However, Betty Revsin would not  
8 really leave anything dangling. I'm positive that we wrote  
9 letters to the people involved and gave them a stern  
10 warning that these shenanigans must be stopped.

11 MR. JOHNSON: Was the word shenanigans used?

12 THE WITNESS: Now, you'll ask me to spell it.

13 ADMINISTRATIVE JUDGE KLINE: The prohibition of  
14 people eating and drinking in areas where radio isotopes  
15 are used, is this based on some arcane reasoning that a  
16 professional in health physics would be unlikely to know  
17 absent this advice?

18 THE WITNESS: The professional health  
19 physicists, is that your --

20 ADMINISTRATIVE JUDGE KLINE: Yeah, would they  
21 be unable to act on this matter absent any advice they  
22 might receive from your committee?

23 THE WITNESS: Yes, things that -- they can act  
24 on it. It is part of our training that where you have this  
25 material that is the state regulation, it's our regulation,

1 that eating, drinking and smoking must stop.

2 ADMINISTRATIVE JUDGE KLINE: That's what I am  
3 trying to understand. Your health physicists, if they  
4 didn't get this advice, they'd still know what to do,  
5 wouldn't they?

6 THE WITNESS: Yes. But the item in the minutes  
7 is primarily to see if the committee's innovative smartness  
8 could come to the floor to give us ways to make sure that  
9 everyone complied and that's why it is in the minutes.

10 BY MR. JOHNSON:

11 Q We wish to ask -- Dr. Karam, are you aware of  
12 any documentation that exists that proves that this problem  
13 has been resolved?

14 A To the best of my knowledge we have not had any  
15 report of this kind ever since that time. I have seen some  
16 reports occasionally that there is an empty coke can and a  
17 bottle in the trash can. We follow up on this by talking  
18 to the PI and the students who are involved in the  
19 experimentation. Almost always they tell us they drank it  
20 outside and they threw it in the trash can.

21 CHAIRMAN BECHHOEFER: I take it you have not  
22 found empty coke cans lying around, for instance? I take  
23 it you haven't found empty coke cans or the like lying  
24 around the reactor itself, the control room --

25 THE WITNESS: No. Our people are ingrained in

1 this. I mean, the people at the reactor do not do that.

2 CHAIRMAN BECHHOEFER: Okay.

3 ADMINISTRATIVE JUDGE KLINE: Is there something  
4 pending now?

5 ADMINISTRATIVE JUDGE LAM: I thought you moved  
6 to admit GANE 44?

7 MS. CARROLL: No.

8 ADMINISTRATIVE JUDGE LAM: You haven't?

9 MR. JOHNSON: No.

10 CHAIRMAN BECHHOEFER: We are waiting to see  
11 which of the minutes are in there.

12 MR. JOHNSON: We still have further exam--- We  
13 should, I feel, proceed with our examination on specific  
14 minutes and then if you do rule that the whole document  
15 can't be admitted, at least we will have the list of other  
16 minutes so we can proceed from there.

17 BY MR. JOHNSON:

18 Q As a concluding question on this prior matter,  
19 these minutes mention a continuing problem. Is it your  
20 testimony that this continuing problem ceased after this  
21 time and has not been an issue since then?

22 A To the best of my knowledge, we have not had  
23 this item for the committee which indicates the inspections  
24 that we routinely do on all the labs on campus.

25 Q We would at this point like to go to the June

1 30th minutes from '89.

2 A Is that an example of where it came up again?  
3 Is that it?

4 Q No, no. June 30, '89. And Item Number 2 of  
5 this particular set of minutes, that Mr. Kahn asks to put  
6 on the agenda for the next meeting, the issue of a  
7 mechanism for revocation of unescorted access to the  
8 reactor security zone. If you move to the next meeting,  
9 which is August 8, 1989, in our chronology, we do not find  
10 this present. Are you aware of this being pursued in  
11 subsequent committee meetings? Was this ever put on the  
12 agenda and was it ever discussed and/or resolved?

13 A I believe we have a procedure on that issue in  
14 place.

15 Q Do you recall when that came into place or if  
16 it was something that was initiated --

17 A I'd really have to look at the record to see  
18 how it connected, but that would be where it came back to  
19 the committee as a procedure.

20 Q Would you be willing, Dr. Karam, to identify  
21 for us when this was specifically resolved and perhaps we  
22 can, you know, address it or tomorrow? We could give you  
23 time to do some review.

24 A I don't know if tomorrow would be adequate time  
25 to look at all the records.

1 Q A lot of times these procedures are only  
2 referred to by their numbers in the minutes. Do you know  
3 offhand what number this procedure was given? Perhaps we  
4 can identify it in the minutes easier.

5 A You mean from memory?

6 Q I know that there are a lot of procedures. I  
7 just thought I would ask.

8 A Yeah, we have 300. No. We have an index.

9 CHAIRMAN BECHHOEFER: Well, is it any of the  
10 three procedures that are mentioned in the next --

11 THE WITNESS: I can't tell you, Your Honor.

12 CHAIRMAN BECHHOEFER: There are three listed.

13 THE WITNESS: Yeah.

14 MR. JOHNSON: I would note that the three that  
15 are listed in the next meeting, Your Honor, draft  
16 procedures of all three of those were issued at the June  
17 30th meeting. So, I'm assuming that those were already  
18 separate issues that were already in a state of some kind  
19 of examination before this issue was brought up.

20 CHAIRMAN BECHHOEFER: 7220, which is referenced  
21 in the earlier paragraph could also be related to that.

22 MR. JOHNSON: Containment building isolation.

23 BY MR. JOHNSON:

24 Q Dr. Karam, on August 8, 1989, we do have an  
25 interesting situation which procedure 72.20 is mentioned

1 and then a similar, a name is given so there is some kind  
2 of connection, the containment building isolation. Are you  
3 aware of whether the containment building isolation  
4 procedure is the procedure that was meant to provide this  
5 mechanism for revocation of unescorted access to the  
6 reactor?

7 A No, that would be different.

8 Q That is different.

9 A Right.

10 MR. JOHNSON: GANE does wish to note that if  
11 this procedure is ever mentioned by name in further  
12 minutes, it is not --

13 ADMINISTRATIVE JUDGE KLINE: It is mentioned in  
14 August 8th. Look at 4-C. They did raise the issue. I  
15 don't know what they did about it. This just addresses the  
16 issue of unescorted access. So, it may not reflect what  
17 they did, but it's there. They didn't neglect it.

18 MR. JOHNSON: Well, we would I guess --

19 BY MR. JOHNSON:

20 Q Dr. Karam, do you recall whether there was a  
21 resolution of this issue at the August 8th meeting  
22 concerning what Judge Kline has just pointed out?

23 A Well, the minutes don't really specify what was  
24 discussed other than, considered the following issues. I  
25 believe that action was taken on all three counts, who pays

1 for Georgia Tech radioactive waste, and there was  
2 discussion on that issue that somehow built into the  
3 overhead rate for these projects that would generate  
4 radioactive waste and additional money is put into the  
5 proposal. That was discussed at some length and it was  
6 decided that rather than have it incorporated in a specific  
7 proposal for funding, Georgia Tech would take the cost of  
8 the entire operation and include it in the federal overhead  
9 rate, and that was what was adopted. So, rather than  
10 charge each project for its waste, it's automatic based on  
11 the entire research projects within Georgia Tech.

12 Q This is -- This issue concerning the mechanisms  
13 for revoking unescorted access is another example of an  
14 issue that we looked through every single other one of  
15 these minutes in good faith, attempting to find an  
16 identifiable reference to it, and we are unable to find  
17 one. Again --

18 ADMINISTRATIVE JUDGE KLINE: You base that on  
19 the initial appearance of the issue in June 30th with a  
20 promise to look at it again, and it was looked at again.

21 THE WITNESS: Yeah.

22 ADMINISTRATIVE JUDGE KLINE: I don't understand  
23 what the problem is. What is the resolution? Is it hard  
24 to revoke unescorted access?

25 THE WITNESS: We have a process by which in

1 order to go into the security zone unescorted you have to  
2 meet certain conditions. Those conditions primarily is  
3 police report, national search on the person is done, the  
4 Dean of Students, if the person is a student, report on the  
5 student, letters of recommendation and when the person  
6 terminates, we  
7 simply take the cards away, and that's automatic.

8 ADMINISTRATIVE JUDGE KLINE: And that  
9 constitutes the revocation or what? Do you write them a  
10 letter or something and say, you don't have unescorted  
11 access anymore?

12 ADMINISTRATIVE JUDGE LAM: How does it work?

13 THE WITNESS: I mean, once we -- I mean,  
14 actually the process also calls for the person to put in  
15 \$10 in the kitty for the card and the keys, and in order  
16 for that person to get his money back, he has to return the  
17 keys and the card. So, once he doesn't have a card, he  
18 cannot go back in. CHAIRMAN BECHHOEFER: Does this

19 amount to, in effect, a revocation of security clearance?

20 THE WITNESS: There is one more item, Your  
21 Honor, and that is there is a list always of the people who  
22 can go inside the security zone, and that list is updated  
23 to remove the names that no longer have access.

24 CHAIRMAN BECHHOEFER: My question was, does  
25 this amount in effect to -- in certain circumstances to a

1 revocation of security clearance even though a person may  
2 be present at the facility, you no longer could go in a  
3 security zone if you don't have clearance for that anymore,  
4 and if so, is some sort of hearing provision involved or  
5 does not this include that?

6 THE WITNESS: We hardly ever really look at  
7 revocation of security clearance or access because of  
8 suspicion that some harm or damage can be brought to the  
9 facility. The primary cancellation or revocation of the  
10 access is due to the fact that the person is graduated or  
11 moving on or quitting or something of that nature.

12 ADMINISTRATIVE JUDGE KLINE: Well, this refers  
13 to access under University rules?

14 THE WITNESS: Right.

15 ADMINISTRATIVE JUDGE KLINE: Not Atomic Energy  
16 Act type thing.

17 THE WITNESS: Yeah, it hasn't nothing to do  
18 with atomic energy.

19 ADMINISTRATIVE JUDGE KLINE: So when you revoke  
20 his access, you just invalidate his key or take it back?

21 THE WITNESS: Exactly.

22 ADMINISTRATIVE JUDGE KLINE: Does that help?

23 MR. JOHNSON: Somewhat. We are going to go  
24 ahead and move on. We're going on to October 26, 1989.

25 This is actually not minutes. Well, this is a

1 letter to the Safeguards Committee from Dr. Karam, so  
2 hence, that's why it appears in here and I do feel it is  
3 worth noting that -- Yeah, this letter was in the same file  
4 as the minutes when we were presented with the minutes to  
5 look at. So we felt it appropriate to put this in here.  
6 And the subject is the bismuth block leak and what to do  
7 about it.

8 BY MR. JOHNSON:

9 Q It says Dr. Kahn was briefed with regard to the  
10 leak location and what is being done to fix it, and there  
11 is a little asterisk in there indicating the footnote at  
12 the bottom of the page.

13 MR. TURK: Which --

14 MR. JOHNSON: October 26th. It's a letter from  
15 Dr. Karam to the Committee.

16 ADMINISTRATIVE JUDGE KLINE: It's not the  
17 minutes. It's a letter.

18 MR. TURK: Which minutes are they attached to  
19 or --

20 MR. EVANS: No, it's just a letter from Karam  
21 to the Committee, a very long letter, I might add.

22 MR. TURK: I have it.

23 BY MR. JOHNSON:

24 Q The foot note at the bottom says, the fix  
25 attempted was to use epoxy in combination with glass fiber.

1 Once the epoxy harden a stop-leak compound was added to the  
2 circulating water. This recipe for fixing the leak was  
3 used effectively the last time the bismuth block leaked in  
4 1983. Seeing as the bismuth block started  
5 leaking again at this point, and as we understand testimony  
6 to date in this hearing, is leaking as we speak, can you  
7 really say that this recipe for fixing the leak was  
8 effective in 1983?

9 A Between 1983 and 1989, there was a period of  
10 six years were it didn't leak. So for during that period,  
11 it was in effect effective, yes.

12 Q Okay, that's a worthwhile clarification. It  
13 says that the temporary solution is recommended for the  
14 following reasons and goes through several reasons. I  
15 would like for you to turn to page 2 where we find numbers  
16 5 and 6. These items state first, "The Center has several  
17 contractual obligations to run the reactor, one includes a  
18 contract with Savannah River Plant for \$75,000." Surely  
19 any contractual obligation to run the reactor is not  
20 binding to the extent that the reactor must be run even if  
21 maintenance is required, or to rephrase it, could this  
22 obligation not be legitimately -- I don't want to say  
23 avoided because it wouldn't necessarily be avoided-- but  
24 could this obligation not be legitimately suspended for  
25 legitimate maintenance purposes?

1           A       The answer to your question is yes, but since  
2 you are talking about safety, whether or not this impacts  
3 safety, there was a complete evaluation of what the cooling  
4 fluid that goes into the bismuth block do, there was an  
5 evaluation whether or not this fluid was indeed removing  
6 the heat from the block, the bismuth block, and it was  
7 determined that the cooling function, through the bismuth  
8 block, was in fact intact. On the way out, the leak was  
9 taking place and where this leak takes place is a cavity  
10 made out of steel, three sides, and it comes out toward the  
11 outside. So the water that was leaking was channeled so it  
12 would be collected purified and recirculated. So in terms  
13 of impact on the facility, safety-wise, there was no  
14 impact. And that proposal was made to the Safeguard  
15 Committee. Whether the requirement we had -- not  
16 requirement, but the fact that we had contracts with  
17 Savannah River or others was not really relevant. It is an  
18 obligation. The fundamental issue before the committee to  
19 decide on was is it okay to run it as is with the leak with  
20 no implication, health or safety of the people working  
21 there or anybody else, and the committee agreed.

22           Q       And on number six where you see, the center is  
23 negotiating with DOE for a short duration contract, for a  
24 large amount of dollars, approximately 300,000, this  
25 contract is essential for this center's continued

1 existence. Did the center receive this contract?

2 A I don't really recall. I need to go back and  
3 check.

4 Q I see. Since the center does continue to  
5 exist, is it safe to assume that you did?

6 A We did. Mr. Johnson, you must be a realist.  
7 Money is important to the operation of anything.

8 Q I understand. Do you wish -- You know, we have  
9 been trying to clarify to what extent it is a priority and  
10 to what extent other things are a priority, but we do  
11 understand that the center does have to pay for itself in  
12 some way.

13 If you can move back to the first page, there  
14 is a statement that dose rates at the leaking -- and this  
15 is still October 26, 1989 -- dose rates at the leaking  
16 block surface were approximately five rem an hour. Is that  
17 the current approximate rate of the leakage?

18 A Before you have a heart attack, let me explain.  
19 This bismuth block is a considerable distance inside an  
20 enclosure where people don't come close to it. The bismuth  
21 is one side of the reactor, there is a section of it that  
22 goes toward the bismuth block, it's encased in a cavity  
23 about maybe four by four by six feet long made out of  
24 steel. This bismuth block is against the tank way toward  
25 the reactor core.

1           Where people come into the biomedical facility,  
2 dose rates are very, very low. So at the surface of the  
3 bismuth block, which no one comes close to.

4           Q       The next sentence in that same says this level  
5 of radiation limits the amount of time a person can spend  
6 in the vicinity of the block. You're saying that someone  
7 can't get that close to the block. What is meant by in the  
8 vicinity of the block in this context? Apparently there is  
9 some area of the facility where you are close enough that  
10 it limits the amount of exposure.

11          A       In order for us to determine where the leak  
12 was, we had to take all that shield in front of it out and  
13 while it was out and inspecting it, that statement is  
14 correct.

15          Q       So currently, someone who is operating the  
16 reactor would not be receiving a greater than usual dose  
17 because of the bismuth block?

18          A       That's correct.

19          Q       In the same collection of documents, there is  
20 another letter from December 6, 1989, which seems to be a  
21 copy, perhaps a revision of this same letter to the Nuclear  
22 Safeguards Committee.

23          A       Where are you?

24          Q       This is a December 6, 1989 letter -- it was  
25 attached to the --

1 CHAIRMAN BECHHOEFER: Is it this thing that's  
2 headed Memorandum, December 6, '89?

3 MR. JOHNSON: Yes, I believe so. And I believe  
4 that this memorandum had all of the --

5 THE WITNESS: I don't have anything dated  
6 September 6.

7 MR. JOHNSON: It's December.

8 CHAIRMAN BECHHOEFER: December 6, it's a  
9 memorandum.

10 BOARD EXAMINATION

11 BY ADMINISTRATIVE JUDGE LAM:

12 Q Dr. Karam, let me ask you to clarify a  
13 question. Looking at these minutes, they are not a  
14 verbatim transcript of what happened in these meeting, am I  
15 right?

16 A That is correct.

17 Q So by reading the minutes, a lot of things that  
18 had happened in the meeting, one would not be able to  
19 determine what actually happened.

20 A The committee is aware of that criticism. The  
21 minutes reflect actions by the committee, the details of  
22 the discussion leading to decisions, approval or  
23 disapproval normally have been abbreviated. The committee  
24 is considering this as we speak, the same criticism came  
25 from some other source. It's really a committee action.

1 We can relay comments made to us to the committee, the  
2 Secretary of the committee is not a member of the staff of  
3 the Nuclear Research Center, all the committee is really  
4 independent.

5 The feeling is that going through verbatim  
6 relating what was discussed is kind of an effort for the  
7 secretary that the committee seems to go along with, that  
8 the full discussion is not necessarily needed as long as  
9 the actions, the approval, a brief flavor of the  
10 discussions are included.

11 Q So they are exactly what they are labeled, the  
12 minutes of a meeting.

13 A Right.

14 ADMINISTRATIVE JUDGE LAM: Thank you.

15 BY CHAIRMAN BECHHOEFER:

16 Q Several previous witnesses before us have  
17 recommended that the minutes be expanded to include  
18 references to different points of view that were presented.  
19 Would you have authority to order that or would that have  
20 to come from a different source?

21 A I will recommend it to the committee. If the  
22 committee adopts it, that's fine; if not, I will go to  
23 higher powers and maybe request it.

24 BY ADMINISTRATIVE JUDGE KLINE:

25 Q Dr. Karam, looking to this October 26

1 memorandum from you to the Nuclear Safeguards Committee, on  
2 page 7.

3 A Page 7?

4 Q Page 7 of that memorandum.

5 MR. TURK: Which memorandum?

6 ADMINISTRATIVE JUDGE KLINE: The October 26  
7 letter.

8 THE WITNESS: At the end of the memo?

9 ADMINISTRATIVE JUDGE KLINE: Yeah, the very end  
10 of the memo.

11 THE WITNESS: Uh-huh.

12 BY ADMINISTRATIVE JUDGE KLINE:

13 Q There's a paragraph at the end which contains  
14 what appears to be a commitment that you're not going to  
15 operate in that mode beyond the conversion to LEU. And it  
16 now appears that your status is now converting to LEU.  
17 Does that commitment still hold?

18 A Yes.

19 MR. JOHNSON: At this point, we do note that  
20 the December 6 -- the first document in the December 6  
21 stack lists several attachments, including another version,  
22 so to speak, of the October 26 letter.

23 MS. CARROLL: By the way, we just got really  
24 confused and all I can guess is that the minutes from  
25 October 27 have gotten mixed up with the minutes from

1 December 6, and their attachments. Those minutes had four  
2 attachments. So in the middle of those attachments is the  
3 minutes from October 27. I think. My team of lawyers did  
4 this research, I have checked up on them -- my team of  
5 volunteers, you know, my legal staff. But I did check up  
6 on them and I think that that is what happened. But there  
7 is a second copy of the October 26 letter, it is listed as  
8 an attachment to the December 6 minutes.

9 MR. JOHNSON: As Appendix D, actually. If you  
10 can find the December 6 memorandum and look on the second  
11 page, it will say Appendix A, Radionuclide Activity in  
12 Bismuth Block Circulating Water; Appendix B is Thermocouple  
13 Calibration; Appendix D is October 26, 1989 memo from R.A.  
14 Karam to Nuclear Safeguards Committee.

15 BY MR. JOHNSON:

16 Q Our main interest on this and this is just  
17 something we'd like to have clarified, it might not be much  
18 of an issue, is that the two versions are different. On  
19 page 7 of the second set -- the second set doesn't really  
20 have numbers on the pages, which makes it more difficult,  
21 but if you can find a page that starts with a heading 5 at  
22 the top of the page and then has A, B, C, D, E, F, G, H  
23 straight down. The original memorandum, the original  
24 October 26 memorandum on page 7 -- and it is numbered at  
25 the bottom in the original memorandum -- has a number 5

1 listed at the top and an A, B, C, D, E.

2 Our main question is what are the substantial  
3 differences between these two memos, if any, and which memo  
4 was the committee expected to consider the official  
5 version.

6 MR. TURK: I want to try to understand where  
7 you are. In the book that you've given us, there are two  
8 copies of the memo, one following the other.

9 MR. JOHNSON: Which are slightly different.

10 MR. TURK: Those are the two copies?

11 MR. JOHNSON: Yes, that's what we're trying to  
12 compare the two copies, which are slightly different and  
13 again, our main question or our main concern is which one  
14 of these copies was meant to be taken as the official  
15 version by the Committee?

16 MR. TURK: And you're pointing to a difference  
17 on page 6?

18 MR. JOHNSON: On page 7. If you can find page  
19 7 of the original memorandum, that might be easiest, is to  
20 go to the original memorandum because the pages are  
21 numbered in the original memorandum. The second one that  
22 we're referring to, the pages are not numbered.

23 MR. TURK: I'm not sure that you've established  
24 which is the original one.

25 MS. CARROLL: I'm not sure either.

1 MR. JOHNSON: That's true. The first one we  
2 referred to -- when I say original, I mean the first one  
3 that we had referred to, which is further back in the book,  
4 further towards the back of the bound copy that we have  
5 provided to you. It has page 7, it has an item 5 with A,  
6 B, C, D, E. Closer to the front of the book, as an  
7 appendix to the memorandum from December 6, Appendix D is  
8 basically the same memorandum in virtually every way except  
9 for part 6 that has A all the way through F instead of A  
10 through E.

11 MR. TURK: Where do you see reference to  
12 December 6?

13 MR. JOHNSON: Excuse me?

14 MR. TURK: I don't see reference to December 6  
15 on either copy of these documents.

16 MR. JOHNSON: There is no reference --

17 MS. CARROLL: That's their internal problem. I  
18 mean we just took what we got. We did see this at the  
19 office when the minutes were reviewed to us. We got it  
20 again --

21 MR. TURK: I think before making assertions of  
22 what one thing is or another, I think we should ask the  
23 witness why are there these two copies.

24 CHAIRMAN BECHHOEFER: Well, that's what the  
25 question is.

1 MR. TURK: And which is the official copy.

2 CHAIRMAN BECHHOEFER: That's what the question  
3 is, I think.

4 MR. TURK: My problem is the way these are  
5 being characterized is one is the original and one is the  
6 later, one is an attachment to the December 6, one wasn't.  
7 I don't know what was attached or what wasn't. It's not  
8 indicated in the document presented to us which was the  
9 attachment to a December 6 memo.

10 To keep things clean, I would just ask is the  
11 paginated version the final or is it the non-paginated  
12 version? And that way, there's no misunderstanding.  
13 Pagination means numbers are written at the bottom of the  
14 pages

15 THE WITNESS: It seems to me that the December  
16 6 memo was preceded by the report made on October 6 and the  
17 meeting October 26 with the subcommittee on the bismuth  
18 block. And the December 6 memo upgrades and consolidates  
19 everything that's been measured up to that point.

20 BY MR. JOHNSON:

21 Q Now again the question -- and again, this is  
22 the substantial question we want answered, which of the two  
23 versions of the October 26 memo is to be considered the  
24 final version or the official version? Which of these two  
25 versions that we have in our possession was the Safeguards

1 Committee intended to consider?

2 A I don't know that I have two versions. I only  
3 have one version in the compilation that you gave me.

4 Q It is difficult to find.

5 MS. CARROLL: I hope you're impressed that  
6 we're not confused, except about what it means. In all  
7 this paper, we're not confused, but there are two and they  
8 are different.

9 MR. JOHNSON: This is the memorandum from  
10 December 6 right here.

11 THE WITNESS: Uh-huh.

12 MR. JOHNSON: Appendix D is October 6 and this  
13 is the Appendix D. I will direct you to this page and then  
14 as we go further back this way --

15 THE WITNESS: That's it, that's all I've got.

16 MR. JOHNSON: I believe -- no, these are the  
17 two pages. I'm going to pop this one out for you so that  
18 you can compare.

19 THE WITNESS: Wait, wait, don't pop --

20 MS. CARROLL: Rob, there's extra pages that  
21 follow, which is also different. Okay? I mean that  
22 seventh page goes on to an eighth page, which the original  
23 version didn't. And then whether these two charts that  
24 follow were attached to the memo later or another appendix,  
25 I'm not sure.

1 MR. EVANS: Maybe it would clarify if you asked  
2 him how come we have two memos dated October 26 which are  
3 slightly different.

4 MS. CARROLL: That's the question.

5 MR. JOHNSON: I think now that I've helped Dr.  
6 Karam find the two different versions, maybe we can go on.

7 CHAIRMAN BECHHOEFER: Let me ask you what  
8 difference it makes, since the commitment with respect to  
9 fixing the block seem to be identical.

10 MS. CARROLL: We don't know. It's too  
11 technical for us to understand, but we think it might  
12 create confusion for people trying to learn from the  
13 history or ever refer to something that's obviously kept on  
14 file for some reason. We think maybe an outcome of this  
15 would be to scrap one of the October 26 letters so that it  
16 never creates confusion for anybody again.

17 ADMINISTRATIVE JUDGE KLINE: This is business  
18 that was transacted in 1989 and we now know what's  
19 happening today, which is they're going to fix it during  
20 the conversion.

21 MS. CARROLL: But the potential for confusion  
22 from another party like GANE at least, if nobody else ever  
23 gets confused, but a party like GANE could bog a lot of  
24 people down for a long time, so you ought to get rid of one  
25 of the letters, I think.

1 ADMINISTRATIVE JUDGE KLINE: Let me ask Dr,  
2 Karam. Did the Committee, the Nuclear Safeguards Committee  
3 ultimate see both copies? I mean whether or not at the  
4 same meeting. Say at one meeting and then a subsequent  
5 meeting?

6 THE WITNESS: Your Honor, without really  
7 studying the issue, I would guess that the paginated memo  
8 was the final memo; the previous one may have been a draft  
9 and it was not paginated and I don't know how she got  
10 copies of that.

11 MR. TURK: May I point out something that was  
12 brought to my attention by Mr. Bassett, who is present  
13 today. The minutes of October 27, 1989, the committee  
14 minutes, if you look at page 2 of those minutes, which get  
15 into the discussion of the one-hour run of the reactor at  
16 one megawatt, lists items A through J. Those are the A  
17 through J items mentioned in the non-paginated version of  
18 the October 26 memo.

19 That doesn't answer any questions. I'm  
20 pointing that out to indicate that at least A through J  
21 were the items set forth in the minutes. I can't explain  
22 the timing of the two versions of the memo or the  
23 significance of that though.

24 BY MR. JOHNSON:

25 Q This may help us get the information we want.

1 Being that the minutes of the meeting from October 27 lists  
2 the version with items A through J, is it your  
3 understanding that it is the non-paginated version with  
4 items A through J that was the official version before the  
5 committee? Is that question clear?

6 MR. TURK: The last thing the witness said was  
7 that he guesses the paginated was the final version. If  
8 this helps his memory -- maybe it does, maybe it doesn't.  
9 But I think you're pressing for an answer that so far has  
10 been indicated is not available to him.

11 MS. CARROLL: By scanning, that text is exactly  
12 the same as what we thought was the second version of the  
13 letter, since it was attached to a later set of minutes.

14 MR. TURK: Should we go off the record so the  
15 witness can study the documents and perhaps refresh his  
16 recollection?

17 CHAIRMAN BECHHOEFER: Why don't we do that.

18 (A short recess was taken.)

19 CHAIRMAN BECHHOEFER: Back on the record.

20 MR. JOHNSON: Coming back on the record now,  
21 I'm not sure if we still have a question really pending.  
22 If Dr. Karam's testimony is that he's not sure or doesn't  
23 recall which one of these versions of the memo is the  
24 official one to the committee, then I suppose we can move  
25 on. I know we've gotten really entangled in trying to

1 discern between these two versions.

2 MR. EVANS: I believe he's come to some  
3 conclusions on which is the draft and which is the one --

4 MR. JOHNSON: Well then we would be happy to  
5 allow him to elaborate.

6 MR. EVANS: At least that's my understanding.  
7 He can speak for himself.

8 MR. JOHNSON: By all means.

9 THE WITNESS: In the minutes of October 27,  
10 1989, there is reference by Dr. Newman that he suggested  
11 rearranging and changing slightly material attributed to  
12 him from the memo of October 26 without the pagination  
13 either on top or bottom, but with the typed equations, on  
14 page 1, 2, 3, 4 under item number 3; in the one with  
15 paginated numbers, magnesium will form a thin layer, he  
16 recommended that we change that, and knowing Dr. Newman,  
17 that would be typical of him, he said magnesium will  
18 normally form a thin layer. So I think the ones that are  
19 not paginated are -- the memo that's not paginated is the  
20 correct one.

21 In addition to that, the fact that the  
22 equations are typed. And a third item, and that is in item  
23 5 of the memo that is not paginated, part (b) says two  
24 thermocouples will be installed and that's actually what  
25 happened; whereas the previous one says a thermocouple will

1 be installed.

2 So the one that's not paginated is the correct  
3 one.

4 BY MR. JOHNSON:

5 Q And do you feel that the committee was clear on  
6 this?

7 A That's what was given to the committee on the  
8 27th, yes.

9 MR. TURK: I hate to interrupt but I don't want  
10 to have to come back to this again. May I ask a question  
11 as follow up, Your Honor?

12 MR. JOHNSON: We don't object, if it's okay.

13 CHAIRMAN BECHHOEFER: Yeah, we don't object.

14 MR. TURK: The question that Mr. Johnson asked  
15 was which is the final one and the answer was the non-  
16 paginated. But were both -- I guess my question would be  
17 was the other version presented to the committee and upon  
18 inspecting it, they decided it should be changed and that's  
19 how we got to the final one? Where did -- when did one  
20 become final and was the other one ever presented to the  
21 committee, would be my question because the reference to  
22 comments by Dr. Newman would seem to be made after he had  
23 seen a prior version.

24 THE WITNESS: There was a subcommittee. To the  
25 best of my recollection, there were discussions with the

1 subcommittee on that memo and I feel that's why there was  
2 two versions and the final version that was submitted to  
3 the committee as a whole.

4 BY MR. JOHNSON:

5 Q We do have one further question which is about  
6 item number F in the non-paginated version. This speaks of  
7 the flow rate setting of the bismuth block cooling system  
8 being lowered from one gallon a minute to .75 gallons a  
9 minute.

10 Is this equivalent to what we were discussing  
11 with Mr. Mendonca yesterday as the secondary water flow  
12 rate?

13 A No.

14 Q This is primary --

15 A What goes in must come out, what's coming out,  
16 some of it is leaking. Since the sensor for the water  
17 going back is on that portion of the lake, it was lowered  
18 to accommodate the fact that a portion of it now is leaking  
19 out.

20 Q I see. We're going to go ahead and move on  
21 to -- this is the 2/15/90, February 15, 1990 minutes, item  
22 number 5 --

23 MR. EVANS: Excuse me again, but what '90,  
24 where are we?

25 MR. JOHNSON: February 15.

1 MR. EVANS: Okay.

2 MR. JOHNSON: 1990.

3 BY MR. JOHNSON:

4 Q And this is item number 5 here. Mr. Petherick  
5 asked the committee to look into the availability of  
6 resources to handle the removal of radioactive material  
7 from campus. He expressed concern over the safety of the  
8 site on campus where it is presently being stored. His  
9 estimate of the cost of twice-a-year cleaning of the site  
10 was on the order of \$100,000 a year. The committee  
11 unanimously passed a motion to recommend to the  
12 administration that the Institute have an adequate budget  
13 for shipment of radioactive waste.

14 Our question to you, Dr. Karam is was this  
15 recommendation made, first -- was this recommendation  
16 passed on to the administration?

17 A Yes.

18 Q Do you feel that the Institute currently has an  
19 adequate budget for shipment of radioactive waste? Do you  
20 feel that this issue has been resolved satisfactorily?

21 A Yes.

22 Q All right. We're going to go on now to -- oh,  
23 this is going to be the March 22 minutes from 1990, item  
24 number 3 says, at the bottom, talking about the shipment of  
25 waste again, it is expected that the fiscal year '91 budget

1 will satisfactorily address the issue. And it is your  
2 testimony that it did?

3 A It was resolved to my satisfaction. They  
4 basically gave us a number any time that we want to ship,  
5 just tell them how much and it will be shipped. So there  
6 was no really constraint on the budget, although had it  
7 exceeded some numbers, I imagine if they didn't have the  
8 money, they would have come back to us. But this has never  
9 happened.

10 Q And in item number 4, there is -- starting with  
11 the second sentence of item number 4, subsequently the  
12 committee discussed the appropriateness of the Associate  
13 Director of the NNRC, also serving as acting manager,  
14 Office of Radiation Safety until a replacement was found.  
15 Several issues pro and con were thoroughly discussed. The  
16 committee resolved the issue by passing a motion urging the  
17 Director of NNRC to expeditiously find a new manager,  
18 Office of Radiation Safety.

19 Would it be fair to say that after this  
20 thorough discussion, that the will of the committee was  
21 that it was not appropriate for the Associate Director to  
22 serve as acting MORS?

23 A Well, I think you're reading into it more than  
24 is stated.

25 Q Well, what do you fee was --

1           A       Well, they felt that we ought to go ahead and  
2 get a MORS in place as soon we can, and we did.

3           Q       If we could go on to May --

4           CHAIRMAN BECHHOEFER: Let me ask one question  
5 about this particular report, not the section you were in.

6           MR. JOHNSON: Please.

7           CHAIRMAN BECHHOEFER: Item number 6, which  
8 seems to say -- and I'm asking this question in view of the  
9 answers of panel C yesterday to my question on separation  
10 of functions, QA and that type of thing. They said that  
11 the auditing function fulfilled that separation of  
12 functions. This item 6 says that you, Dr. Karam, and Mr.  
13 Kahn had to remind the NSC members to complete the audits.  
14 Now isn't this getting a little bit close to non-separation  
15 of functions if the Director has to talk to the committee  
16 and say hey, audit me?

17           ADMINISTRATIVE JUDGE LAM: I think that's in  
18 the right direction.

19           (Laughter.)

20           CHAIRMAN BECHHOEFER: Well, I'm not saying that  
21 there's anything adverse, but I'm trying to figure out how  
22 it affects the separation of functions which the staff --  
23 panel C -- indicated in response to my question, how it  
24 worked.

25           THE WITNESS: The charter for the Nuclear

1 Safeguards Committee is that audits shall be made annually.  
2 Each member of the committee has a copy of that charter and  
3 this is reiterated to them, that it must be done annually.  
4 Once a year, they are sent a memo by me that it is that  
5 time again for members of the Safeguard Committee to come  
6 and audit our records and our operation. Someone has to  
7 remind them, they are not paid, they all have full time  
8 jobs elsewhere. By and large, they are very conscious and  
9 conscientious about what is needed and they may drag it two  
10 or three weeks, four weeks sometimes, but it is done.

11 CHAIRMAN BECHHOEFER: I take it that you do not  
12 contact them whatsoever concerning the content of the  
13 audit?

14 THE WITNESS: No. When they come in to audit,  
15 we give them the super index of all the procedures, all the  
16 operational records and they pick and choose on a random  
17 basis the procedures they want to audit. They look at it,  
18 they write their reports. The only contact I have with  
19 them afterwards is after I respond to their comments. So  
20 it's completely free, no coercion of any kind I assure you.

21 CHAIRMAN BECHHOEFER: Thank you.

22 THE WITNESS: And if you know some of those  
23 people, you would know that probably they couldn't be  
24 coerced anyway.

25 BY MR. JOHNSON:

1           Q       We're proceeding to May 24, 1990, trying to  
2 move along. Item number 2 from May 24, 1990 says that R.  
3 Karam informed the committee that a DOE team from EG&G in  
4 Idaho had favorably reviewed the operation at Neely and had  
5 recommended to DOE to fund the facility to the tune of  
6 about \$500,000 a year to bring it up to speed.

7                   What did they mean by bringing it up to speed  
8 in this context? Bring it up to speed for what, for what  
9 purpose?

10           A       There was one item that we did anyway, the  
11 cooling tower needed replacement and we did, at our  
12 expense. The \$500,000 didn't ever come into play. What  
13 they were talking about, we were talking about increasing  
14 the staff to be able to run the facility around the clock  
15 for a week. So bringing in people, training them, getting  
16 them licensed and run that facility around the clock for a  
17 week or, you know, during the week but shutdown on  
18 weekends. That is what that's talking about.

19           Q       And did the DOE fund the facility at \$500,000 a  
20 year?

21           A       No.

22           Q       Did not happen?

23           A       No.

24           Q       I thought that's what you said, I just wanted  
25 to clarify.

1                   Okay. Now, we're going to go now to this July  
2 19th.

3           A       Same year?

4           Q       Yes, July 19, 1990, skipping over. This is  
5 going to be page 2 of these minutes and it is going to be  
6 item number 5, starting at the top of number 5 and at the  
7 top of the page there. "Dr. Karam briefed the committee on  
8 the responsibility and liability to committee members. He  
9 stated that the Nuclear Safeguards Committee members  
10 rendered their decisions based on the information given  
11 them by the Neely Nuclear Research Center personnel with no  
12 liability for decisions or recommendations made by the  
13 committee members." I'll go ahead and finish this  
14 paragraph, I guess I should for context. "However,  
15 institute, faculty and staff who are members of the  
16 committee are avoided protection through Board of Regents  
17 insurance policies. Non-institute members of the  
18 committee, of which there are two, may not be protected as  
19 institute members are. The two non-institute committee  
20 members recommended that they need first a letter from the  
21 institute guaranteeing them indemnity against any liability  
22 charges brought against them for service on the committee,  
23 with the exception of their knowingly giving false or  
24 misleading information." Especially when you consider the  
25 last part, with the exception of their giving false or

1 misleading information, what -- what was the concern of  
2 these two members? What did they perceive that they would  
3 be held liable for? What, in terms of their actions on the  
4 committee, could have caused them a liability problem? I'm  
5 just curious. There isn't much context given to how this  
6 discussion came up. I'm just curious as to why they were  
7 concerned about it?

8           A       The discussion came up because the two outside  
9 members raised the issue in terms of liability in case they  
10 are sued for whatever reason because of their position on  
11 the committee. Who is responsible? We discussed the issue  
12 with our legal department, and knowing that these people  
13 were rendering advice for Georgia Tech, free of Georgia,  
14 Georgia Tech came to the conclusion that indeed liability  
15 would extend to cover these people on the outside.

16           Q       Why were they concerned about the possibility  
17 of being sued -- I guess I -- What kind of realistic  
18 scenario involves people getting sued for being on the  
19 Nuclear Safeguards Committee? Especially if it is not a  
20 matter of them giving misleading information or lying?

21           A       I think the lawyers on the panel could answer  
22 it better than I could. Any time you serve on any kind of  
23 committee, the question is, if you give advice to the best  
24 of your ability that is not in any way misleading or  
25 deliberately knowing that it is false, can they be sued for

1 that action on the committee? The question came from them.  
2 It was raised. Georgia Tech responded. We, as members of  
3 the faculty at Georgia Tech, have that insurance  
4 automatically, so we extended it to them as well.

5 Q I see. A matter of consistency --

6 A Right.

7 Q -- to a certain extent. Okay. The other  
8 question, Safeguard Committee members rendered their  
9 decisions based on information given them by the Neely  
10 Nuclear Research Center personnel. Being that the Nuclear  
11 Safeguards Committee is supposed to serve in some ways as a  
12 safeguard, a check, a balance, in a safety function,  
13 shouldn't they perhaps seek out information on their own  
14 the make sure that they have a complete picture of --

15 MR. EVANS: I think I object to the form of the  
16 question. It's just overly broad to the viewpoint. It  
17 depends on what you're talking about. There's testimony in  
18 the record that if they want to get outside help for some  
19 issue, they may, but if it is a rinky-dink sort of a thing,  
20 presumably they would not, and I think the question posed  
21 is just too broad. If you tie it to some hypothetical,  
22 that might be somewhere.

23 MR. JOHNSON: I'll ask a more specific  
24 question.

25 BY MR. JOHNSON:

1           Q       Is there any obligation or responsibility for  
2 these committee members to seek information other than that  
3 provided to them by the Neely Nuclear Research Center  
4 personnel?

5           A       I feel that way, yes.

6           Q       Thank you. I'd now like to go on to the  
7 January 31, 1991 minutes. Number 4, item number 4 on this  
8 document states that, "The committee discussed the status  
9 of the security precautions at the NNRC during these times  
10 of international tension. It was recommended that a motion  
11 detector be installed in the main entrance to announce the  
12 arrival of a person." Was this done?

13           MR. TURK: I think at this point, Your Honor, I  
14 would object, if we are going to start getting into any  
15 details of a security plan. Also, unless there is some  
16 showing of a relationship to management.

17 BY MR. JOHNSON:

18           Q       As the manager of the facility were you  
19 involved in any efforts, if there were any, to proceed with  
20 this plan?

21           MR. TURK: I have an objection to the previous  
22 question.

23           MR. JOHNSON: Well, that's true. I'm sorry,  
24 they should have ruled.

25           CHAIRMAN BECHHOEFER: I thought he had

1 withdrawn the previous question and replaced it with this  
2 one.

3 MR. TURK: Then I would raise the same  
4 objection to this question, Your Honor. The problem I have  
5 is I don't think that we should be getting into details of  
6 a security plan. I don't know that this is or is not a  
7 detailed security plan, but before the witness answers, I  
8 want to note that objection.

9 ADMINISTRATIVE JUDGE KLINE: This is in the  
10 public record.

11 CHAIRMAN BECHHOEFER: This is in the public  
12 record.

13 MR. TURK: What's here is that there was a  
14 recommendation that a motion detector be installed. Now,  
15 the question of whether something was done or not would  
16 become a part of the security plan. It goes beyond the  
17 recommendation.

18 MR. JOHNSON: Is this -- I'm sorry.

19 CHAIRMAN BECHHOEFER: Why don't you -- I think  
20 he is probably right that the answer at least should not be  
21 in a public record.

22 MS. CARROLL: Tell the judges, we'll leave the  
23 room.

24 CHAIRMAN BECHHOEFER: We could have another in  
25 camera.

1 MR. TURK: What's the possible connection to  
2 the management at the facility other than the fact that Dr.  
3 Karam is the manager of the facility?

4 MR. JOHNSON: Excuse me, I'm sorry?

5 MR. TURK: What's the possible connection to a  
6 management issue?

7 MR. JOHNSON: Our entire purpose in even  
8 discussing these minutes at all is that the Nuclear  
9 Safeguards Committee forms an integral part of the  
10 management structure and it is our position that the lines  
11 of communication between Dr. Karam and the committee and  
12 how items put before the committee are resolved are an  
13 indication of how functional that relationship is, and --

14 MR. TURK: This has nothing to do with that  
15 possible theory. Whether or not the committee decided to  
16 install a motion detector has nothing to do with the  
17 relationship between Dr. Karam and the committee. That's  
18 first in response to your question. Secondly, I don't know  
19 of any part of a contention that alleges that the security  
20 measures that are in place are deficient and that shows a  
21 management failing. So regardless of whether they  
22 installed a motion detector or not does not relate to a  
23 management issue in the case. Where will the proof come  
24 that says that they --

25 CHAIRMAN BECHHOEFER: The Board believes the

1 question is relevant for the same reason we found the video  
2 tape matter relevant, but we will disallow the question on  
3 the grounds that the answer should not be in the public  
4 record, and if it gets very close and if we decide that the  
5 answer is needed, we'll have to go in camera for that  
6 question and answer. I'm not sure that that one question  
7 and answer would be crucial to our overall decision one way  
8 or the other.

9 MR. TURK: Your Honor, I would argue again, I  
10 appreciate the ruling, and there's no need for me to say  
11 anything further, but I take exception to the ruling that  
12 there is some relevance to this.

13 CHAIRMAN BECHHOEFER: Well, you took exception  
14 to our ruling on the video tape as well, and you were  
15 overruled.

16 MR. TURK: Nonetheless, I do not see any  
17 possible connection of this matter to the management  
18 contention before you, and if we do get into further  
19 questions, I'll raise that objection again.

20 CHAIRMAN BECHHOEFER: We can proceed.

21 MR. JOHNSON: Are we --

22 CHAIRMAN BECHHOEFER: Go ahead.

23 MR. JOHNSON: We just wish to note that in  
24 light of the video tape mentioned, it would seem not -- and  
25 we'll be happy to drop the issue in light of the security

1 plan and not wanting that to get to the public record.

2 That was all we wanted to say.

3 BY MR. JOHNSON:

4 Q We would like at this point to go on to May --  
5 May 9, 1991. Item number 4 --

6 CHAIRMAN BECHHOEFER: Wait a minute.

7 MR. JOHNSON: I'll allow everyone to find it.

8 CHAIRMAN BECHHOEFER: Yeah, that's fine.

9 MR. JOHNSON: It's May 9, 1991, item number 4.

10

11 BY MR. JOHNSON:

12 Q "The committee discussed a request of setting  
13 lower limits on secondary water flow rate in the GTRR. It  
14 was decided that more data was needed to perform detailed  
15 power calculations and that the request be denied.  
16 However, a 90 day trial approval was given with the proviso  
17 that the flow rate be adjusted back to 960 gallons per  
18 minute at the end of the trial period." Now, is this the  
19 same -- the secondary water flow rate is not the same as  
20 the set point. Is that correct? Those are two different  
21 values?

22 A I believe it is one in the same.

23 Q It is one in the same. Is saying that it be  
24 adjusted back to 960 gallons per minute at the end of a  
25 trial period, in this particular note, there is no mention.

1 I was wondering if you could enlighten us. What was the  
2 original flow rate before this trial approval was given?

3 MR. TURK: I think that --

4 MR. JOHNSON: I'm sorry, I was totally  
5 incorrect. I'm going to withdraw that question and I am  
6 going to rephrase it.

7 BY MR. JOHNSON:

8 Q What was it adjusted to -- It says it will be  
9 adjusted back to 960 gallons per minute. What I mean to  
10 ask is, what was it adjusted to for the 90 day trial  
11 period?

12 MR. TURK: I think there is some confusion.  
13 This was gone into in testimony, if I am not mistaken, by  
14 the staff, and there is a distinction drawn in the flow  
15 rate and the lower limit, the low level set point.

16 MR. JOHNSON: Yes, exactly. The set point.

17 MS. CARROLL: We just asked Dr. --

18 MR. TURK: The question that was asked is --  
19 had a predicate that this is the flow rate.

20 MR. JOHNSON: Yes, and it says, the secondary  
21 water level.

22 MR. TURK: It says the lower limit.

23 MR. JOHNSON: I see.

24 BY MR. JOHNSON:

25 Q Well, then, for the purpose of clarification,

1 the committee discussed a request of setting lower limits  
2 on secondary water flow rate. The term set point is not  
3 used in that sentence. To us it seems to be discussing the  
4 secondary water flow rate in setting lower limits for that.  
5 Are we incorrect when we read it that way, Dr. Karam?

6 A Yes, the lower limit is the point where the set  
7 point is set at.

8 Q Okay, then that is helpful clarification.  
9 Thank you, sir. And what was it adjusted to during the  
10 trial period before it was adjusted back to 960 GPM?

11 A I believe 900, but I'm not 100 percent sure.

12 Q I think that that matches -- I think that does  
13 match up with what we --

14 MR. JOHNSON: We can go off the record  
15 probably.

16 CHAIRMAN BECHHOEFER: Off the record for a  
17 minute. Let's take a quick break. I have to make a phone  
18 call at 4:00.

19 (Off the record)

20 CHAIRMAN BECHHOEFER: Back on the record.

21 MR. JOHNSON: Again, we do wish to clarify this  
22 whole issue of the water flow and the set point with one  
23 further question.

24 MR. TURK: What's the management issue? We did  
25 this yesterday, and I made the point that there are eight

1 federal employees, eight government workers sitting here  
2 trying to educate you on the flow point. What is the  
3 management issue? We just keep going back to it again and  
4 again. I object.

5 CHAIRMAN BECHHOEFER: I am advised there is no  
6 safety significance at whatever level it is set at, so we  
7 will allow the objection.

8 MS. CARROLL: You will what?

9 CHAIRMAN BECHHOEFER: We will allow the  
10 objection. We will uphold the objection. I'm told it  
11 doesn't matter what they set it at or whether they set it,  
12 so there's obviously no management issue.

13 MS. CARROLL: It's not apparent since they  
14 discussed it in the Nuclear Safeguards Committee over  
15 several meetings and there is a section in their safety  
16 analysis report. We aren't talking about it from a safety  
17 standpoint necessarily, but from the Nuclear Safeguards  
18 Committee having deliberated over it for several meetings,  
19 a lot of confusion. Two questions ought to clear up the  
20 record.

21 MR. TURK: There is no confusion --

22 CHAIRMAN BECHHOEFER: There is no confusion.

23 MR. TURK: -- except in your mind and that's  
24 because you didn't listen to the prior testimony.

25 MS. CARROLL: I thought we didn't know what was

1 in each other's mind. That was speculative.

2 ADMINISTRATIVE JUDGE KLINE: Let's don't get  
3 into that. We have been asked the question as to what is  
4 the management issue here. The fact that this took place  
5 in the safety committee just indicates, as far as I can  
6 see, without anything more, just business as usual before a  
7 committee. Now, what is it that flags this particular  
8 issue and ties it to the management deficiency of the  
9 nuclear reactor that could have some bearing on management?

10 MS. CARROLL: It is an apparent discrepancy and  
11 the question we were going to ask is that the words flow  
12 rate are used in the minutes and wouldn't it be better if  
13 it does mean set point to change it to set point because  
14 this is the origin of our confusion is that it probably was  
15 badly worded in the minutes.

16 ADMINISTRATIVE JUDGE KLINE: Well, we observed  
17 yesterday that we are not going to go through the  
18 document -- We said the SAR, but let's include this -- and  
19 edit it for them. I mean, you may wish to edit these  
20 documents, but isn't really very helpful and it is not  
21 helpful to us in trying to decide whether a license should  
22 be issued or not related to this petition.

23 MS. CARROLL: Well, I hope you see there is a  
24 valid origin of our confusion that they used the wrong  
25 words, that's why we got off on this. Now, it can stand

1 uncorrected, but I want you to perceive that we were paying  
2 attention and there is a valid reason that we got off on a  
3 non-issue.

4 ADMINISTRATIVE JUDGE KLINE: Well, there is a  
5 premise here that it is uncorrected, or that there is  
6 something in need of correction. Why don't we ask the  
7 witness if there is?

8 MS. CARROLL: Well, we were going to, but we  
9 got objected to.

10 ADMINISTRATIVE JUDGE KLINE: Okay, let's just  
11 ask the witness now. Is there anything in need of  
12 correction on this?

13 THE WITNESS: No, sir.

14 ADMINISTRATIVE JUDGE KLINE: Okay. Isn't that  
15 easy?

16 MS. CARROLL: Unless you get objected to.

17 (Laughter)

18 MS. CARROLL: Now, there was just one tiny  
19 little piece of it which is that there's no set point  
20 referred to in Section 4.4.8.2, which further led to our  
21 confusion that there was any distinction, and we wondered  
22 if there was any regulatory requirement to be met on the  
23 set point of the secondary water flow?

24 THE WITNESS: Not this particular one. There  
25 are set points that are required, but not on the second

1 level.

2 MS. CARROLL: Thank you. That lays this matter  
3 completely to rest. May it rest in peace.

4 (Laughter)

5 MR. JOHNSON: At this point we will go ahead  
6 and move on to June 27th of '91, which -- Oh, these are out  
7 of order as well.

8 CHAIRMAN BECHHOEFER: It's right next door.

9 MR. JOHNSON: Is it? Not in this one.

10 CHAIRMAN BECHHOEFER: It's the next one in  
11 line.

12 MR. JOHNSON: September and August are out of  
13 place in this one. I don't know how that happened, but  
14 I'll just change it around.

15 CHAIRMAN BECHHOEFER: Well, anyway, June is  
16 right here.

17 MR. JOHNSON: June 27th.

18 THE WITNESS: This, you can blame on us, I  
19 suppose, since you put this together. Is that right?

20 (Laughter)

21 MS. CARROLL: But if his copy is right and  
22 theirs is wrong, I blame it on QuikCopy.

23 MR. JOHNSON: QuikCopy is not here to defend  
24 themselves.

25 THE WITNESS: So you have a management problem

1 of your own, is that it?

2 (Laughter)

3 MS. CARROLL: Without safety implications.  
4 Just minor annoyances.

5 (Laughter)

6 BY MR. JOHNSON:

7 Q Part 2, section ii of these minutes states, "R.  
8 Karam informed the committee of the interest shown by EG&G  
9 Idaho to make the NNRC a major BNCT facility. EG&G showed  
10 interest in supporting the research and activity at the  
11 NNRC of 500,000 to one million dollars," perhaps a year,  
12 I'm not sure, "provided Georgia Tech continues to support  
13 the functioning of the center." And it says, "It will take  
14 anywhere," -- Well, I'll just leave that at that. Well,  
15 actually, I will go down, "It is anticipated that some  
16 changes will be made to the configuration of the facility."  
17 We've already heard Dr. Karam's testimony on that. It will  
18 take anywhere from six months to one year to get NRC  
19 approval for such changes." Is NRC approval necessary to  
20 make these changes?

21 A Depends on what changes --

22 Q Well, these specific changes --

23 A Generally, though, for any change -- any change  
24 that we do to the facility, we go through a procedure of  
25 assessing whether or not it meets 50.59 requirements. If

1 it does, we have to submit it to NRC. If it doesn't, what  
2 we normally do is we get approval from the Safeguard  
3 Committee and inform the NRC that this is impending and  
4 give them a chance before we do anything to object or raise  
5 a flag before we do it. So this is the process that we  
6 pursue.

7 Q Item number 2 iii, down at the bottom, R. Karam  
8 informed the committee NRC had improved a modification of  
9 the organization chart of the NNRC, removing the chair of  
10 the NSC from being the RSO at Georgia Tech. At Georgia  
11 Tech the Manager of Office of Radiation Safety is  
12 equivalent to the Radiation Safety Officer. Is this a  
13 formal attempt to clarify any confusion about the  
14 management structure at the facility?

15 A We never had any confusion in our minds.

16 Q But did you conform to the charts?

17 A We should be asking the question for people  
18 like you, that's fine. Did that help you?

19 MS. CARROLL: Yeah, after two weeks of  
20 wondering what happened, it happened here. It's nice to  
21 know that.

22 THE WITNESS: Well, I'm glad I eliminated the  
23 confusion.

24 BY MR. JOHNSON:

25 Q We do wish to note -- We do wish to note, just

1 as a matter for the record at this point, before we go on  
2 to the next actual minute citation, that we do believe  
3 there was a meeting on November 14, 1991. I believe there  
4 is reference to it in the meeting prior. However, there  
5 are no minutes for it that have been provided to us or that  
6 we knew to exist. And this is -- Just for general  
7 reference, if you will look at September 26, 1991, it says,  
8 the next meeting of the committee was scheduled for  
9 November 14th, and the next meeting we have minutes for is  
10 December, and they approved -- They say the minutes of  
11 September 26th were deferred. There's not even any mention  
12 of whether the meeting did take place on November 14th of  
13 not. We just wanted to note the record keeping seems  
14 incomplete. Do you recall, Doctor?

15 A Where are you reading from?

16 Q Well, first if you will look at September 26,  
17 1991, you'll find number 10 at the bottom of the page, the  
18 next meeting of the committee was scheduled for November  
19 14, 1991 at 1:00 p.m.

20 A Okay.

21 Q The next set of meetings that we have -- the  
22 next set of minutes that we have for the next meeting is  
23 December 19th. There is no mention of a meeting of  
24 November 14th of even if one existed or not, and again, you  
25 know, being that the NSC is an important management

1 safeguard, we were concerned that the records seemed  
2 incomplete or inaccurate.

3 A Is that a question?

4 Q Well, let me ask this question. Was there a  
5 meeting? Do you recall a meeting taking place on November  
6 14th?

7 A It's not unusual, Mr. Johnson, that the date  
8 for the next meeting is set at the meeting before. It's  
9 not unusual that that date for the next meeting sometimes  
10 is changed because members of the committee -- not all  
11 members of the committee can meet. So unless we have a  
12 quorum, the meeting is deferred to some other time.

13 Q Is it traditional that in such a case there  
14 were be an official notice or reference of the fact that  
15 the meeting was canceled?

16 A There is no official anything. It just was  
17 held on the day we could get a quorum.

18 Q And if we would go to January 29, '92, there is  
19 a great detailed discussion -- This is actually another one  
20 of these memos to the Nuclear Safeguards Committee --  
21 excuse me, this is not minutes proper. This is a memo to  
22 the committee from Dr. Karam. This is a detailed summary -  
23 - I'm sure it's not fully detailed, but it is a detailed  
24 summary of these of a contract that the Neely Center  
25 received from EG&G to irradiate LIH lithium hydroxide, I

1 suppose.

2 THE REPORTER: I'm sorry? LIH --

3 MR. JOHNSON: It's a chemical notation.

4 THE REPORTER: What was the word you said? LIH?

5 MR. JOHNSON: I was assuming that probably mean  
6 lithium hydroxide. I'm not sure if that is accurate.

7 THE WITNESS: The correct name is lithium  
8 hydride.

9 MR. JOHNSON: Hydride. Thank you.

10 BY MR. JOHNSON:

11 Q This is discussed in great detail and fairly  
12 matter of fact. Is this experiment one that required  
13 approval from the Nuclear Safeguards Committee or is this  
14 memo just offered for their knowledge and edification?

15 A At the end of that you would see NSC approval  
16 is requested -- of that memo.

17 Q But I guess my question is, is it necessary for  
18 the experiment to continue?

19 A Any experiment that is conducted in the  
20 facility is submitted to the committee for approval. Any.  
21 The only exceptions are those experiments that have been  
22 approved and repeated verbatim.

23 Q I see. And was this approval given?

24 A Yes.

25 Q Is there any documentation of this approval?

1           A       Should be, someplace. On the meeting of  
2 January 30th of the Safeguard Committee 1992, item 2 says  
3 the committee approved SB100 lithium hydride radiation  
4 experiment.

5           Q       Thanks. We will move on to 4/30/92, April  
6 30th.

7           MR. EVANS: At this time I am going to impose  
8 an objection to the entire line of questioning on these  
9 minutes. I have counted these one, two, three, four, five,  
10 six, seven, eight -- We've spent about an hour, we've gone  
11 over twenty minutes, I have yet to hear anything where as I  
12 think to do with this case. 16 February '88, Dr. Karam  
13 disagrees with somebody on the thoroughness of NRC  
14 examinations. The next one, March '99 (sic), the committee  
15 rejects Boyd's shutdown recommendation. I don't see  
16 anything in here -- We've been wasting an hour. We haven't  
17 heard a thing that has anything to do with management. I  
18 think the questioning -- the entire line of questioning  
19 should be ruled out. It should be completed. I think all  
20 documents -- I don't care whether you are talking about the  
21 whole book or those specifically referred to, I think they  
22 should all be -- Well, they haven't been tendered yet, but  
23 they ought to be rejected from being tendered -- or  
24 tendered and kept out, because it just seems to me we are  
25 wasting an awful lot of time about nothing.

1 MR. TURK: Your Honor, I would join in Mr.  
2 Evan's objection. I'm trying to imagine what your decision  
3 would look like with regard to these matters. I'm trying  
4 to imagine how we would write proposed findings that  
5 reference these matters in any way that's relevant to the  
6 issue before you. I don't see a connection.

7 CHAIRMAN BECHHOEFER: How much more time do you  
8 think you need on this series here?

9 MR. JOHNSON: Can we take a moment off the  
10 record?

11 CHAIRMAN BECHHOEFER: Yes, off the record.

12 (Off the record discussion.)

13 CHAIRMAN BECHHOEFER: Back on the record.

14 MS. CARROLL: There are only three more  
15 questions on the minutes.

16 MR. EVANS: Well, the only thing I'm worried  
17 about -- Are we off the record? We can be off the record  
18 for this. I'm just saying, off the record, that we were  
19 trying to finish this up tomorrow --

20 CHAIRMAN BECHHOEFER: We don't need the red  
21 flags raised every time that there's a line of questioning  
22 that somebody disagrees with.

23 MR. EVANS: The point is, it's a total waste of  
24 over two hours this afternoon. I just can't understand  
25 that.

1 MS. CARROLL: Waste is in the eye of the  
2 beholder, I guess.

3 MR. EVANS: Maybe so, but...

4 CHAIRMAN BECHHOEFER: Back on the record.

5 MR. TURK: You've been on the record.

6 CHAIRMAN BECHHOEFER: Oh, I'm sorry.

7 MR. TURK: Mr. Warren here, he's taking it all in.

8 CHAIRMAN BECHHOEFER: Okay. I'm sorry.

9 (Laughter)

10 MR. JOHNSON: In the minutes from April 30,  
11 1992, towards the bottom of the page, it says --

12 MR. EVANS: What is the date?

13 MR. JOHNSON: April 30, 1992, and these minutes  
14 have a substantially different look to them than many of  
15 the other ones. It should be easy to pick out, the way the  
16 top of the page looks is not the same as most of the rest  
17 of them.

18 BY MR. JOHNSON:

19 Q Towards the bottom it says, James Powers' form  
20 A was approved. There was some question as to how James  
21 Powers was able to obtain radioactive materials without  
22 going through channels. The radioactive procedures  
23 violation here is supposed to be investigated and reported  
24 on at the next meeting. My question is, is this  
25 appropriate management attitude to approve someone's Form A

1 when they are, quote, unquote, "may be a procedures  
2 violation"? First, perhaps, we should say for the record,  
3 Dr. Karam, what is a Form A? What is the function of a  
4 Form A?

5 MR. TURK: May we inquire, maybe as a  
6 predicate, whether James Powers is associated with the  
7 reactor or is this a state licensed material user?

8 THE WITNESS: The answer to that question is  
9 the state license has nothing to do with the reactor.

10 MR. EVANS: In that case, I certainly will  
11 object to the question being asked.

12 CHAIRMAN BECHHOEFER: I think if it only  
13 relates to the state license we will disapprove the  
14 question -- uphold the objection.

15 MR. JOHNSON: Okay, we're moving on.

16 BY MR. JOHNSON:

17 Q 6/25/92, June 25, 1992, there is on the second  
18 page, part 7 ii, a request has been made to the president  
19 to approve replacements of retiring members, Doctors  
20 Gordon, Fairfield and Mahaffey by Doctors Braga, Tornabene  
21 and Ghiaasiaan. It is -- Was this request made by you or  
22 was it made by the committee?

23 A Whenever we have a change in the membership of  
24 the committee, the committee devises a list of potential  
25 members of the committee and in this particular case, the

1 recommended members were the three names involved, Dr.  
2 Braga, Tornabene. Dr. Braga is a chemist. Dr. Tornabene  
3 is a bio-chemist and Dr. Ghiaasiaan is a nuclear engineer.  
4 I don't recall if I made the request to the president by  
5 sending him that and their resumes or the committee.  
6 Probably my office made the submission to the president for  
7 the appointment.

8 Q And this is a fairly standard procedure  
9 whenever there are openings that come up in the --

10 A Yes.

11 Q At this point we would like to -- Let's go to  
12 10/13/95. This is a memo, actually. This is a memo  
13 dated --

14 This memo is signed by Mr. Cobb who is the chairman of the  
15 Nuclear Safeguards Committee.

16 A Before you get very far, this is also totally  
17 state license. It has nothing to do with the center.

18 CHAIRMAN BECHHOEFER: Which date was this?

19 MR. JOHNSON: This is October 13, 1995. It's a  
20 memo --

21 MR. EVANS: Subject: Old X-ray Producing  
22 Devices.

23 MR. JOHNSON: We have one yes or no question on  
24 this. We'll throw that out. This would be our last  
25 question about these minutes.

1 CHAIRMAN BECHHOEFER: Do you have a question to  
2 ask, did you say?

3 MR. JOHNSON: Dr. Ice already testified about  
4 this memo. We just wish to ask a yes or no question to Dr.  
5 Karam. Has this been fixed? Has this been resolved? Yes  
6 or no, and that will be the last question we ask about  
7 these minutes.

8 MR. TURK: Has what been fixed?

9 MR. JOHNSON: Has the x-ray -- Have new devices  
10 been acquired? Have the old ones been repaired? Has the  
11 situation been resolved?

12 THE WITNESS: Is it okay to answer it? No.

13 MR. JOHNSON: Thank you, sir.

14 MR. TURK: Your Honor, at this time I think it  
15 is appropriate to move to strike without us having to get  
16 into more explanation about, well, why not? And was it  
17 necessary to replace the machines or not and what does that  
18 prove about management at the facility? It seems to me the  
19 question and answer do not relate to this license and  
20 should not be a part of this record, without us having to  
21 go into the converse and explore the opposite.

22 MR. EVANS: About x-ray machines.

23 CHAIRMAN BECHHOEFER: Okay, we will decline to  
24 strike the answer. I won't - and when you offer the  
25 documents, we may not accept all of the documents when you

1 formally offer your documents into evidence.

2 MS. CARROLL: Can we go off the record for a  
3 minute because we're about to offer the documents and I  
4 think we need to share an understanding of what we are  
5 going for.

6 CHAIRMAN BECHHOEFER: Off the record.

7 (Discussion off the record.)

8 CHAIRMAN BECHHOEFER: We're back on the record.

9 MR. EVANS: To avoid spending a great deal of  
10 time on rebuttal, it would help if I would be permitted to  
11 ask a clarifying question. It's my understanding the court  
12 denied the motion to strike the question and answer;  
13 therefore, they are now in the record.

14 CHAIRMAN BECHHOEFER: Right. Right now though,  
15 we have to determine whether any or all of these minutes  
16 get put in the record.

17 MR. EVANS: Well, we --

18 CHAIRMAN BECHHOEFER: Before you go back --

19 MR. EVANS: Could I ask a clarifying -- I would  
20 like to ask a question on the last answer.

21 CHAIRMAN BECHHOEFER: Oh, okay.

22 MR. EVANS: I'm not talking about the minutes,  
23 I'm talking about the last answer.

24 CHAIRMAN BECHHOEFER: Oh, okay. Yeah, you can.

25 MR. EVANS: You were asked a question about the

1 committee recommended that the X-ray units -- it had  
2 nothing to do with the reactor -- be replaced with units  
3 that have interlocks for safer operation. You were asked  
4 has this been done; your answer was no. I would like to  
5 ask you -- it's a compound question, if I may. First of  
6 all, why were they not replaced and second, what, if  
7 anything, has been done to alleviate the situation of these  
8 machines?

9 THE WITNESS: If I may answer the last question  
10 first. Indeed in any operation there are philosophical  
11 approaches to the solution of the problem. Administrative  
12 control is almost always one way of solving the problem.  
13 By administrative controls, I mean that you write very  
14 tight procedures to tell the people who are using these  
15 machines that this is how we want you to use them and you  
16 can only use them under these conditions. We go through  
17 this with everyone on that list that has a machine like  
18 that. And that has been done.

19 The other side of the issue, which comes to  
20 your first question, have they been replaced? The answer  
21 is no. That requires quite a bit of money. The money has  
22 not been appropriated to replace all the machines we're  
23 talking about.

24 MR. EVANS: Thank you.

25 CHAIRMAN BECHHOEFER: Okay, are you ready?

1 MS. CARROLL: We have a follow-on question to  
2 that. Did the committee approve the administrative  
3 approach to solving the problem?

4 THE WITNESS: Absolutely.

5 MS. CARROLL: I take it those are in the  
6 minutes from 1996 that we haven't seen?

7 THE WITNESS: They are in the minutes some  
8 place, yes.

9 MS. CARROLL: Okay.

10 MR. JOHNSON: At this point, we would like to  
11 offer GANE Number 44 into evidence with the stipulation  
12 that we would only offer those documents that we have  
13 specifically asked questions about in the proceeding today,  
14 with the exception -- we would actually even except 9-30-  
15 88, which we did ask a question about. We would even  
16 stipulate that that one wouldn't be -- would be one that we  
17 would not ask to go in the record. And also 5-24-90. With  
18 the exception of those two, and also -- let's see, 1-29-  
19 92 -- 1-29-92, 4-30-92 and 6-25-92. So those would be five  
20 exceptions.

21 CHAIRMAN BECHHOEFER: The 1-29, is this one  
22 you're not offering?

23 MR. JOHNSON: Yes.

24 CHAIRMAN BECHHOEFER: Okay.

25 MR. JOHNSON: I now have --

1 CHAIRMAN BECHHOEFER: I'm just going to mark  
2 out the ones you're not offering.

3 MR. JOHNSON: Yes, we have five, I believe.  
4 I'm going to go through it one more time. 9-30-88, 5-24-  
5 90, 1-29-92, 4-30-92 and 6-25-92. With the exception of  
6 those five, we would wish to offer into evidence -- and we  
7 would also -- because we did use this document as a  
8 reference when we were cross examining Dr. Ice, we would  
9 like to offer 12-8-94, 2-9-95 and 3-23-95 as they pertain  
10 to our discussion that we had with Dr. Ice when he was on  
11 the stand. So those three we discussed with Dr. Ice and  
12 with the exception --

13 CHAIRMAN BECHHOEFER: Would you read out those  
14 three again?

15 MR. JOHNSON: 12-8-94, 2-9-95 and 3-23-95. And  
16 with the exception of the five that we're withdrawing, the  
17 ones that we have referenced today, we offer those into  
18 evidence as GANE 44.

19 MR. EVANS: I would object to any of the  
20 documents being admitted. In trying to save time, I'm  
21 going to argue them all together because the reasons are  
22 basically the same, starting with the first one of 16  
23 February, 1988 on. What do these minutes show? As I see  
24 it, they all show that the committee, the Nuclear  
25 Safeguards Committee, was performing the way it was

1 supposed to. It was having meetings, analyzing things and  
2 making decisions. There is not a suggestion, not a  
3 scintilla, not a hint of any mismanagement on the part of  
4 Dr. Karam, of the president of Georgia Tech, of the dean of  
5 engineering, of anyone in the superstructure, of anyone on  
6 the staff. There is not a hint of -- there's not a  
7 suggestion of anything that could be even remotely called  
8 mismanagement or a flaw in management, even a defect in  
9 management.

10 We have, as I see it, wasted over two hours  
11 going over minutes that have absolutely nothing to do with  
12 anything remotely in this case. The minutes -- now the  
13 testimony is in the record. I suppose technically maybe I  
14 should move to strike the entire line of testimony. I  
15 think that would be appropriate. But if you want to keep  
16 the testimony in, anything relevant, which I don't think  
17 there is anything relevant, but even if you thought  
18 anything was relevant in the documents, that has been  
19 incorporated in the questions and answers in the testimony;  
20 therefore, the documents themselves would be redundant as  
21 to the point from which they are tendered. So you have  
22 redundancy, but it's redundancy of something which is  
23 irrelevant. It has nothing to do with any issue in the  
24 case. It is immaterial.

25 I mean, we've heard -- I kept asking myself,

1 and I try to be objective. I kept coming back with the  
2 same thing, so what? I mean, you hear comments about  
3 eating and drinking. Well that's a no-no. Everybody  
4 agrees that you ought not to eat and drink where you have  
5 isotopes. Big deal. So what? What does it show in this  
6 case? I guess I'm a little upset because I really feel  
7 that we're trying to wind this thing up and we've wasted  
8 over two hours this afternoon for absolutely no legitimate  
9 purpose.

10 CHAIRMAN BECHHOEFER: Let me tell you what the  
11 Board proposes to do, and that is to allow these minutes in  
12 for what they're worth and subject to the limitations that  
13 the intervenors have placed on them, but not the ones  
14 that -- there are three, if I kept my records correct.  
15 Three of the ones that aren't already stricken that relate  
16 only to state matters. And as far as we can see, there's  
17 no relationship at all to the federal license. Those are  
18 February 16, '88; October 14, '88 and October 13, '95. We  
19 would propose not to let those in, but to let the others in  
20 for what they're worth. And the finding can be a proposed  
21 finding these don't demonstrate anything. On the contrary,  
22 if the intervenors want to use them to prove their case, I  
23 think they should be able to. They may not succeed, but I  
24 don't think we should decide on the merits at this stage.

25 MR. TURK: Your Honor, I think there's some

1 disconnect --

2 CHAIRMAN BECHHOEFER: Pardon?

3 MR. TURK: There must be some disconnect in  
4 what's being offered and the reason for the offer. As I  
5 understand it -- tell me if I'm wrong. I ask GANE to tell  
6 me this. GANE is offering the entire volume of what's been  
7 marked as GANE Number 44, is that correct?

8 MS. CARROLL: No.

9 MR. JOHNSON: No, that's not correct.

10 CHAIRMAN BECHHOEFER: No, they are --

11 MR. TURK: You are only offering the ones that  
12 you examined on?

13 CHAIRMAN BECHHOEFER: That's correct.

14 MR. JOHNSON: I believe --

15 MS. CARROLL: I am having a misgiving right  
16 now, which is -- you know, we have made the claim that  
17 there -- in two instances that there was no follow-on, no  
18 satisfactory follow-on in here and we don't -- you know, we  
19 can still probably find that unless we're given some  
20 rebuttal that can't be denied. So, I hope we haven't  
21 obviated the use of them for that, to make that claim. But  
22 other than that --

23 MR. TURK: I would like --

24 MS. CARROLL: We do want to stipulate that this  
25 is what we face on except for our two claims, but they

1 didn't follow up as they should have.

2 MR. TURK: I don't understand the offer. Even  
3 with that extra statement, I don't know if they're offering  
4 the whole book or they're not.

5 CHAIRMAN BECHHOEFER: Well they've made it very  
6 clear for the record that they're not.

7 MR. TURK: All right. With that understanding,  
8 then I would like to address --

9 CHAIRMAN BECHHOEFER: Only the ones that they  
10 elicited testimony on.

11 MR. TURK: Then, I was --

12 CHAIRMAN BECHHOEFER: And they had some that  
13 were excluded and they announced what they were. And we  
14 have identified, I think, three others that are state only,  
15 which we will not take.

16 MR. TURK: I believe what I need to do then is  
17 to address each of the documents that are being offered  
18 individually to understand a ruling on each of them and to  
19 make sure the Board understands the purpose for its offer  
20 and whether it's relevant. Because GANE's interest in  
21 getting them into the record does not make them relevant  
22 and I think the parties should be able to address each of  
23 them. Now that will take a little bit of time. It will  
24 take less time than the three hours of examination that has  
25 preceded already. But examination for three hours was

1 allowed and I think we should be allowed to address the  
2 relevance of each of the documents that are being offered.

3 CHAIRMAN BECHHOEFER: We are approaching five  
4 o'clock.

5 MR. TURK: Well, we can do it tomorrow morning  
6 if necessary. I understand that Ms. Carroll has an  
7 engagement tonight which requires her to leave here at five  
8 o'clock. So we can do that tomorrow morning.

9 CHAIRMAN BECHHOEFER: That's why I was aiming  
10 for five.

11 MR. TURK: I would like to address the  
12 relevance of each of the documents that are being offered.  
13 And I would suggest perhaps for the sake of clear record  
14 that each of those documents individually should be marked  
15 for identification and we can then argue the admissibility  
16 of each of them.

17 CHAIRMAN BECHHOEFER: I think we can do it by  
18 date just to save time from going through and marking each  
19 one. Forty-four with the date of the subheading --

20 MR. TURK: I'm used to a procedure where if an  
21 exhibit is offered, it gets a number and then it goes with  
22 the record whether it's excluded or it comes into the  
23 record.

24 CHAIRMAN BECHHOEFER: It would take a long time  
25 to mark them that way.

1 MR. TURK: Otherwise, if you're going to refer  
2 to a document in your decision, you need to refer to it by  
3 an exhibit number.

4 CHAIRMAN BECHHOEFER: Exhibit 44, date.

5 MR. TURK: I think a better procedure is simply  
6 to number each of them. The numbering of them takes a  
7 moment. We would say this item is this number and we go  
8 on. But I would like to address the admissibility of each  
9 document.

10 CHAIRMAN BECHHOEFER: Well, okay, we don't have  
11 any strong feelings about that. We will allow you tomorrow  
12 to object -- but don't object to the three that we've said  
13 we won't take.

14 MR. EVANS: May I inquire, is that the  
15 completion of your cross exam?

16 MR. JOHNSON: We have two more questions.

17 MR. TURK: May I just --

18 MS. CARROLL: I think. I'm going to kind of  
19 shuffle through the paper a little bit before I commit to  
20 that, but we're really down to the wire.

21 MR. TURK: For clarification, which are the  
22 three that you said you will not admit?

23 CHAIRMAN BECHHOEFER: On the basis that they  
24 are state only -- relative only to the state. My notes  
25 here aren't too good, but February 16, '88; October 14, '88

1 and October 13, '95. Now in addition, there were several  
2 other state only ones which the intervenors have withdrawn.

3 MR. EVANS: Well, we may -- when we're talking  
4 of them individually, we probably will -- might have  
5 something to say on that basis. I mean, I would like to  
6 reserve the right since I was unsuccessful on getting them  
7 all out. I think if we're going to go over tomorrow  
8 individually, I might have something to say about each  
9 individual document.

10 CHAIRMAN BECHHOEFER: Well, you will be  
11 permitted to do that.

12 MR. TURK: Also, the offer from GANE, is it  
13 only those portions of the documents upon which there was  
14 examination of witnesses, or do we need to look at the  
15 other portions of the documents?

16 CHAIRMAN BECHHOEFER: That's our understanding.  
17 At least, that's what my --

18 MS. CARROLL: Yeah, but I quailed on that,  
19 because there's what you called an interesting term. I may  
20 not understand the negative aspect. The fact that we made  
21 claims things weren't followed up on.

22 ADMINISTRATIVE JUDGE KLINE: I have --

23 MS. CARROLL: And -- I'm sorry, Judge Kline.

24 ADMINISTRATIVE JUDGE KLINE: I have a serious  
25 problem with attempting to prove a negative by the absence

1 of a line somewhere in a document this large. And the  
2 reason is, that we had demonstrated right before us the  
3 error of that approach. It was alleged that something  
4 wasn't followed up on and then I found that in fact in the  
5 following meeting it had been followed up on and it had  
6 just been an error of reading the subsequent document.

7 MS. CARROLL: We acknowledge that.

8 ADMINISTRATIVE JUDGE KLINE: So that indicates  
9 the extreme hazard of making an error by doing things like  
10 that. You have the opportunity to elicit the affirmative  
11 testimony. You can just ask the witness did he follow up.  
12 If he knows, he can tell you. But going through the  
13 backdoor like this doesn't assist anybody. It's not the  
14 best evidence on the matter and the risk of error is  
15 extreme. I mean, we had it displayed right before us.

16 MS. CARROLL: That's why I hate to give up this  
17 use of it because I hope that tomorrow there will be  
18 documentation by reserving -- that GANE -- that has a  
19 backdoor, that they will close that backdoor with proof  
20 that these were followed up on. Proof that is in evidence  
21 that the committee commitments to follow up on this were  
22 met. That they didn't document it in their minutes. Now  
23 by tomorrow, with their staff over at Georgia Tech, they  
24 should be able to produce something that closes that  
25 backdoor. But if we've given up our right, which I think I

1 naively did in making this offer, then they -- then it will  
2 be, you know, just say he said he did, but the committee  
3 didn't document it, so how does anybody verify that?

4 MR. TURK: There's a total disconnect. Number  
5 one, I'm not aware of a commitment to find documents for  
6 GANE. Number two, it sounds like what Ms. Carroll is doing  
7 is saying she does want the whole book in and she's saying  
8 she wants to prove the negative. Well, how does she do it  
9 with just a few documents? It sounds to me like she wants  
10 to put in all -- I make note that I counted 92 different  
11 documents that comprise the NSC record as it appears in my  
12 files. I may be off. It may be 110. It depends on how  
13 you staple them. Anyway, if the offer by Ms. Carroll is  
14 different from what we have heard from Judge Bechhoefer,  
15 and what I believe to be GANE's prior offer, I want to know  
16 that now, and I would ask for a ruling on that offer of the  
17 whole before we get into ruling on individual items.

18 ADMINISTRATIVE JUDGE KLINE: Well answer the  
19 question, are you offering the whole document?

20 MS. CARROLL: Apparently, I'm not being  
21 understood. We acknowledge that we found these documents  
22 to be relevant and asked questions about them today and  
23 they are in the record in that case. But we have made  
24 claims in two cases that they didn't follow up on  
25 commitments that they made, which we see as a management

1 problem. It seems to me that if we reserve -- see, we have  
2 to make that claim based on the fact that we've read all  
3 the minutes and didn't find them. Now, if they come back  
4 tomorrow and say it's in these minutes, you're wrong. Or  
5 in the proposed findings, they say it's in these minutes,  
6 you're wrong. I mean, it needs to be incumbent on them, I  
7 think, to counteract that claim, and we need to be able to  
8 make that claim in order to pressure them to counteract it.

9 ADMINISTRATIVE JUDGE LAM: Ms. Carroll, the  
10 question is, are you offering this document in whole?

11 MS. CARROLL: Well --

12 ADMINISTRATIVE JUDGE LAM: Yes or no.

13 (Pause.)

14 MS. CARROLL: Well, let me put it this way,  
15 yes, but we would reference a small number of them. But  
16 there are two instances where we would say there were  
17 commitments made in minutes we're offering into the record  
18 that weren't followed up on, and I guess it's just up to  
19 them to prove it -- prove that they did if they claim they  
20 did.

21 MR. TURK: Your Honor, the last part of Ms.  
22 GANE -- Ms. Carroll's statement, I would ask for a ruling  
23 at this time on whether the entirety of this document -- of  
24 what's been identified as GANE Exhibit 44 for  
25 identification is to be admitted. I would note that I

1 object to it. There is no relevance going to the entire  
2 document --

3 CHAIRMAN BECHHOEFER: And the answer is no. We  
4 will not accept the whole thing, but we have not been shown  
5 proof of why it's relevant. As I pointed out, there are  
6 least -- well, of the three I mentioned, plus several  
7 others that we thought had been withdrawn relate only to  
8 state matters and we're not going to take them in. It's  
9 dealing with state matters.

10 MR. TURK: And I would note also, Your Honor,  
11 that they've examined on roughly --

12 CHAIRMAN BECHHOEFER: Pardon?

13 MR. TURK: They've examined on roughly 20  
14 documents and there are 90 to 100 documents that comprise  
15 the entirety of it.

16 CHAIRMAN BECHHOEFER: It's our -- we don't want  
17 just a blanket offer.

18 MS. CARROLL: Okay, now, we'll just offer these  
19 -- I've thought it through. I've thought it through again.  
20 I think that we can still go for it the way I was planning.  
21 We'll just offer the ones we talked about.

22 MR. TURK: So the offer of the entire document  
23 is withdrawn?

24 MS. CARROLL: Because I think you --

25 MR. TURK: Yes or no.

1 MS. CARROLL: I don't think -- see, I'm having  
2 a hard time figuring out how to change --

3 MR. TURK: There's a need for --

4 MS. CARROLL: No, we just withdrew it.

5 MR. TURK: You withdrew the entire document?

6 MS. CARROLL: And we're back to the first way.

7 MR. TURK: And you offer individual items?

8 MS. CARROLL: I mean, it's just we're kind of  
9 on a fast track here and I'm worried about giving away the  
10 store.

11 ADMINISTRATIVE JUDGE KLINE: You haven't given  
12 away anything, ma'am. It's already been ruled that the  
13 entire document is not accepted --

14 MS. CARROLL: I kind of heard that point, yeah.

15 ADMINISTRATIVE JUDGE KLINE: -- so it isn't  
16 even an open question.

17 MR. TURK: But then I also heard that she's  
18 withdrawing it. So that eliminates any question about --

19 MS. CARROLL: And entering it -- reentering it  
20 with stipulations of the --

21 MR. TURK: No, what I understand that you're  
22 saying now is that you're going to offer the individual  
23 documents that you believe to be relevant, rather than the  
24 entirety, correct?

25 MS. CARROLL: Yes.

1 MR. TURK: It's withdrawn, Your Honor.

2 CHAIRMAN BECHHOEFER: Okay. Then why don't you  
3 just ask -- I don't know about today or tomorrow, but ask  
4 the witness about whether certain things have been included  
5 or followed up on.

6 MS. CARROLL: Oh, we have. We just don't have  
7 any documentation and, you know, they agreed to, you know,  
8 produce documentation as they choose.

9 ADMINISTRATIVE JUDGE KLINE: You're assuming  
10 that some documentation is going to be provided. We don't  
11 know that that's so. It isn't even required. One way to  
12 produce proof --

13 MS. CARROLL: Well, if that's your finding --

14 ADMINISTRATIVE JUDGE KLINE: One way to elicit  
15 proof is to ask the expert who is here. He can tell you  
16 orally what the answer is. That's one way of proving it on  
17 the record and it's a better way than going through a  
18 remote kind of process asking for a very, very hazardous  
19 inference from the Board. We've already shown how much  
20 error can creep into that method of saying something hasn't  
21 been followed up on because you can't find the lines. That  
22 is prone -- exceedingly prone to error and we found an  
23 error that happened like that today. Now, there is a  
24 direct way to do it, ask him.

25 MS. CARROLL: I don't know why I had a mindset

1 that documentation was crucial in this very complex  
2 industry --

3 CHAIRMAN BECHHOEFER: It may or may not be.

4 ADMINISTRATIVE JUDGE KLINE: In this case, you  
5 have the person who is knowledgeable in the matter --

6 MS. CARROLL: So I guess there's a trust issue  
7 here.

8 ADMINISTRATIVE JUDGE LAM: Well --

9 ADMINISTRATIVE JUDGE KLINE: There's none for  
10 us.

11 MS. CARROLL: The documentation is more  
12 trustworthy than --

13 ADMINISTRATIVE JUDGE KLINE: This man is a  
14 sworn witness before us.

15 ADMINISTRATIVE JUDGE LAM: The fact that you  
16 could not find the follow-up item in whatever you're  
17 reading is not sufficient proof for us.

18 ADMINISTRATIVE JUDGE KLINE: It isn't.

19 ADMINISTRATIVE JUDGE LAM: You may not be able  
20 to find it.

21 MR. TURK: I would also note, Your Honor, there  
22 is no proof that merely because an item doesn't appear in  
23 the minutes that it wasn't discussed.

24 CHAIRMAN BECHHOEFER: Well, that's what I'm  
25 saying --

1 MR. TURK: It may have been followed up outside  
2 of the minutes.

3  
4 ADMINISTRATIVE JUDGE KLINE: Ask the witness.

5 CHAIRMAN BECHHOEFER: Ask the witness.

6 MR. TURK: It may have been followed outside of  
7 the minutes. There may have been follow-up outside of the  
8 committee meeting altogether.

9 CHAIRMAN BECHHOEFER: Well, we realize that.  
10 That's why we suggested asking the witness.

11 ADMINISTRATIVE JUDGE KLINE: Do you wish to  
12 adjourn? It's five minutes after five and you had  
13 somewhere to go.

14 MS. CARROLL: Well this is the most important  
15 thing happening except for my dog and my husband and my  
16 dad.

17 Are we going to wade through this tomorrow  
18 according to Mr. Turk?

19 CHAIRMAN BECHHOEFER: Yes.

20 MS. CARROLL: So we've settled it, I suppose.

21 CHAIRMAN BECHHOEFER: He does have a right to -

22 -

23 MS. CARROLL: Of course. But he agreed that  
24 tomorrow will be fine, so that racks it up for me today.

25 MR. TURK: Can we inquire what GANE expects for

1 cross examination tomorrow?

2 MS. CARROLL: Well, we need to kind of shuffle  
3 through everything and make sure we have a couple of  
4 exhibits to offer. I think three questions, but I would  
5 like to shuffle before we -- you know, make sure we covered  
6 everything. This is sort of a complex challenge to cross  
7 examine our witness.

8 CHAIRMAN BECHHOEFER: Do you think that'll take  
9 about an hour maybe or what?

10 MR. JOHNSON: Not that long. I know -- I  
11 apologize for continuing to get peoples' hopes up, but I  
12 really hope it won't take long.

13 CHAIRMAN BECHHOEFER: I know Mr. Evans will  
14 take some -- and Mr. Turk as well.

15 MR. EVANS: We do have a logistical problem.  
16 Dr. Karam is supposed to be at a rather important meeting  
17 on Monday, which means --

18 CHAIRMAN BECHHOEFER: Well, we're planning on  
19 finishing tomorrow.

20 MR. EVANS: Okay. What I will do -- and I've  
21 already thought about it. I will probably waive cross exam  
22 -- excuse me. I will waive redirect. By doing that, I  
23 will accomplish the avoidance of any recross and I will  
24 move directly to my rebuttal case.

25 CHAIRMAN BECHHOEFER: Okay.

1 MR. EVANS: Also on cross, I would be confined  
2 to the scope -- excuse me, on redirect, I will be confined  
3 to the scope of the cross, and moving directly to the  
4 rebuttal case, I can handle the entire thing together. I  
5 think that will save a little time.

6 CHAIRMAN BECHHOEFER: Right.

7 MR. EVANS: And I am trying.

8 CHAIRMAN BECHHOEFER: Okay. Okay, so with  
9 that, we will adjourn until nine o'clock tomorrow morning.

10 (Whereupon, the hearing was adjourned at 5:08  
11 p.m., to resume at 9:00 a.m. on Friday, June 28,  
12 1996.)

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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: June 27, 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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